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**Social construction of technology, between
policy, sustainability and consumer: the case of
the Italian automotive sector.**

Supervisor

Ch. Prof. Valentina Fava

Graduand

Andrea Benvenuti

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1. INTRODUCTION

We are living through a historical period in which the topic of environmental sustainability and the climate crisis is increasingly gaining momentum and importance. The term green transition appears daily in debates and political announcements.

But what is the process through which a technological transition towards environmental protection takes place? Who decides which path to take? Is it only an ecological choice or do economic and social interests also influence decisions?

These are some of the questions that this thesis will attempt to answer. To do so, two parallel cases of European regulations that have forced the introduction and use of technologies to lower the environmental impact of road transport will be presented. In fact, in the following chapters, the introduction of the three-way catalytic converter in Europe from the early 1990s and the obligation to sell electric cars in the European Union scheduled for 2035 will be explored, explained and analysed. The two cases will be compared and examined in order to understand and break down the process, the forces and the interests behind the implementation of these laws at EU level. An attempt will also be made to understand from which needs an innovation arises, which actors influence the final design of that technology, and the role the end user plays in the success or failure of an innovation. The intricate web of economic, political, social and technological agents and their opposing interests will be analysed. It will be realised that the two cases explained are not only similar in terms of environmental issues, but also in terms of the development of regulations and the forces that have contributed. In addition to a general overview, an attempt will be made to go into the specifics and analyse the case of Italian industry, politics and society in both situations. How did the Italian socio-economic fabric react, influence and respond to the mandatory adoption of the catalytic converter? And how will it adapt to the ban on the sale of internal combustion cars? These topics will be discussed in the following chapters.

Dwelling on the Italian situation will be of extreme interest for several reasons. Firstly, the Italian system has never before been analysed in depth with reference to the European emission regulations of the late 1980s and early 1990s. Moreover, such a study can serve to more convincingly understand the current context and possible scenarios, both Italian and European, in view of 2035 and the ban on fuel-powered cars. In addition, until now, previous literature had mainly focused on the analysis of countries that were more advantaged and ready for the transition to the catalytic converter; the choice to focus on Italy will also help understand the implications and inertia present in a nation more reluctant to change. To do

this, it will be essential to use the foundations of the theory called 'Social Construction of Technology' (SCOT). It is based on the assumption that an innovation, technological progress is not just the work of great inventors or creative people. A new technology is not a godsend. This way of looking at the innovation process is extremely simplistic and inadequate. The world around us is complex and full of a disordered system of powers and influences. The Social Construction of Technology theorises that different actors of different natures interact and influence the final choice and success of an innovation. The innovation process is not unidirectional and rational, but responds to the moods of the macro-environment, which determine its fate. It places extreme importance, through the concept of the 'Consumption Junction', on the end user and his or her interpretation of the technology, also called an artefact. If the environment and audience are not mature, or the artefact does not correspond to consumer needs, it is very likely that the innovation will be a failure.

A number of sources were used to develop the analysis and arguments of this thesis. The research has been based, first of all on a broad interdisciplinary literature review including articles and monographs focusing on green transition in the automotive sector, on the history of business and government relations and of the automotive technology. In addition, it was also useful to examine EU policy papers (white papers) and EU legislation. In order to study the Italian case, in relation to both the late 1980s and the current situation, so as to better understand the context and attitudes of the various social groups, the following was developed a review of relevant newspapers and periodical press.

With reference to the Italian case following the regulations obliging the adoption of the catalytic converter a set of articles of the newspaper La Stampa were used. A series of keywords such as 'catalytic converter', 'unleaded green petrol', 'ecological car incentives' and 'diesel injection' were used to find these sources. The articles retrieved and which will be useful in the following analysis reflect the evolution of nine years, in fact they date from 1986 to 1994.

Instead, articles from mainly three newspapers, La Stampa, ilSole24ore and il Post, were used to investigate the mood of public opinion and its actors in contemporary Italy. To find these articles, the following keywords were used in the databases of the two newspapers: 'electric cars', 'electric cars china', 'batteries china', 'electric cars europe', 'electric cars italy', 'fiat electric cars', 'Stellantis electric cars', 'Tavares electric cars' 'Urso electric cars'. The articles collected are dated from 2019 to 2024.

This thesis will, therefore, analyse two cases of the introduction of technologies to reduce road transport pollution using this perspective and orientation. It will seek to understand what prompted the introduction of the catalytic converter in Europe at the turn of the last century and how this transition was a success; and also, what will be the pitfalls to the implementation of the new regulation on the banning of combustion cars. The parallels that will be created will allow us to grasp all the facets of the context and to understand the possible future developments of the European automotive sector and the centrality of the European Union as an institution.

The first chapter will explain in more detail the contents and concepts behind the Social Construction of Technology. All phases of the innovation process theorised by the SCOT will be explained, from the diversity of interpretation of the artefact by different actors to the gradual consensus towards a certain artefact design.

This section will serve as a scaffold for understanding and decoding the facts and events that will be narrated next. The Social Construction of Technology will provide the tools and notions to critically and interpretatively observe the cases examined.

Following this, the second chapter will study in depth the process that led to the compulsory adoption of catalytic converters for the entire European car industry from 1993 onwards. In the first section, the antecedent and international regulations concerning car emissions will be explained. In the second section of the chapter, the analysis will look at the continental context, chronologically setting out the vicissitudes in Europe that led to the implementation of EU laws. Starting with German environmentalist sentiment in defence of national forests, to the automotive market's need to conform to international standards, to the negotiating role of the various national governments. The last section of this macro chapter will focus specifically on the Italian case. It will analyse the Italian environmental movement, the attitude of politics towards ecological issues and the preparedness of the Italian manufacturing sector to undertake the transition to the three-way catalytic converter. This is a success story of Italian politics and industry, despite a position of disadvantage and incompetence compared to continental competitors. The measures put in place to close this gap and keep the Italian automotive industry internationally competitive will then be listed.

The third chapter will deal with the European Commission's Von der Leyen decision to ban the sale of polluting cars with Regulation (EU) 2023/851. The first section of this chapter will

outline the contents of the law and the political context from which it arose. The second section will outline the importance of environmental movements, in particular Fridays for Future, in the 2019 European elections. These continent-wide protests have reawakened environmentalist sentiment. The European policies implemented by the Parliament elected after those elections and the Von der Leyen Commission are a direct consequence of this. In the third section of this chapter, the economic and strategic reasons that influenced the European institutions' decision to accelerate towards an electric future for road transport will be investigated. In particular, the data confirming China's monopoly in the electricity sector will be listed, a situation that has prompted European leaders to move in this direction, with the aim of keeping the European industry competitive in the future. As in the previous chapter, the fourth paragraph will discuss the Italian political, industrial and social context, in order to understand the real prospects of the Italian automotive sector with reference to the transition to the electric motor.

The fourth chapter will serve as a link. In fact, it will analyse, through the notions of the Social Construction of Technology, the parallelism of the two cases set out above. An attempt will be made to understand their procedural and formal similarities, and their similarities from a social and political point of view. It will be summarised which were the fundamental forces and actors in the development of the final choice, breaking down this process into the stages theorised by the SCOT.

A comparison will also be made between the two Italian contexts; thirty years later, the situation is similar. This similarity may be useful in understanding what policies need to be implemented in order for the transition to electric power to be satisfactory.

Lastly, in the fifth and final chapter, the threads of the themes dealt with in this thesis will be drawn together, attempting to summarise them and set out what the prospects and expectations of the European and Italian automotive sector will be, given the example and success of thirty years ago.

2. THE SOCIAL CONSTRUCTION OF TECHNOLOGY

How is an innovation born? What is the process behind the introduction of a new technology, a new product? What forces come into play? What is the role of consumers?

Over the past decades, legions of scholars have tried to answer these questions, proposing different points of view, different interpretations and different analyses to explain the phenomenon of innovation. To understand, to codify the different steps and moments of the innovation process. From the consumer's need or revolutionary idea to the implementation and marketing of this new invention.

In an increasingly complex and interconnected world, studying these dynamics becomes more and more complicated and exhausting. Understanding the reasons and mechanisms behind the success or failure of an innovation is clearly not straightforward. It is necessary to unpack and break down the process into all its parts, to identify the agents and their different interests that influence the final version of the introduction. Nowadays, the end-user has also gained considerable importance. If the innovation does not convince the consumer, it is unlikely to be as successful as hoped. Especially if it is a technology that will have a major impact on people's lives.

Therefore, it is impossible to think of analysing this web of interconnections and relationships with the deterministic theory of technology. It is now obsolete to reason by believing in the indissoluble dominance of technology in the development of society. It is extremely simplistic and intellectually poor as an approach. Technological progress is not independent, it is not the only true driver of society, its dynamics and values. Technology, new inventions do not come from nothing, they are not the result of a hermetic development that is impervious to other possible influences and influences. Moreover, this theory does not include and exclude influences of politics on technological decisions, a decidedly unrealistic and limiting axiom (Bijker 2009, 9). Technological determinism does not even take into account the consumer, his opinion, his worldview, his values. It does not take into account the culture, customs and habits that a technology will impact. Technological determinism is a model that reasons in watertight compartments, with specious assumptions that lead only to a fallacious and distorted view of the world and progress.

Innovation is not a godsend, the result of a simple flash of genius by an enlightened inventor, but the product of a complex process consisting of several attempts, successes, failures, power and influence games. To fully understand it, it must not oversimplify it. One must

maintain a heuristic view of the process, understand all its many components and moments. Schumpeter, in his early studies, was wrong to consider the entrepreneur or inventor the only true promoter of innovation. Perhaps this consideration might have made sense at the beginning of the industrial age, when the role of the business owner was predominant. Now, in a globalised world, the innovation process involves economic, scientific, business, political and social agents.

In order to explain these relationships and how they affect the evolution of a new technology, the so-called Social Construction of Technology (S.C.O.T.) theory was developed in the 1980s. The term 'Social Construction' was first used by the sociologists Berger and Luckmann in their 1966 essay 'The Social Construction of Reality'. In it, they expounded the theory that knowledge is in effect a social construct and that social institutions are an effect of this process (Bijker 2009, 2).

This concept was taken up again almost twenty years later by a number of scholars to form the theory of the Social Construction of Technology. The fathers of this model are considered to be the Dutchman Wiebe Bijker and the Englishman Trevor Pinch. They published an article in 1984 entitled 'The social construction of facts and artefacts: or how the sociology of science and the sociology of technology might benefit each other', in which they outlined all the principles of this theory.

The Social Construction of Technology arose from the union and tradition of three different paths of study. Firstly, from the Science-Technology-Society (STS) movement, which arose in the 1970s in northern Europe and the United States of America with the aim of studying the implications of technology on society. Another branch of study from which the SCOT took its cue is the sociology of scientific knowledge (SSK), which originated in the late 1970s in the United Kingdom and was based on the sociology of knowledge, the philosophy of science and the sociology of science. In addition, so was the history of technology; historians and scholars of this discipline were beginning to ask questions at a sociological level at that time (Bijker 2009, 3).

What is special about the Social Construction of Technology is that it is an interdisciplinary model. Indeed, in it we find, as has just been mentioned, components of sociological, engineering, economic, historical, political science and marketing studies. This makes it

possible to analyse the complex web of interdependencies and influences that generate a new technology and decree its failure or success. Furthermore, the SCOT assumes that the innovation process is not a linear evolution, but instead a succession of obstacles and changes influenced by the various social, political and economic agents on this intricate stage. It is characterised by a succession of variations, selections and attempts until the final design of the technology is achieved. A complex evolution that takes years, if not decades. Thus, SCOT is defined as a multi-directional view of the innovation process. Its empirical method is but an adaptation of the Empirical Programme of Relativism (EPOR), which originated in the sociology of scientific knowledge. With it, the focus on explaining scientific development shifts from the Natural World to the Social World (Bijker and Pinch 1984, 12). Technological progress is also permeated by other disciplines.

At the heart of the Social Construction of Technology are the various agents, referred to by Bijker and Pinch as 'relevant social groups' (Bijker and Pinch 1984, 18). By this term, the two scholars define groups of people and institutions that have a connection to the artefact, i.e. the new technology in its primordial state, and have the power to modify or influence the design or the characteristics it will have at the end of the process. The detailed description of these 'relevant social groups' is a key step of the SCOT, as this allows us to define the relationships of the various agents with the innovation and what problems they detect in the artefact. Among the most obvious are the producers and consumers of the technology. To this, however, one must also add political agents, other economic agents who might be affected and social agents who might have certain interests. Not all 'relevant social groups' are easily identifiable. And within them there may also be internal divisions. Therefore, not all end users will have the same opinion and view towards the artefact. Each 'relevant social group' has a different problem with the artefact, and will therefore try to influence the process so that the final innovation meets its desired criteria.

The Social Construction of Technology, for its analysis, takes up concepts of the so-called technological system, i.e. the set of parts that constitute the artefact. In particular, the SCOT adopts the work of Thomas Hughes, according to whom the technological system is also the ensemble, not only of the technical components, but also of the social, organisational, economic and political elements that make up the artefact (Bijker 2009, 4).

A founding concept of the Social Construction of Technology is the absolute symmetry of judgement between all agents that play a role within the innovation process. There must be no a priori preferences, neither for a group per se nor for its idea of the artefact. Only in this way can there be an objective analysis of the evolution of technology (Bijker 2009, 6).

Thus, as mentioned, the first step in the Social Construction of Technology is to define the 'relevant social groups' and to understand their interpretations of the artefact. Bijker and Pinch used EPOR's own term, i.e. 'interpretative flexibility', to describe the multitude of possible constructed representations (Bijker and Pinch 1984, 22). Each 'relevant social group' describes technology and its elements in its own way, depending on cultural background and different interests. Thus, there are different artefacts, one for each interpretation, one for each social group.

Understanding what different groups of people think about the artefact will be crucial to understanding how they acted and influenced the innovation process that then led to a final practical and technical solution. The 'technological frame' is defined as the set of all the elements that influence the interaction between the 'relevant social groups' and the artefact. Through the 'technological frame', users give meaning to the technology, attributing problems and theories to it (Yousefikhah 2017, 7).

Given these assumptions, Social Construction of Technology studies, as mentioned above, the non-linear process of creating the finalised innovation accepted by most 'relevant social groups'. What usually unfolds is a process in which each social group tries to make its own benefit prevail, so as to best solve problems with unfinished designs. It is a confusing and random process, which often does not follow rational logic. The final choice is the result of compromise, forcing and accident. But a focal point of the SCOT is the importance of the end user. Indeed, SCOT gives the consumer an active role, which the deterministic view of technology excluded a priori. Society and users are responsible for and participate in the innovation process. The social norms, beliefs and fears of a culture can play an important role in the selection of the decisive design.

In fact, the Social Construction of Technology is closely related to the concept of the 'Consumption junction', described by Ruth Schwartz Cowan (Bijker et.al. 2012, 253). This term is linked to the idea of successes and failures within the innovation process. In fact, according to the idea of the 'Consumption junction', time and place are crucial for the success of a certain technology. The concept behind the principle of 'Consumption junction' is extremely intuitive: a technology, an innovation will only be accepted by the end user if it conforms to their needs, their cultural background. The insertion context of the innovation is crucial for its success and affirmation. This means that it is not always certain that the best possible technology will ultimately be the one on which the final choice will fall, in complete

contrast to the deterministic view of technology. It is not predominant, consumer decisions are. So an innovation that is successful in a certain place at a certain time may have the opposite result in another context. The environment commands the technology.

The second step in the Social Construction of Technology Theory concerns the analysis of the choice of the final design by the 'relevant social groups'. Bijker and Pinch take the concepts of 'closure' and 'stabilisation' from EPOR (Bijker and Pinch 1984, 27). After a phase of comparison between the 'relevant social groups', consisting of failures and successes of different technologies, there is what is called 'closure'. This term signifies that a consensus is being created, with respect to a certain interpretation of the technology, between different 'relevant social groups'. It therefore means that a particular design is asserting itself over other proposed alternatives, as it begins to meet the expectations and doubts that the relevant social groups had placed in their idea of the technology in question.

Closely related is also the concept of 'stabilisation'. By the time the final design of an innovation has spread among the relevant social groups, its components forming the technological system reach a certain degree of stabilisation, become defined, clear. This means that the design of the innovation has connotations that are recognised and accepted by the relevant social groups. Thus, the improvement of the artefact, until there is a new radical innovation that upsets the interpretation of that technology, will only be incremental. The problems that users previously attributed to the artefact are gone, or rather have been solved in the new interpretation of the technology.

Many branches of study have developed from the Social Construction of Technology theory. One of these, which is useful for the purpose of this thesis, analyses the dynamics relating to transitions, innovations responsible for radical change from a technological and social perspective. This field of study has also focused on examining in detail the development of technologies responsible for a sustainable transition. It stems from the work of researchers Frank Geels, Johan Schot and John Grin.

Like the SCOT, their approach involved the interpenetration of technological and scientific dynamics with those in the social and political environment. It is based on a co-evolution between technology and society, founded on mutual adaptation and dialogue between technology and end users. Again, the evolutionary process of innovation is not linear, but dynamic, built on multiple interactions and trajectories. It is not technology that plays the leading role in such progress, but there is an interweaving of socio-cultural, political, scientific and economic forces.

Geels and Schot have therefore developed an approach called Multi Level Perspective (MLP). This view, divides the environment of innovation development and application into three stages, micro, meso and macro level. The three levels identified by Geels and Schot are the technological niches, the socio-technical regimes and the socio-technical landscape (Grin et.al. 2010, 19).

Niches are the level from which radical innovations arise. It is the least stable level, characterised by uncertainty. This is because social networks are relatively limited and consist of entrepreneurs and innovators trying to emerge from the technological niche where they are.

In contrast, socio-technical regimes and socio-technical landscapes have a more stable configuration, as they involve more complex and structured systems and relationships. In particular, in the regimes we find the network made up of economic, political, market, cultural and scientific actors, however with a certain degree of specificity in the reference sector. The socio-technical landscape, on the other hand, is the highest level in terms of heterogeneity and generality. It encompasses the socio-cultural context in its entirety.

According to the MLP, for there to be innovation, an alignment between the three different levels is necessary. This alignment is called the window of opportunity. It arises when there is a change at the macro and exogenous level, in the socio-technical landscape. Such an alteration creates pressure in the socio-technical regimes, as the opportunity opens up to create a novelty, an innovation.

Innovations proposed in niches therefore find fertile ground at the higher level and succeed in gaining credit and success at the social, economic and political level. These adjustments in the context of the regime will also influence the macro level and society as a whole.

This is the process, according to Geels and Schot, that leads to the success of a radical innovation, which will lead to a transition from the past. Agreement and alignment between different interests and forces is necessary.

The theories of the Social Construction of Technology, the Consumption Junction and the Multi Level perspective will be very useful and fundamental in analysing the issues that will be set out in this thesis.

Understanding the dynamics behind the introduction of technologies that will change people's lives forever is clearly not an easy task. This is the case with the catalytic converter during the 1980s and 1990s in Europe and with electrically powered cars in the present day. Understanding the forces, agents and reasons that drove the introduction of these

technologies is the primary objective of this thesis. Studying how it came to be decided that such innovations would be the most suitable solutions for the future of road transport is preparatory to understanding which social and institutional rules technological progress follows. It is also interesting to analyse these two particular cases for two simple reasons. Firstly, these are two decisions taken by European institutions with environmental protection at their core. The topic of energy and ecological transition is extremely topical and as never before important. Therefore, understanding what is behind it, what influences have conditioned such radical environmental regulations, will be extremely useful in order to critically and analytically observe the events of the present and the near future.

Moreover, although imposed by an institutional authority, such decisions have marked and will mark a decisive upheaval in many economic activities and in the daily lives of many people. Their impact has been and reasonably will be revolutionary. Thus, for its complete success, the innovation in question must be accepted by all 'relevant social groups', which in this case are numerous and diverse.

In fact, both cases are characterised by the presence of many 'relevant social groups' that have conditioned, with their power of influence, or tried to condition the final decision, trying to make their interests prevail over those of the other social groups.

In the first instance we find the citizenship and environmental movements. Both in the 1980s, particularly in Germany, and at the end of the 2000s, European squares were filled with environmentalist protests and demonstrations clamouring for the political class to intervene in defence of the environment and health. The merit of these movements was that they brought environmentalist battles into the public debate, and thus also onto the political agenda, giving impetus to the introduction of cleaner technologies in the automotive sector. Below we find the automobile companies, with their purely economic interests. It should be emphasised at the outset that the automotive sector in each European country has different characteristics and peculiarities, whether in terms of the advancement of research and development, the differentiation in production or the different target market. Therefore, each national sector had different demands, which often clashed with those of European competitors. This means that in both cases, there were companies that pushed and fostered the ecological revolution and others that tried to limit its impact.

From this we can deduce the different approaches of different national governments. The first objective was to defend the interest of their own automotive sector in the European forum. However, in addition to this, governments also had to balance their action with

reference to the pressure from environmentalist circles on the one hand and motorists, who were pushing for inertia, following the famous rule of 'path dependency', i.e. fear of change. The motorist, thus the one who was supposed to be the end user of less impactful cars, is crucial in this narrative and analysis. Understanding their point of view is crucial to understanding the real prospects for success of the technology in question.

The European summits, on the other hand, had and have the arduous task of mediating all these interests. The clear orientation of the European Commission and Parliament has always been the common welfare of the member states. So for some nations and for some governments, European summits have represented the part of the 'bad guy', of those who impose a decision that goes against economic and social interests. The role of the EU institutions has always been a delicate one, as they had to agree in principle with practically all countries within the Union and enforce these regulations effectively, even in hostile or unready nations. In the 1980s and 1990s, the EU leadership and the various national governments took concrete steps in this direction. It remains to be seen whether this will also be the case with the compulsory sale of electric cars, managing to overcome resistance from consumers and some political camps.

3. EMISSION REGULATIONS OF THE 80s AND THE 90s

3.1 HISTORY OF EMISSION REGULATIONS

The western countries, in the second postwar phase, were characterized by an economic boom, a surprising growth of the population welfare and of the industrial capabilities. This increased wealth led to a natural increase in demand for cars, which became a true mass commodity in the 1950s. The direct consequence was an obvious increase in exhaust emissions in the cities or more industrialised areas. This growth in pollution soon became a major public health problem as air quality deteriorated. Research established that HC and NO_x were precursors to urban smog, and many cities had elevated concentrations of CO. Therefore, some governments began to worry about regulating car emission levels as early as the late 1950s, also pushed by public opinion and activists (Ballor 2023, 6 ; Klier and Linn 2016, 2; Smith and Davies 1996, 2; Gerard and Lave 2005, 5). The first country that implemented emissions standards was Japan in 1966, introducing limits for carbon monoxide emission (Ballor 2023, 10).

Also the United States of America was one of the international forerunners, in particular California, a state with a high pollution rate due in part to the conformation and climate of the Los Angeles basin. Suffice it to say that already in 1959, the state of California enacted the Motor Vehicle Pollution Control Act introducing limits on car emissions for the first time in the States (Klier and Linn 2016, 2). These regulations imposed the use of positive crankcase ventilation (PCV) valves for 1963 vehicles and set performance standards for 1966 (Gerard and Lave 2005, 6).

In the 1965 the California's HC and CO emission standards passed at the federal level, coming into force in the 1968 (Klier and Linn 2016, 3).

In the 1960s, the US government passed a series of measures at the national level: the Clean Air Act in 1963, allocating funds to technology research, the Motor Vehicle Air Pollution Control Act in 1965, the National Traffic and Motor Safety Vehicle Act in 1966.

However, the most important American legislation were the Clean Air Act amendments of the 1970 with the contemporary creation of the Environmental Protection Agency (EPA), whose role was to administer and enforce the limits (Ballor 2023, 7; Smith and Davies 1996, 2).

The 1970's Clean Air act gave the power to the federal government to impose and develop emissions standards both for industrial and passenger vehicles, and most importantly, for

domestic producers and exporters alike. In addition, it provided a cut of the 90 percent by 1975-1976 of the emissions of carbon monoxide (CO), hydrocarbons (HC), and nitrogen oxides (NOx). However, the implementation of these requirements was delayed until 1983 (Ballor 2023, 11).

In the following years, all parties, so both car manufacturers and legislators, agreed to abandon the use of fuel additives such as lead, given its harmfulness to health. In fact, this decision led to the acceptance of the introduction of catalytic converter technology. The implementation of the latter made it possible to lower the emission of hydrocarbon and carbon monoxide. The first models fitted with catalytic converters appeared in the United States in 1975 and by the end of the decade all vehicles sold were in fact obliged to use the use three-way catalytic converter, capable to also reduce nitrogen oxides emissions (Klebaner and Ramírez Pérez 2019, 22; Gerard and Lave 2005, 3).

And what about Europe? The European countries initially lagged behind their international competitors, as Japan and United States. During the 1960s, there were a few isolated countries that implemented the first legislation regarding car pollution. For instance, Germany imposed emission limits in 1967, which became effective in 1968. Germany was soon followed by France, which approved norms that limited the level of carbon monoxide emission (Ballor 2023, 8).

It is very important to mention the case of the Stockholm Group. It consisted of a group of predominantly non-EEC countries led by Sweden, which from 1984 began discussing the possibility of aligning with American standards on lead-free petrol and emissions. Among these countries, Switzerland decided to adopt the US limits in 1987, Austria and Sweden in 1988 (Näsman and Pitteloud 2022, 17).

In spite of these individual cases, what was really missing was a collective European approach with the aim to maintain European automotive industry competitive in terms of technology and global sales. The European Economic Community failed to impose a common emissions policy, a “Global Approach”, which could overcome the market fragmentation and technical barriers until the mid-1980s (Klebaner and Ramírez Pérez 2019, 9; Ballor 2023, 10).

The first timid attempt of Community regulation was the Directive 70/220/EEC of 1970. It consisted of weak restrictions on emissions, far removed from those imposed in the United States in the same year. Nevertheless, it represented the foundation of a common European

emissions policy, as countries that failed to meet the standards would be punishable by the Commission and the European Court of Justice (Ballor 2023, 10). Afterwards, the first real step towards standardisation with the US83 standards, after a long mediation process, was the so-called Luxembourg Compromise of 1985 (Ballor 2023, 17; Holzinger 1995, 4). This agreement mainly existed due to pressure from Germany and the other Nordic countries. As will be seen in the next chapter, Europe was essentially divided into two blocs, with opposing positions. These positions were supported by economic, political but also social reasons dictated by the different cultural and industrial fabrics of the different countries.

The introduction of stricter regulations and thus the compulsory implementation of the catalytic converter would have favoured Germany, already a leader in Europe in this technology given the important exports to the United States, but would have damaged France and Italy, countries producing small cars and thus more subject to a relative increase in production costs. Furthermore, an environmental movement and culture had long been structured in Germany, particularly after the effects caused by acid rain on the Black Forest (Arp 1995, 93). In Italy, on the other hand, there were no major political parties with an environmentalist perspective and Italian sentiment towards environmental protection was inconsistent.

The German threat to implement the restrictions individually and to structure a tax incentive scheme was the fundamental push that led to the 1985 agreement (Arp 1995, 241). It was decided that the common standards should have a progressive implementation, with several coming into force from 1988 to 1993 (Ballor 2023, 17). The Compromise envisaged a division of regulations into three distinct vehicle classes, distinguishing the car category according to size. De facto, the new norm imposed to the large cars, market sector dominated by German firms, to comply with the 1983 American regulation and the implementation of the three-way catalyst from 1989 (Holzinger 1995, 10; Ballor 2023, 17). The German government, for its part, obtained the possibility to design its program of tax incentives for “green” cars (Arp 1995, 245).

Instead, medium-size automobiles had less stringent emissions limits, so producers were not obliged to apply the catalytic converter technology for this vehicle class. Regarding small cars, the standards were divided into two stages of effectiveness; firstly 1990, it provided very low limits; secondly 1992, the restrictions had not yet been decided (Holzinger 1995, 10). It was, therefore, an unambitious and loose agreement.

For this reason, Denmark, the nation most strongly convinced in the usefulness of strong requirements, withdrew the agreement, blocking its implementation with its power of veto

until 1987, when the unanimity rule in the EEC was overcome with the Single European Act (Ballor 2023, 18; Holzinger 1995, 12; Arp 1995, 246). From that moment on, a qualified majority in the European Council was required to pass measures on car emissions. This led to an acceleration and increase in restrictions, towards the goal of homogenising standards with those of international competitors.

Thanks to the fundamental push by the European Parliament, in the summer of 1989 Directive 89/491/EEC, also called the Small Car Directive, was passed. It provided for the use of catalytic converters also for small-sized automobiles (de Lassalle 2008, 21; Arp 1995, 256).

The last step in a process initiated with the Luxembourg Agreement of 1985 towards uniform standards was the so-called Consolidated Directive of 1991, which extended the implementation of the three-way catalytic converter to all new vehicles registered, also medium-size cars, from 1 January 1993 (Arp 1995, 256; Klebaner and Ramírez Pérez 2019, 18).

3.2. THE FORMATION OF THE CEE LAWS AND THE DIFFERENT POSITIONS INSIDE THE CEE

What can be the reasons for a government to force the adoption of a technology? Where did the European acceleration in the 1980s towards cleaner mobility come from? This section will attempt to answer these questions. In fact, we will analyse why Germany and other European countries insisted on stricter emission limits and the importance of the pressure these governments had within the EEC dynamics in ratifying the European standards in the late 1980s and early 1990s.

First of all, it must be emphasised that the case of EEC regulations in the 1980s is emblematic of how different forces and causes influence each other in the process of innovation and technological change. Social, environmental, economic and political motivations. And how, in the different member states of the European Community, depending on social, political and industrial attitudes and sensitivities, there were different reactions and positions. Let us be clear, innovation is not manna from heaven, but is the result of a complex interaction between different agents and institutions in which end customers play a crucial role. This is the foundation of the theory of Social construction of technology (S.C.O.T.).

The process towards the approval of European regulations on car emissions and towards the adoption of catalytic converter in the European market probably had its origin in the German social and cultural fabric. Here was the fuse that triggered a domino effect that led to the EU agreements of the late 1980s and early 1990s, laws that were also fundamental in setting the balance and dynamics of what would later become the European Union. It all came about due to a case of environmental degradation that stirred the consciences of the German population.

In fact, the extensive literature on the case traces the growing concern for German environmental protection, first socially and then also politically, to the so-called *Waldsterben*, a German word that literally means forest decay (Milor 2022, 2; Arp 1995, 88; Klebaner and Ramírez Pérez 2019, 9). It is estimated that more than thirty percent of German forests were in a state of decay in 1983.

This worrying phenomenon had its peak and its greatest outcry in the early 1980s. It was partly caused by acid rain and poor air quality, effects of high air pollution from car exhausts and, mainly, from industrial plants. Although the manufacturers rejected the accusations, a

number of studies came out at the time proving the connection between environmental damage and the gases emitted by vehicles.

The *Waldsterben* became a national case and the media were soon filled with pictures of damaged trees and diseased forests. The magazine that triggered the collective anxiety was the "Der Spiegel", which published a series of articles on the subject in the winter of 1981.

Newspapers and television stations set up a veritable horror story about the phenomenon. This exposure of the problem meant that the German population's concern and anxiety about environmental protection grew as never before. In fact, it is no coincidence that during the 1980s, according to Hofrichter's study (1990, 10), German citizens were the closest Europeans to environmental issues, more than eighty per cent described the environmental problem as urgent and immediate, putting it at the top of the most important issues throughout the decade, with more than sixty per cent of people believing it to be so in both 1983 and 1986.

Therefore, it was natural that activist groups organised themselves to demonstrate and take on the concerns of the German population. The best known of these collectives was Robin Wood, founded in 1982 by former Greenpeace members. Their input and engagement in the public debate through their protest activities was crucial in convincing the authorities to take countermeasures against the increasingly evident environmental degradation of the Black Forest.

Another demonstration of the German public's concern for environmental issues was the growing consensus of the Green Party, which managed to enter parliament in 1978 and became increasingly important in the dynamics of German politics over the next decade.

Popular pressure pushed the environmental issue onto the political agenda. A clear example of this was the federation president Karl Carstens, who showed his concern when confronted with images of deteriorating forests. The Catholic-Liberal government led by Chancellor Helmut Kohl also took on the problem, amplifying the dramatic narrative and national anxiety. The goal of the government and in particular of Interior Minister Friedrich Zimmermann, who made the battle his own, in particular by pledging to implement standards that would more stringently regulate automobile emissions (Arp 1995, 98).

At this point, it is important to add a piece to the jigsaw puzzle, namely to discuss the economic dimension of the situation and to understand why the introduction of emission-reducing technologies would not be a major detriment to the German automotive sector after all.

It can be said that the situation was in fact favourable, at least compared to other European countries, for the spread of unleaded petrol and the catalytic converter; it must be specified that this technology did not work with fuel containing traces of lead, so their introduction onto the market was connected.

The German industry was the leading European exporter in the 1980s. In fact, in 1984, sixty-eight per cent of the cars produced in the Federation were then sold in foreign markets, of which fourteen per cent were sold in the United States of America, where the catalytic converter was already adopted (Arp 1995, 130). Thus German car manufacturers and companies such as Bosch and Degussa were already continental leaders in the production of three-way catalytic converters and thus ready to make the step to mass production in Europe as well (Ballor 2023, 15; Klebaner and Ramírez Pérez 2019, 10).

Another characteristic of the Teutonic automotive industry was its specialisation in the production of large cars; data from 1984 says that more than seventy-five per cent of the vehicles built in the country had an engine capacity of over 1.5 litres (Arp 1995, 133). These types of cars were less sensitive to the cost increase, both in absolute and relative terms, due to the installation of the three-way catalytic converter than smaller automobiles. This fact, in view of a future tightening of emission standards, certainly favoured the German industry as French and Italian companies specialised in the production of smaller vehicles, sold mainly in domestic markets.

The goal of the German government was to arrive at legislation that would make lead-free fuels and catalytic converters mandatory by 1986. 1983 was the pivotal year for the acceleration in strategy and planning towards this historic step. In this year, two of the most important automotive groups in the country, namely Mercedes and BMW, gave their support to the possible use of catalytic converters. This announcement was proof of the possible realisation of the German institutions' intentions (Arp 1995, 97). Both government and industry agreed on the importance of trying to forge a common approach throughout the European Economic Community, so as not to break up the continental market and to remain technologically competitive internationally.

The German government was aware of the possible hostility and resistance at the European Council. In the course of 1983, it began lobbying in the European forum demanding a ban on leaded petrol and the implementation of US83 limits for car emissions, using the best available technology, the catalytic converter. The European Council then instructed the Commission to write proposals for a directive regulating these topics. The biggest supporters of the German policy were the Netherlands and Denmark, countries without an automotive industrial tradition, so they would not suffer economically with any regulation, and with a high popular sensitivity to environmental issues (Hofrichter 1990, 9). In the 1980s, in these two northern European countries, more than ninety per cent of the population considered environmental protection a fundamental cause to be pursued, and in both 1983 and 1986 it was perceived as one of the three most important problems for state authorities to deal with.

In the spring of 1984, the European Commission prepared and submitted to the Council two proposals for directives concerning the two issues. First, it proposed a ban on leaded petrol from 1986 onwards, with final removal from the market in 1989. On the other hand, as far as emission limits were concerned, the Commissioners intended to embrace the US83 standards for the entirety of new registrations from 1995, but first imposed a gradual tightening in 1989 (de Lassalle 2008, 17).

The first proposal found virtually unanimous support among all member countries. On the other hand, the Commission's proposed consolidation of emission limits aroused the cold shoulder of those countries traditionally more tied to the sale of small to medium-sized cars, such as France and Italy. First of all, companies in these countries did not have the export power to the US that their German counterparts had. In fact, French automakers had a 4 per cent share of exports to the US market, while Italian automakers had a 2 per cent share. So they were still lagging behind in terms of research and use of the catalytic converter. Furthermore, as described above, smaller cars were more prone to increased costs, and thus prices, with the eventual use of the three way converter. The Italian industry produced more than seventy-six per cent small to medium-sized vehicles, while French companies produced more than sixty per cent (Arp 1995, 133).

The United Kingdom was also against the German and Commission proposals, for a number of reasons. First of all, from a social point of view, the public did not feel the anxiety and need to undertake a policy aimed at environmental protection, at limiting car emissions. In 1983, only thirty-four per cent of the British population considered environmental protection

as one of the main problems to be solved (Hofrichter 1990, 15). Thus the popular action present in Germany was lacking. The climate of hostility was also present in the British automotive industry. Indeed, given the scientific doubts about the effectiveness of the catalytic converter that hovered in the public debate, British car manufacturers preferred to invest in the lean-burn engine. In addition, Ford and Rover, the two companies most active in opposing German and EU policy towards the adoption of the three-way catalytic converter, were manufacturers of small and medium-sized cars. Margaret Thatcher's British government was therefore committed to defending the interests of its companies in this sector (Arp 1995, 161).

In addition, the road transport sector was crucial to the economic structure of the old continent. Indeed, in the seven countries belonging to the European Economic Community, in 1983 it contributed four per cent of the gross domestic product and employed more than four and a half million people (Moguen-Toursel 2023, 4). For these reasons, the hostility of the governments of these countries to the European proposals and to the activism of the German representatives is understandable and explicable.

The French government decided to play its negotiating cards to make its hostile position prevail against German pressure. It therefore decided to veto the Commission's proposal on unleaded fuel, with the almost declared intention of increasing its weight in the negotiations on car exhaust emissions and the use of catalytic converter. Without an easing of the German institutions' stringent demands, the Paris representatives would not have budged from their position of rejection (de Lassalle 2008, 18). Only an agreement that brought the two visions closer together in a compromise could overcome this impasse.

In view of the momentary impossibility of pursuing the rigid line in the European institutions, the German government was forced, in order to achieve its goal of a European Community policy on emissions regulation and to respond to domestic pressure, to force its hand. At the end of 1984, Chancellor Kohl reiterated Germany's desire to introduce unleaded petrol from 1986 onwards and criticised the Commission's proposals, which he said were too light and with obligations that were too far in the future (Moguen-Toursel 2023, 20).

So the government in Bonn decided to go its own way. This choice was decisive for a definitive shift in European organisation, politics and the market. The most important European automobile industry, or rather the government that represented it, decided to leave its continental competitors behind. It was a risky decision, because the possible

consequences could have a negative impact on the entire European automotive sector, increasing barriers to entry and with clear counterproductive effects for consumers. It was also a considerable setback towards the prospect of a single European market. In September 1984, therefore, the Kohl government decided to embrace the US83 standards from the beginning of 1988 for large cars and for the entire fleet from 1989 (Arp 1995, 243). The organisation of German automotive manufacturers, the VDA, questioned the federal government's choice, but managed to convince the institutions to introduce a system of tax incentives to encourage the purchase of cleaner cars (Klebaner and Ramírez Pérez 2019, 11). In German plans, the support system was to come into effect from July 1985 (Arp 1995, 115).

The French response was not long in coming. In fact, at the end of January 1985, the government in Paris adopted a detailed notice in order to delay the effectiveness of the German public supports. According to France, Italy and the United Kingdom, they represented a clear violation of the EU trade policy in the 1957 Treaty of Rome, which founded the EEC (Klebaner and Ramírez Pérez 2019,11; Ballor 2023, 16; Moguen-Toursel 2023, 21).

The Commission engaged in a delicate and in-depth analysis of the measures to check whether they had actually broken EU laws. Within the European government there were different views on the issue. According to Competition Commissioner Peter Sutherland there was no violation of the European Treaties, unlike Industry Commissioner Karl-Heinz Narjes who ruled that the German tax incentives were in fact contrary to European market rules. The government in Bonn attempted an appeal in vain, arguing that state aid would not distort the market given its limited contribution.

Therefore, the German institutions were forced to dialogue with the other EEC governments, in particular with France to find a solution and a common agreement (Ballor 2023, 14).

Convincing France and the bloc of countries hostile to regulation would have been difficult. The French and Italian governments were opposed to the introduction of standards for small cars, the government in London, on the other hand, was against emission controls for medium-sized cars. Instead, as mentioned, there was virtually unanimous agreement on lead-free petrol. Germany still wanted to insist on the approval of its own tax incentive scheme, seen as a tool to help the conversion to catalytic converters, despite the tough stance taken by other European countries (Arp 1995, 245).

The final talks towards began in March 1985, with the environmental council on 7 and 8 March. Despite nineteen hours of sitting, the desired compromise was not immediately reached. What emerged was that Germany had to abandon its demands on the adoption of the US83 standard for smaller cars and the introduction of the catalytic converter by 1989. There was, however, an openness towards German state aid, even before the adoption of EU limits (Arp 1995, 245; Proni 1985).

Two weeks later, in a new council, the Commission tried to propose a final median solution. The plan was to divide the emission restrictions into three car classes, with different limits and different entry into force. The government in Bonn succeeded in gaining the adoption of the three way converter for the vehicles of big sizes, niche in which Germany was the European leader, and the approval for the state incentives, although it was forced to revise them and weaken them.

The final agreement on the actual standards to be adopted in the EEC was then found at the European Council on the 27 June 1985, with the so-called Luxembourg Compromise.

The importance of the Luxembourg Compromise is clear. It was in fact the first response of European Community policy to the social, cultural and industrial drive, particularly from Germany and other intransigent countries.

Environmentalist sentiment and awareness was growing steadily in Europe throughout the 1980s, especially after the Chernobyl disaster of 1986. The damage of pollution and its effects on health were now known, studied and explained. Institutions could not therefore stand idly by in the face of public concern and public opinion.

On the other hand, the strength and power of German car manufacturers also played a not inconsiderable role in the legislative process. German industry is traditionally the locomotive of Europe, with the automotive sector playing a leading role. It was crucial for German companies to push and lobby for the adoption of the catalytic converter, a technology for which they already had considerable know-how, in order to conform to international standards and increase economies of scale.

Added to this were the benefits of sharing a common policy and boundaries with other European states, laying the foundations for the single market and the European union.

The crux of this argument is thus even clearer. The introduction of a new technology, of an innovation, is complex at all stages. In the phase of forming the need, the new idea; in the phase of negotiating and developing the solution; and finally in the phase of implementing the innovation. At each moment of this process there are different forces and agents at play, who with their interests and attitudes can make the innovation fail or change. The Social Construction of Technology is a perfect tool to understand the complexity and interactivity of this development.

In fact, the Luxembourg Compromise was but the first brick in a regulatory process that ended in 1992 and still has its effects in European emissions decisions. It envisaged, as previously mentioned, the Community adoption of unleaded petrol from 1989, since France had withdrawn its veto, and Community standards for exhaust gases from cars. First of all, as already mentioned above, the agreement provided for a decoupling of the limits in the three vehicle categories identified in the Commission's March proposal. At the council meeting in June 1985, the two blocks of countries still clashed over the final definition of these standards. The Commission presented a basis for discussion whereby the US83 standards would be implemented for all cars, with different entry into force depending on whether the model belonged to the taxonomy decided on at the previous meetings. The northern countries Germany, the Netherlands, Luxembourg and Denmark demanded stricter limits in terms of timing. Greece also insisted on tighter regulations on small cars, as it was committed to alleviating the major pollution problems in the capital Athens. On the other hand, Italy, Great Britain, France and Belgium found the commissioners' proposal unacceptable and inadmissible, given the inability of their domestic industry to meet and adhere to the proposed standards (Arp 1995, 246).

Finally, both sides made concessions and an agreement was found. What emerges, however, is that all states achieved something at the end of the negotiation, defending the national interest and that of their industry.

Despite the symbolic value of the compromise, it was nothing more than a weak and unimpressive understanding. It was based on the concept of optional harmonisation, so in fact states were not obliged to respect the agreed limits. The Commission's primary goal was to standardise and liberalise the European market, not the environmental protection (Arp 1995). The agreement therefore included the introduction of the three-way catalytic

converter for all new large car models from 1989. Germany adopted this technology from 1985, also thanks to the implantation of state tax incentives, which had the approval of the other European partners.

Medium-sized and small cars were a different matter. Great Britain and France managed to let their own interests prevail. For small cars, with an engine cubic capacity of between 1.4 and 2.1 litres, the limits were much less stringent and only technologies such as oxidation catalysers or lean-burn engines were required to achieve them. For smaller vehicles, it was decided to set emission targets in the medium term now. In fact, the constraints were divided into two different entries into force; in 1990 easily respectable standards would be introduced, while in 1992 stricter limits would be introduced, the determination of which was to be decided by 1987 (Holzinger 1995, 10).

The agreement was coolly received in Germany and Denmark. The German car manufacturers were relieved that the government had finally reached an agreement in the European Union without being forced to make an unequivocal decision and without disrupting the European market. On the other hand, the Green Party harshly criticised the Catholic-Liberal government for deviating from its intention to introduce the US83 standards as soon as possible and for bowing to the interests of other governments.

Denmark, instead, took the decision at the European Council of Environment Ministers in November 1985 to veto the June agreements. It did so on the grounds that the deliberate standards were too weak and far removed from what was desired. At that time, the unanimity rule for the passage of directives still applied (Arp 1995, 246).

This system changed shortly afterwards with the Single European Act of 1987. It was the main revision of the Rome Treaties with the perspective of creating a single European market from 1992. It also introduced the so-called Cooperation Procedure. It was presented to speed up the legislative process and in fact overcame the need for unanimity. Indeed, it provided for an important role of the European Parliament. The plenary had to vote on the proposal submitted by the Commission in the 'first reading'. The European Council also had to vote on the Commission's proposal. In order to adopt a 'common position', the Council had to scrutinise the bill with a qualified majority. Afterwards, the European Parliament had three months to evaluate the 'common position' and approve it in a 'second reading'. In case

of non-acceptance at the 'second reading', the Council could force its hand through unanimous approval.

In July 1987, following the Cooperation Procedure, the Council approved a common position on the Luxembourg Compromise Agreement, with Denmark and Greece voting against. This was followed by the approval of the European Parliament in November of the same year. Thus, the 1985 limits came into force with Directive 88/76/EEC, which was ratified in December 1987 (Arp 1995, 247).

When setting new standards for cars with a cubic capacity of less than 1.4 litres, the Parliament, with its strengthened role, asserted its power over the Council and the European Commission.

At the beginning of 1988, the Commission, after consultation with interest groups such as the European Car Manufacturers Association (CCMC) and the European Environmental Bureau (EEB), presented the Council with a proposal that the emission limits for small cars should be 30 grams for CO and 8 grams for the combined emission of HC and Nox. The Council, as in previous meetings, split into two blocks of countries. The most intransigent and also called 'environmentalist' countries, namely Germany, Greece, the Netherlands and Denmark, considered the Commissioners' proposals unambitious. In fact, they considered it more appropriate to impose standards with emission ceilings of 20 grams CO and 5 grams HC+Nox.

In contrast, the other countries supported the British proposal, which was less stringent than the Commission's, with 35 grams of CO and 12 grams of HC+Nox as values. The Commission then tried to mediate between the parties and succeeded in imposing its median proposal during two councils in June 1988. In fact, the Council adopted a common position with a qualified majority on the 30/8 values identified by the Commission, with the Netherlands, Greece and Denmark voting against (Arp 1995, 252; Holzinger 1995, 14).

Shortly after approval in the Council, the French government also abandoned the agreement. It probably did so due to pressure from its own car industry, in particular the PSA group. In fact Peugeot, unlike Renault, was hostile to the introduction of catalytic converters in Europe (Arp 1995, 253; Ballor 2023, 21). In the CCMC board, due to PSA's hard line, no clear common position could be taken on the issue of EU emission limits because the unanimity rule applied. These internal disagreements within the automotive association led, among other things, to the dissolution of the CCMC in 1990 and the

formation of the European Automobile Manufacturers Association (ACEA), initially without the presence of PSA, where a majority for joint decision-making would apply (Ballor 2023, 23; Milor 2020, 2).

Officially, however, France withdrew from the June 1988 agreement in protest against the tax incentive plans of the Netherlands and Denmark. The Commission began legal investigations in October into the Hague government's measures.

The French government overcame pressure from the domestic automobile lobby and retraced its steps. The common position of the European Council was adopted in November 1988 and formalised at the end of December (Holzinger 1995, 11; Arp 1995, 253).

The European Parliament, however, supported the 'environmentalist' states' proposal of 20/5 limits in its Opinion⁹ in September 1988.

Shortly before the 'second reading' of the Council's firm position on the 30/8 standards, the new European Commissioner for the Environment, the Italian Carlo Ripa di Meana, let it be known that the Commission would support the Parliament in its call for stricter standards. Thus, in April 1989, the plenary approved amendments to the Council Common Position. In this case, the Cooperation Procedure provided for a review of the proposal by the Commission, which then proposed the limits, initially conceived by the stricter bloc of countries, to the European Council in May 1989. By this time the pressure from the automobile industry lobby had subsided, as by then the companies had prepared themselves for the irremediable introduction of three-way catalytic converters. The final agreement was reached in June 1989. The last discussions were about the time window for the standards to come into force. Germany again threatened to take a unilateral decision, but finally a deadline of July 1992 was set for new models and the end of 1992 for all newly registered small cars. In addition, the French representatives succeeded in inserting an article in which regulatory stakes were placed on plans for fiscal aid to encourage the purchase of cleaner cars (Holzinger 1995, 12; Arp 1995, 255).

A month and a half after the June agreement, the so-called Small Car directive was formalised, with Denmark and Greece voting against. So from that moment on, EU standards required the use of the three-way catalytic converter for cars with a cubic capacity above 2.1 litres and for those with a cubic capacity below 1.4 litres (Arp 1995, 256).

All that was missing was the introduction of the three-way catalytic converter even for the last of the class of cars, the medium-sized cars. The process that led to the approval of what came to be known as the Consolidated Directive was less impassable than the laws that preceded it. By now the resistance of politics and industry had softened and this step seemed inevitable and necessary. The Consolidated Directive did not only include the completion of the standardisation of standards. In fact, it was divided into five parts, including the durability of catalytic converters and the tightening of emission limits for diesel engines. The discussion between the countries in the European Council, still divided into the usual two blocs, was mainly about technical, rather than principled issues. Thanks to the cooperation of all three European summit bodies, the Consolidated Directive was finally approved at the end of June 1991. From 1 January 1993, all car classes were to adopt the three-way catalytic converter (Arp 1995, 296). The final act of a social, political, cultural, technological and economic process that lasted just under ten years.

3.3. THE ITALIAN CASE

This section will deal specifically with the Italian situation with reference to the issue of extending restrictions on vehicle emissions. As mentioned, the Italian government and its automotive sector were one of the main opponents to German and EU policy towards the adoption of the catalytic converter. The Italian case can be mirrored in the German case. A different sensitivity towards environmental protection, a political class not committed to environmental protection, a hostile and technologically disadvantaged industry. The Italian example, not dealt with in the previous literature, is therefore fundamental to broaden the historical narrative of the dynamics that arose in the negotiations that later saw the introduction of stricter emission standards. Moreover, the study of the Italian case is even more useful for studying the stages that constitute the formation and adoption of an innovation, even in a hostile or indifferent environment in which such technology is imposed from above and not out of a feeling of need on the part of the population.

The following analysis will delve into the social, political and industrial attitude of the Italian fabric, to understand the initial coldness of the government, population and companies towards cleaner mobility. It will also analyse the catalytic converter adoption phase and how Italian sentiment changed to some extent throughout the 1980s. This study enriches the arguments discussed in this thesis based on the theories of the Social Construction of Technology and Consumption Junction. As seen above, innovation is the result of trade-offs, power plays and social participation. And it also requires, for its success, a good acceptance by the target public. The Italian case shows how this consensus can be built or imposed, so that the new technology is normalised and not seen as a burden or a detriment.

Italy was and remains an area extremely damaged by human activity. With the economic boom after the Second World War, Italian industry was structured into districts, i.e. clusters of companies specialising in a single sector. These densely industrialised areas were subject over decades to high rates of air, soil and water pollution. Examples include the tanning district near the city of Vicenza, the textile district in upper Tuscany or the ceramics district in the province of Modena. In post-war Italy, several heavy and chemical industries also developed that were responsible for environmental disasters, the destruction of ecosystems and numerous health problems for the surrounding population. Among others, the Ilva plant in the city of Taranto and the Solvay chemical factory in Rosignano, Tuscany, stand out.

Urban areas, not just industrial ones, were also the scene of increased pollution. The increasing affluence of the population also led irrevocably to the exponential growth in personal car sales. Figures state that the fleet of cars circulating in Italy in 1950 was just over three hundred and forty thousand; in 1965, fifteen years later, the number of cars in Italy had more than increased tenfold, registering almost five and a half million models; in 1975, the total number of cars registered exceeded fifteen million (Paolini 2012, 4). An increase in smog in Italian cities was therefore to be expected. Moreover, the conformation of Italian cities, with their medieval structures and streets, were not suited to accommodate modern car traffic. The narrow streets of historic centres were more prone to traffic jams. Added to this was also the inadequate urban public transport network of many Italian cities, which meant that residents were not encouraged to use their cars to get around within the municipal boundaries. All these factors only deteriorated the air quality of urban areas (Liberatore and Lewanski 1990, 3).

The damage, or as they are called in the economic field, the negative externalities that the economic exploit during the 1960s and 1970s deeply marked Italian culture and society. The population has always lived with a very fragile territory, which man's action has weakened even more. It is therefore not surprising that Italian citizens in 1976 professed to be sensitive to the environmental cause, precisely in the year of one of the most important industry-related environmental disasters: the Seveso disaster. It was caused by the leakage of a toxic cloud of TCDD dioxin from the chemical company located in Mesa. The consequences were enormous: seven hundred evacuees, more than three thousand dead cattle and the contamination of a large area of lower Brianza. The survey found that 95 per cent of the respondents considered the environmental problem important or extremely important (Hofrichter 1990, 12).

The only positive effect of the Seveso Disaster was that it succeeded in bringing the ecological issue to the forefront of public debate. Throughout the previous decade and even in the 1970s, with a few exceptions, the topic did not find space in the mainstream media and public opinion. Environmental education within the Italian school system was also modest.

Given the lack of concern shown by the population, the political agenda effectively ignored environmental protection. Small parties, such as the Radical Party, which took up ecological demands, did not get much response from the ballot box. Therefore, the large mainstream parties found it counterproductive to take an interest in these issues (Liberatore and Lewanski 1990, 8).

The Italian environmental movement has always been characterised by a very heterogeneous nature. The first organisation that placed the defence of Italy's landscape heritage, together with its cultural heritage, at the centre of its values was Italia Nostra, founded in 1955. In contrast, the first purely ecological association was ProNatura Italica, established in 1959. Also worthy of note is the creation of the Italian division of the World Wildlife Fund, better known by its acronym W.W.F., in 1966. The organisation became one of the important players in the Italian environmental movement in just a few years, gathering numerous adhesions (Liberatore and Lewanski 1990, 5).

Despite the presence of such active associations in the area, the movement remained extremely niche and relegated to a few people. Environmental protection was seen as a local issue, which the individual regional and municipal administrations had to deal with, and therefore not worthy of occupying a prominent role in the public debate (Arp 1995, 181). It was not considered by the general public and even less so by political dynamics. The event that first raised the profile of ecological issues on a national level was the 1972 Stockholm Conference. Officially called the 'United Nations Conference on the Human Environment', it was a meeting of representatives of all U.N. countries held in Stockholm from 6 to 15 June 1972. The world's powerful gathered to discuss a common, international commitment to defending the environment and the risks of man's exploitation of nature. The Italian influence and role at the conference was extremely marginal and irrelevant. The delegation was described as 'weak and unqualified', and conformed to the American positions and those of its other western allies. It was, however, the first occasion on which some of Italy's leading newspapers and media covered environmental issues. Major newspapers such as La Stampa and Corriere della Sera followed the event closely with correspondents on the spot and did not spare harsh criticism of the Italian expedition. For the first time in the history of republican Italy, environmentalism had a considerable resonance, abandoning its relegation. It must be added, however, that despite this new popularity, the subject was still treated in an extremely intellectual and theoretical manner, without any pragmatism. It also

managed, finally, to influence politics to some extent. The ruling class described itself as ready to take action in defence of the environment. But in this, too, it was cosmetic environmentalism, without any programmatic vision or real practical consequences (Lorenzini 2016, 23).

The issue that most animated the Italian environmental movement over the years was the opposition to the use of nuclear reactors for energy production, particularly since the late 1970s. In 1977, mass demonstrations were held in many parts of Italy to protest and demand a stop to the use of nuclear energy.

The first was held in Caorso, in the province of Piacenza, to call for a halt to work on the nuclear power plant there. It was organised by the Italian Radical Party in collaboration with ecological associations such as the W.W.F. and Italia Nostra and local communist and socialist representatives. Another noteworthy demonstration was called in Montalto di Castro, near Rome. Residents and radical leftists protested against the proposed construction of a power plant in the village.

The anti-nuclear sentiment was central to the values and actions of a new association, founded in 1980: Lega per l'Ambiente, today known as Legambiente. It arose from circles politically close to the left and became the most important ecological organisation in Italy. With its initiatives, such as the 'Green Train', it tried to sensitise the Italian population towards an environmentalist sensibility (Liberatore and Lewanski 1990, 5).

In 1981, the now numerous Italian ecological associations attempted to coordinate and create an inter-organisational structure. The so-called Arcipelago Verde (Green Archipelago) was then founded, which also tried to make its voice heard in the political arena and on a national level from the beginning of the 1980s. The first Green lists had already been running in some local elections since 1980. In 1985, in local and regional elections, the Green list managed to achieve its first slightly significant results. In 1986, the first real structured party was formed, called the Federation of Green Lists (Liberatore and Lewanski 1990, 6).

The real and political turning point for the Green Party was 1986. Italian public opinion is extremely sensitive to major events. One example is the already mentioned Seveso

Disaster, which succeeded in involving many Italians in environmentalist battles. But the event that changed Italian politics, and not only, and really brought environmental issues to the centre of public debate was the Chernobyl nuclear power plant disaster of April 1986. The already strong public resentment towards nuclear energy found new vigour and permeated the entire Italian population. Hofrichter's research (1990, 20) shows us that Italians who considered atomic energy useful fell from forty-one per cent to fifteen between 1984 and 1986. By contrast, the percentage of those who considered the risk of nuclear power plants too high rose from forty-three per cent in 1984 to seventy-four per cent in 1986.

As already mentioned, Italian politics has never actively approached ecological demands. The dominant party in the Italian parliament had been the centrist and moderate Christian Democrats since 1946, who remained uninterruptedly in the country's government for over forty-five years. The Christian Democrats, given the lack of voter interest, never committed themselves to implementing serious environmental protection policies or to including ecological measures in their electoral programmes. It is therefore not surprising that Italy has been brought before the EEC Court of Justice several times for violating EU directives on environmental protection.

The same can be said for the traditional centre-left and left-wing parties, the Socialist Party and the Communist Party. Both parties were civil nuclearists and the Communists viewed pro-environmental activists with distrust.

However, the Chernobyl accident changed the game. Anti-nuclear discontent and fear had become extremely present in public opinion. This consequently also triggered a change in the approach of the mass parties to environmental issues. It was still factually a matter of an ecologism of shamelessness and convenience, but it was clear that the general sentiment had changed. Worthy of note, however, was the establishment of the Ministry of the Environment in 1986, with the specific aim of safeguarding and managing Italy's landscape heritage.

Until then, the only, small, ecological parties in Italy were the Radical Party, the radical left-wing party Democrazia Proletaria and the newly formed Green Party. It was precisely these formations, in order to ride the growing concern about nuclear power plants, that promoted an abrogative referendum at the same time as the general election in May 1987. The three proposed questions called for the abolition of state intervention if the municipality banned

authorisation for the construction of a nuclear site, the abolition of compensation contributions to local authorities for the presence of a nuclear power plant, and a ban on Enel's participation in nuclear plants abroad.

The Socialist Party and the Communist Party changed their opinion on nuclear power and were in favour of the referendum. The Christian Democrats held a more indifferent attitude, deciding not to oppose the referendum request (Liberatore and Lewanski 1990, 8).

The results were incontrovertible. In all three questions, the yes votes exceeded seventy percent, even reaching eighty percent for the first two. To this victory of the Italian environmental movement was also added the good result in the general elections held at the same time by the Green Party. Despite a modest two per cent, which nevertheless corresponds to almost one million voters, thanks to the proportional electoral system they managed to enter Parliament. Seventeen representatives of the Green list sat in the Chamber of Deputies; in the Senate, three parliamentarians were elected (Liberatore and Lewanski 1990, 6; Arp 1995, 180).

The electoral result was even better in the 1989 European elections, where, however, the Greens ran with two competing lists, the Federation of Green Lists and the Rainbow Greens, born from the union of Radicals and Proletarian Democracy. In fact, the sum of the percentages of both stood at over six per cent. The discrete electoral results can be attributed both to the high focus on environmental issues at the time and to an anti-system, anti-establishment vote against the traditional parties and for a new way of doing politics (Liberatore and Lewanski 1990, 6).

From this excursus on the history of the environmental movement and political debate, one thing can easily be understood. The subject of emissions and the impoverishment of air quality was not the most important issue in the Italian environmentalist debate, not even in the late 1980s. Anti-nuclear sentiment was the real glue and driving force behind the action of Italian ecologists in the 1980s.

Even at the legislative level, given the lack of interest, very little was done. The only law at the national level to regulate emissions was Law No. 615 of 1966, the so-called Anti-smog Law. It was a feeble attempt to reduce pollution in cities by, for example, limiting the amount of sulphides in petrol (Liberatore and Lewanski 1990, 3; Arp 1995, 181). Italy's inability to

act on the problem was dictated not only by the absence of the issue in party programmes, but also by the intricate bureaucracy and administrative fragmentation between central government, regions and provinces. A decentralisation of power, and complexity that only made institutional action slower and more ineffective. This weakness, incompetence and unpreparedness of the Italian political class were decisive in the power games at the European level (Liberatore and Lewanski 1990, 2; Arp 1995, 179). The Italian representatives were not committed to defending the health of their citizens, but only responded to the economic and technological interests of the Italian automobile industry, in particular Fiat. The Italian government, unlike its German, British and French counterparts, never took the initiative, only adopted a defensive and reactive attitude in order to limit the damage.

Fiat, with the group of subsidiaries that the Agnelli family had built up over the decades, had a real monopoly in the automobile market in Italy. In 1987, the Fiat group, thus including brands such as Alfa Romeo and Lancia, was responsible for ninety-five percent of the cars produced in Italy. Furthermore, seventy per cent of the Turin holding company's European sales were made in Italy (Arp 1995, 182). So it is easy to see the importance and power of Fiat's influence on the Italian government in the European Council negotiations.

3.3.1. ANALYSIS OF THE ITALIAN CASE WITH THE USE OF THE PRESS

In order to fully understand Fiat's aversion to and difficulties in making the transition to the catalytic converter, it was extremely useful to research some newspaper articles of the time that dealt with the issue. But not just any newspaper, but *La Stampa*, an important newspaper based in Turin and, above all, owned by the Agnelli family since the Second World War. As you can easily guess, the editorial line of that newspaper is and was a megaphone of the economic and strategic interests of the Agnelli family and Fiat. So, in the following section you will find quoted a series of articles from *La Stampa* that describe, in their own way, the situation in the Italian automotive sector in the late 1980s and early 1990s, with a very favourable and supportive slant on Fiat's policies. We will use these articles to critically analyse the interests of the Turin-based car manufacturer and to understand the evolution that later led to the successful switch to catalytic converters for all categories of cars from 1993 onwards. In addition, these articles will serve to understand the sentiment of

motorists, as Fiat, in order to justify the poor performance of cars equipped with catalytic converters in the early 1990s, pointed the finger at the institutions, guilty of not encouraging the sale of 'clean' cars.

These articles were found thanks to a research activity through the historical archive of La Stampa, which can be consulted in the online portal. A series of keywords such as 'catalytic converter', 'unleaded green petrol', 'ecological car incentives' and 'diesel injection' were used to find these sources. The articles retrieved and which will be useful in the following analysis reflect the evolution of nine years, in fact they date from 1986 to 1994. So, exactly the years following the Luxembourg Compromise that led to the three way catalytic converter revolution.

It has already been mentioned why the Italian sector would be damaged by an EU-wide introduction of the catalytic converter. With the adoption of this technology, production costs would have risen considerably. Clearly, small cars, the category of car that accounted for the bulk of Fiat's production, would have been the class that would have been penalised the most in view of the lower overall production costs. This would, consequently, have affected the price, causing damage to consumers, sales and the company's margins.

This issue has been emphasised several times over the years by the journalists of La Stampa in their articles, in order to highlight the damage allegedly suffered by Italian motorists and the entire Italian automotive industry. For example, an article in 1990 emphasised that the price of smaller cars, with the adoption of the catalytic converter, would have increased by more than ten percent, compared to larger cars, which would have been affected by a price increase of a modest five percent¹

It would have been counterproductive for the Italian automotive industry to adopt the catalytic converter in the mid-1980s for other reasons as well. As mentioned, Fiat sold mainly in Italy, with few exports, especially to countries such as the United States that had already introduced standards requiring the three-way catalytic converter. So the Turin group, prior to the European imposition, had not invested in research into such technology. Clearly, given the lack of interest from citizens, consumers and Italian politicians, before the Luxembourg Compromise it made no sense for Fiat to offer clean cars.

¹ Rogliatti, G. 1990. "Il verde piace ma non riesce a crescere". La Stampa, May 03, 1990. n.100 p.23.

In fact, the most important Italian automotive company focused, as did the British manufacturers, on the lean-burn engine. It was more efficient than its predecessors and consumed less fuel. Therefore, it would also benefit consumers, who would spend less on petrol (Arp 1995, 183).

Fiat found itself in difficulty and was caught unprepared when it became clear that the catalytic converter would be introduced in Europe. In particular, it found itself trailing behind when it came to the application for smaller class cars. In fact, some medium and large Fiat cars were already sold in America equipped with electronic fuel injection, which was essential for the operation of the three-way catalytic converter. In 1988, the Turin group exported more than two hundred and fifty thousand cars equipped with catalytic converters to countries that had already adopted stricter emission restrictions. So Fiat was more competitive in this technology than the French and British companies (Arp 1995, 184).

However, it also needed to adapt electronic fuel injection for small cars.

At that time, the European monopoly of this technology was in the hands of Germany's Bosch. Even Fiat, since it had not yet concretely invested in the development of such technology, was forced in the 1980s to use components of German origin. This information can also be found in an article in *La Stampa* from 1986, which proudly described the environmental progress of the Fiat galaxy cars presented at the Geneva Motor Show that year. Indeed Fiat, with its Lancia brand as well, presented a series of models equipped with a catalytic converter, a system designed and built by the leading German company².

Clearly, Fiat did not want to be dependent on a supplier outside the group, German in addition. It therefore lobbied the Italian government to delay as far as possible the entry into force of the new EU standards for cars with a cubic capacity of less than 1.4 litres.

Despite this, the future of the car would be with the catalytic converter. German pressure got the better of French, British and Italian resistance. So Fiat was forced to invest in research into electronic fuel injection. For this purpose, it used two of its subsidiaries, two component companies: Magneti Marelli and Weber. Another reason that prompted Fiat to speed up the development of technology for the three-way catalytic converter adapted for small cars was the state aid that many European countries structured after the Luxembourg compromise to encourage clean cars. The increase in demand and sales hastened the processes at Fiat (Arp 1995, 184).

² Bernabò, F. 1986. "L'auto europea diventa ecologica". *La Stampa*, March 14, 1986. n.61 p.17.

These reasons, and pressure from European institutions, led Fiat not to fail in implementing and introducing 'clean' models. It is no coincidence that by the time the Small Car Directive was being discussed and approved, at the end of the 1980s, Fiat was practically ready to see car models for all cubes with the three-way catalytic converter implemented.

Despite Fiat's investments, the situation in the Italian car market was still extremely uncertain, with sales of catalyst cars far below the European average. Using the columns of *La Stampa*, the Turin-based group tried to baste the narrative that the industry, hence Fiat, was ready for the change, but it was the market and the infrastructure that were not ripe for the transition to the catalytic converter. In a series of articles, dating back to 1989, the journalists of *La Stampa* blamed, indirectly and otherwise, the critical situation on the few efforts made by the Italian state to boost sales and educate consumers. It is important to note that motorists, in this biased narrative, are not portrayed as culprits, but as passive victims of institutions that do not work for the economic and social interests of the nation. In fact, in an article from 1990, Italian consumers were described in a survey as being inclined to buy a car equipped with a catalytic converter: seventy-eight per cent of consumers considered the presence of a catalytic converter to be important in the future purchase of a car¹.

The narrative in *La Stampa* went on to list the negative sales figures in Italy for the new EU-compliant models over the years, highlighting the great number of 'green' models on the market.

In fact, by 1989, in the Italian market were on sale one hundred and fifty-three models equipped with catalytic converters, of which twenty five produced by Fiat³.

Starting with the figure provided by Arp (1995, 188) concerning the percentage of cars equipped with catalytic converters in Italy, which was five per cent of the total, the other extremely negative data from the early 1990s can be traced in the articles of *La Stampa* journalists.

In 1991, they reported that of the eight hundred and fifty thousand cars sold from 1 January to 30 September 1991 in Italy by Fiat, only ten thousand were 'ecological'⁴. At the end of that year, they wrote in 1992, cars with catalytic converters accounted for just three per cent

³ Villare, R. 1989. "Il verde non tira in Italia". *La Stampa*, December 07, 1989. n.281 p.23.

⁴ Villare, R. 1991. "Tutti per il verde, ma solo a parole". *La Stampa*, November 28, 1991. n.291 p.35.

of the entire car fleet in Italy, one of the worst percentages in Europe⁵. A figure that underlined, in their narration and in the Fiat perspective, the backwardness and difficulty of the Italian system in undertaking this transformation of the automotive landscape.

And what reasons do the La Stampa articles list to justify these negative sales figures for the new models?

First of all, the high price, compared to older models, of cars with catalytic converters implemented. It must be remembered that the best-selling category of cars in Italy was particularly small and therefore more susceptible and sensitive to the increase in production costs dictated by the three-way catalytic converter. Although Italians described themselves as ready to buy less impactful cars, the journalists registered that the consumers were not prepared to spend any more than the usual amount at the time of purchase. In an article of 1990 it was reported that only forty-one per cent defined themselves as being willing to pay two hundred thousand lire more, a percentage that progressively decreased as the surplus increased, reaching a meagre nine per cent inclined to spend even seven hundred thousand lire more¹.

A further reason identified by La Stampa and useful to defend the interest of Fiat and the Agnelli family, is the concern of Italian motorists regarding the spread of green petrol, the lead-free petrol necessary for the operation of the three-way catalytic converter, throughout the peninsula.

In this case, the articles were intended to highlight and draw attention to the infrastructural backwardness of petrol stations equipped with fuel adapted to the new models.

Therefore, the development of the clean fuelling network and the introduction of cars with catalytic converters necessarily had to be parallel. In 1989, they wrote, there were still very few filling stations with unleaded fuel, an estimated one in seven. Added to this was the fact that it cost 25 lire more per litre than classic super petrol, a problem that certainly discouraged consumers from switching to cleaner technology⁶.

The reasons given above certainly have a basis in truth and unquestionably were a brake, initially, on the sale of cars equipped with the three way catalytic converter. But it is also

⁵ Villare, R. 1992. "Il verde conquista l'Italia. Fanalino di coda dei Paesi europei". La Stampa, January 30, 1992. n.29 p.33.

⁶ Fenù, M. 1989. "Benzina verde? No, d'oro". La Stampa, February 02, 1989. n.26. p.10.

undeniable that they are reasons tacked on and filtered through the narrative constructed by the Agnelli family-owned newspaper. The real culprit, according to that view, for the lagging situation present in the road transport sector is to be found in the state and the few interventions to encourage the diffusion of the new technology.

It was clear that state intervention was needed to encourage the purchase of cars that met EU standards. The Italian sector had to catch up with continental and international competitors, so all players had to work together toward the common goal of transition.

So, the first agreements between Fiat and the Italian government were greeted with pleasure in the articles in *La Stampa*. In 1989, Fiat and the Ministry of the Environment signed a letter of intent. Fiat was to invest as much as one thousand two hundred billion lire in raising public awareness, producing vehicles with low-impact technology and adapting old models to European standards. On the other hand, the government agreed with the oil industry, and therefore with the A.G.I.P., to spread green petrol in all Italian petrol stations (Gignetti 1989). In addition, it was decided to lower the price of unleaded fuel, making it cheaper than the super fifty lire per litre⁷.

In 1991, Fiat found a new agreement with the Italian government worth two thousand five hundred billion lire. The Piedmontese company promised to undertake policies to reduce industrial emissions and offer a wide range of green, environmentally advanced cars. For its part, the Italian institutions pledged to guarantee a tax incentive system to boost sales from 1992 (Arp 1995, 187).

Another measure implemented, in this case by local administrations, was the traffic blockade for the most polluting cars. Following a ministerial ordinance of November 1991, Italy's largest cities decided to ban circulation, particularly in historic city centres, for the oldest and most polluting models in winter (Arp 1995, 188). These bans throughout Italy were fundamental in that they made Italian consumers realise the urgency and need for change. It was a way of getting used to the fact, even a year before the final revolution of 1993, that the future of the car was with catalytic converter and unleaded petrol.

1992 was the year of the decisive change of course. State incentives, increasing prohibitions and the haste to adapt to the impending obligation to register cars with catalytic converters

⁷ di Robilant, A. 1988. "Da aprile benzina verde in tutta Italia". *La Stampa*, November 04, 1988. n.245 p.1

led to a marked change in the landscape of the Italian automotive market. This change of course, was celebrated by La Stampa as a success of the Italian automobile industry, and thus of Fiat. We then find, in the following years, a series of articles reporting on the excellent sales and diffusion results of cars equipped with catalytic converters. In 1992 sales of green petrol doubled to thirteen per cent⁸. The most significant figure concerns cars with catalytic converters purchased. This rose from five per cent of total sales in 1991 to sixty-five per cent in 1992⁹. Consequently, 'clean' cars accounted for three per cent in 1991, five per cent in 1992⁹, and thirteen per cent in 1993¹⁰.

⁸ La Stampa. 1992. "Raddoppiate le vendite della verde". La Stampa, December 31, 1992. n.357 p.35.

⁹ Bernabò, F. 1993. "Nel duemila saremo tutti verdi". La Stampa, January 21, 1991. n.20 p.35.

¹⁰ Fenù, M. 1994. "In marcia verso il verde più verde". La Stampa August 11, 1994. n.218 p.29.

4. 2035 EUROPEAN BAN OF COMBUSTION ENGINE

After having presented in the last chapter the case concerning the introduction of EU emission standards in the late 1980s and the related obligation to use catalytic converters for new models, this section will analyse the situation created by the recent European ban on combustion-engined cars, scheduled for 2035.

The two cases have several similarities. Both regulations were generated by social, political and economic needs. In both cases, the introduction of the new technology was facilitated and in some ways driven by real windows of opportunity, as theorised by the Multi Level perspective. Firstly, the awakening of environmentalist sentiment concretely influenced the legislative process and European demands in both situations. In addition, economic reasons contributed to the choice. Thirty years ago there was a need to conform to international regulations and to create a single market in Europe, nowadays there is a need to give certainty and time limits to the European automotive sector in its challenge to international competitors, especially China.

Similarly to the restrictions imposed after the Luxembourg compromise, the ban on the sale of petrol-powered cars will in fact see a new, or rather less widespread, technology being imposed. A technology, in this case electrically powered vehicles, which like the catalytic converter has had and continues to have supporters and opponents among the various EU countries. The different reactions and positions of the various national governments to the Brussels decision is understandable given the variegated industrial, political, infrastructural and social differences that characterise the twenty-seven members of the Union. Exactly, mirroring what happened more than thirty years ago.

It will also be interesting to investigate consumer attitudes, particularly in a country as Italy that is currently lagging behind in the expansion of the electric motor, both at industrial level and in terms of market penetration. A condition comparable to that experienced in the late 1980s. At that juncture, state intervention had been crucial in accelerating change. In today's Italy, it will be seen whether the conditions for a change of course are in place.

The chapter will open by analysing in detail what the recent legislation, Regulation (EU) 2023/851, provides for, analysing all its points and the novelties it introduces. This section is placed at the beginning of the chapter to expose the revolutionary effects this law will have in the near future in Europe. It will reshape the automotive sector, the infrastructure

landscape and the economic ties of European countries. Indisputably, there will be a before and after regulation, it will mark European history.

Afterwards, we will elaborate on the reasons that prompted the Commission and the European Parliament to take such a radical path. In particular, it will discuss the social impetus that the Fridays for Future movement had first in the 2019 European elections and then in the environmental policies of the European government. Through the use of sociological and political papers and studies, the extent and media importance of this youth movement throughout Europe will be understood. The characteristics of the Italian Fridays for Future movement will also be specifically analysed.

The following section will be reserved for the analysis of the economic reasons that prompted the Von der Leyen Commission to approve Regulation (EU) 2023/851. In particular, the need to invest in the value chain for battery production, given China's current monopoly, will be discussed. It will also investigate how Italian public opinion deals with the issue, through the analysis of some articles and the editorial line of some newspapers.

Finally, the situation of Italian politics, industry and consumers will be analysed using both scientific papers and press articles. It will be important to understand the actual state of progress of the transition to electric power and how public opinion treats this topic.

It will be studied the coldness in reference to electric cars that characterises some of the main political parties, motorists and the Italian automotive sector. The challenge awaiting Italy is therefore extremely arduous. It will be interesting to see whether the country will succeed in changing to a satisfactory adoption of electric cars or whether it will be overwhelmed by European obligations.

4.1. REGULATION (EU) 2023/851

Regulation (EU) 2023/851 is one of the regulations and proposals of the European institutions towards a more sustainable future during the 2019-2024 legislation. Indeed, the Von der Leyen Commission, despite being led by a president from the centre-right Catholic CDU party, had a strong ecological vocation and commitment. Even the European Parliament, a large part of which was made up of politicians belonging to the European People's Party, has over the years taken various positions strongly in favour of environmental protection.

It is also crucial to emphasise, the very important role that Frans Timmermans played within the dynamics of the Commission. Dutch, Labour, in the 2019 European elections he was appointed as the presidential candidate of the European Socialist Party. As had always happened, the three most influential European parties, namely the Christian Democrats, Socialists and Liberals, agreed on the formation of the Commission. The traditional European political compromise included representatives of the centre-right, centre and centre-left, leaving the most extremist parties excluded. After the long negotiation following the elections in May 2019, Timmermans managed to take on the post of Vice-President of the Commission, a role he had already held in the previous Juncker Commission, and European Climate Commissioner. Thus, Timmermans became, to all intents and purposes, in charge of the Union's environmental policy. He was thus the main proponent of the environmentalist trajectory decided and undertaken by the Von der Leyen Commission.

From the very first months of the new legislature, the European summits showed their renewed ecological commitment.

In November 2019, the European Parliament recognised the climate crisis situation and appealed to the Commission to undertake a series of policies that would respect the climate agreements signed in Paris in 2016. The challenge given by the Parliament to the European government was to limit the increase in the average temperature below one and a half degrees compared to pre-industrial levels and to considerably reduce greenhouse gas emissions, which are responsible for global warming (European Parliament 2023).

On 11 December, therefore, the Commission proposed a large package of measures, with a total value of over one trillion euros, divided between funds from the common European budget and public funds from individual countries (European Commission, nd). This was the so-called European Green Deal, a name that harked back to Roosevelt's 'New Deal' during the depression of 1928. And as it was then, the intention of the European institutions'

massive initiative was to mark a turning point, an acceleration towards ecological transition, towards decarbonisation. Just a few months after the elections in May 2019 and very few days after the new Commission took office on 1 December 2019, the Union's leaders made clear the new direction they were taking, the moral and social obligation and commitment they were taking on.

The goal behind the Green Deal was to achieve European climate neutrality by 2050, and then to achieve negative emissions after that year. The intention was to be the spearhead of environmental regulations and a world leader in investing in clean, cutting-edge technologies (European Parliament 2023a).

In June 2021, the European Parliament passed a binding law, obliging the EU and its member states to reduce greenhouse gas emissions by 55 per cent by 2030 compared to 1990 levels and to commit to neutrality by 2050.

The following month, in July 2021, with the aim of achieving these targets, the Commission presented the group of reforms called 'Fit for 55', which was part of the broader Green Deal plan (European Parliament 2023a).

It consisted of thirteen legislative reforms and six legislative proposals focusing on climate, energy and the environment.

These include, for example:

- a revision of the Emissions Trading Scheme (ETS) to also include new polluting sectors, such as construction and road transport, and the phasing out of free allowances by 2032;
- the proposal for an increase of the target for the share of renewable energy in the EU's energy consumption to more than forty-two per cent by 2030;
- the implementation of the 'carbon leakage' instrument, so as to tax the carbon produced for goods imported by emission-intensive industries outside the EU borders, in order to counter relocation to nations without ambitious environmental legislation. This regulatory instrument is called the 'Border Carbon Adjustment Mechanism (CBAM)';
- the implementation of 'effort sharing between EU countries' to increase national emission reduction targets in those sectors not covered by the emissions trading scheme, such as transport, agriculture, construction and waste management, from twenty-nine to forty per cent by 2030;
- the strengthening of standards for limiting CO₂ emissions, up to a target of three hundred and ten million tonnes by 2030, in the areas of land use, land use change and forestry.

The most ambitious proposal, however, and the one that has attracted the most attention in public opinion and political debate, is the one concerning the regulation of exhaust emissions from the transport sector.

As far as aviation and shipping are concerned, the Emissions Trading Scheme (ETS) will be extended to both, so as to discourage the use of polluting technologies in favour of less impactful solutions. In addition, the Council and the European Parliament have stipulated that seventy per cent of aviation fuels within the Union should be sustainably derived, such as pre-used cooking oil, by 2050.

The Parliament also decreed further restrictions for the maritime sector. Vessels with a gross tonnage of more than five thousand tonnes will have to reduce emissions by more than fourteen per cent by 2035 and by eighty per cent by 2050 compared to 2020 levels. This type of ship was responsible for more than ninety per cent of the total greenhouse gas emissions of the shipping sector (European Parliament 2023b).

The real focus, however, was on road transport, given its importance and the impact its revolution could have on the daily lives of citizens.

In 2021, road transport will account for seventy-two per cent of all transport-related emissions in Europe and fifteen per cent of all man-made greenhouse gases on the continent. A figure that, despite the introduction of cleaner models over the years, continues to rise alarmingly as car sales on the continent continue to grow. The transport sector is the only one that has seen rising emission levels; since 1990 they have increased by twenty-five per cent.

Therefore, European leaders decided to further and more radically limit exhaust emissions from passenger cars and light commercial vehicles. It was therefore defined that from 2035 all newly registered cars and vans must not emit any exhaust gases, i.e. they must be without an internal combustion engine. Thus, no more petrol and diesel cars can be sold (European Parliament 2023c).

The first Commission proposal was presented on 14 July 2021. It was the result of a complex and extensive consultation session that European leaders undertook from November 2020 to February 2021. The Commission listened to the demands of all possible stakeholders. Indeed, it held talks with representatives of car manufacturers, the components industry, energy suppliers, environmental NGOs and consumer associations (European Commission 2021).

The final text that emerged from the dialogues represented an amendment to the previous European legislation regulating the topic, namely Regulation (EU) 2019/631, approved in April 2019. This regulation provided for a reduction in emissions for the newly registered fleet of cars and vans of fifteen per cent by 2025 compared to 2021, and a reduction in exhaust gas levels of more than thirty-seven per cent for new cars by 2030. It also required car manufacturers to sell more than fifteen per cent zero- and low-emission passenger cars and light commercial vehicles from 2025. From 2030, this percentage would be increased to thirty-five per cent for cars and thirty per cent for vans (European Parliament 2019).

The Commission's proposal was followed by the European Parliament's first reading. The Euro Chamber, after amendments by the Committee on the Environment, Public Health and Food Safety, gave its favourable opinion.

In October 2022, the European Parliament and the European Council reached a provisional agreement on the regulation. This understanding was then approved by the majority of MEPs at the plenary session on 14 February 2023 and was also ratified by the Council of Energy Ministers on 28 March 2023. Regulation (EU) 2023/851 then officially entered into force on 19 April 2023 (European Parliament 2023d).

What are the measures in this new regulation?

As mentioned above, Regulation (EU) 2023/851 represents a strengthening of the previous Regulation (EU) 2019/631. In fact, the objectives set by the new law are extremely more ambitious and complicated to achieve. Indeed, it is reasonable to assume that if the imposed timetable and the planned regulations are adhered to, the automotive sector and the entire European road transport sector will be irreparably disrupted.

The first target imposed by the European summits is an intermediate target. It is a gradual lowering of emissions from newly registered passenger cars. In 2030, emissions from cars are expected to fall by fifty-five per cent and from vans by fifty per cent compared to 2021. This is a marked narrowing compared to the previous targets for the same year in Regulation (EU) 2019/631, which were a reduction in emissions of thirty-seven per cent and thirty-one per cent respectively.

Most importantly, the percentage of clean models that automotive companies are obliged to sell in the near future was revised. Between 2025 and 2030, the minimum sales of fifteen per cent environmentally friendly cars increases to twenty-five per cent for passenger cars and seventeen per cent for light commercial vehicles. In contrast, the obligations between

2030 and 2035 remain unchanged, with car manufacturers having to meet the obligation to sell at least thirty-five per cent of passenger cars and thirty per cent of vans with non-impact technology.

From 2035, however, a new revolution is expected. In fact, Regulation (EU) 2023/851 stipulates that from that year it will no longer be possible to sell cars with exhaust emissions within the borders of the European Union. In particular, in paragraph 5a of Article 1 it is made explicit that from 1 January 2035 the “a hundred per cent” emission reduction target for the entire new car fleet will apply. This means that the sale of cars and vans equipped with an internal combustion engine powered by petrol and diesel will be prohibited, apart from a few rare exceptions. In addition, the approval of new, so-called hybrid models will be banned. In fact, it will no longer be possible to market cars with full hybrid, mild hybrid and plug-in hybrid technology, despite the fact that they are models with a low environmental impact.

Clearly, cars currently on the road will not be affected by the regulation, and after 2035 it will still be possible to use cars with exhaust gas if they were purchased before 1 January (European parliament 2023e).

The rationale behind this decision is the Commission's stated goal in the European Green Deal to achieve complete European climate neutrality and thus also of the entire car fleet by 2050. The standard takes into account the life and average use of cars, which is precisely fifteen years. This is why 2035 has been set as the target date for the complete transition, so that by 2050 the European Union will have an almost entirely zero-emission car fleet.

In its first proposal dated 14 July 2021, the Commission spelled out the three specific objectives it intended to achieve with this measure. It is well to specify that Regulation (EU) 2023/851 is not intended to be prohibitionist, but to catalyse a radical transformation in the automotive industry and road transport infrastructure.

The first of the three objectives is to make a substantial and decisive contribution to the climate targets of the European Green Deal and the 'Fit for 55' reform plan. It emphasises the urgency and need for early action, given the lack of immediacy that such a transformation requires.

The second refers to the increased benefits for citizens and consumers resulting from the planned spread of clean cars. In addition to the expected improvement in air quality in urbanised areas, the Commission speaks of benefits in relation to the increased availability

and accessibility of zero-emission cars for motorists. This will lead, in the view of the Commissioners, to considerable energy savings and a lower total cost of ownership for such cars (European Commission 2021).

Finally, the Commission sets out its will to stimulate investment and innovation in the automotive sector towards ever less environmentally impactful technologies and zero-emission mobility. In the Commission's convictions, in the near future the European Union and its automotive industry must play a leading role in the ecological transition. Reference is also made to investment plans to boost employment in the sector and to promote the production of zero-emission fuels and the construction of infrastructure for recharging batteries (European Commission 2021).

In this regard, the European Parliament in July 2023 approved new rules, as part of the broader 'Fit for 55' regulatory design, for the installation of charging stations along major roads. It was decided that along the most important arteries of the TEN-T network, i.e. of the Trans-European Transport Network, by 2026 an electric charging station with a minimum output of four hundred kilowatts should be built every sixty kilometres. This value from 2028 will have to be compulsorily higher than six hundred kilowatts. On the other hand, specific charging stations for trucks and buses must be installed every hundred and twenty kilometres on half of the main roads in the European Union by 2028 (European Parliament 2023f).

The programme signed by the European institutions is undoubtedly ambitious and puts the first fundamental step towards a revolution that will involve all European citizens and the entire economy of the old continent. If indeed the Commission's plan succeeds in its intentions, and this will have to be verified given the many possible obstacles, the European Union will no longer be the same and neither will the entire global automotive sector. It will be crucial to understand the political direction that European leaders will take in the coming years. The Von der Leyen Commission has succeeded in its five-year term of office in structuring a package of reforms that, having medium-term objectives, must also be carried forward by future commissions. There is also the question of the willingness and reaction of the automotive industry and consumers, who, if dissatisfied or unmotivated, could put pressure on the policy and overturn what has been decided in the 2019-2024 European legislature. Only the future will tell whether the time is ripe in Europe for a decisive and necessary transformation.

4.2. THE IMPORTANCE OF THE FRIDAYS FOR FUTURE MOVEMENT

In this paragraph it will be analysed one of the pressure that pushed the Commission led by Ursula Von der Leyen to take a policy direction focused on green reforms and aimed at a green transition. As in the case of the introduction of the catalytic converter, legislation that introduces a technological innovation hardly ever arises solely due to economic and technical reasons. Especially in the case of technologies that have and can have an impact on the quality of life of consumers and the health of the environment. The citizenship, sentiment and opinion of ordinary people has a huge influence on the innovation process and progress, both technological and legislative. They can influence the political direction of institutions and can block or facilitate the adoption of a specific technology. These, as repeated several times in this thesis, are some of the foundations of the Social Construction of Technology and the concept of 'consumption junction'. The Multi Level Perspective can also be useful in analysing and understanding these dynamics, in particular the concept of the window of opportunity. As already described, a window of opportunity occurs when there is change, a shift in the socio-technical landscape, i.e. the macro level in the MLP view. Such a disruption generates pressure in the lower levels and can allow radical innovation to emerge from the niches. As already stated by some scholars, the growing environmentalist sentiment and concern about the climate crisis can be seen as a window of opportunity for the transition to more sustainable and electric mobility (Berkeley et.al. 2017, 5; Geels et.al. 2011, 14) .

In fact, the ban on internal combustion cars from 2035 envisaged by the European summits can also be read as a direct consequence of some major popular uprisings and the action of environmentalist collectives throughout Europe after 2018, the year before the 2019 European elections that brought Ursula Von der Leyen to the government of Europe. These demonstrations that carpeted the European squares and these initiatives of these activist groups all had one thing in common. They were characterised by a strong youth component. Young people across the continent mobilised to demand guarantees and environmental policies from their representatives in the institutions. And as it will be shown, these movements certainly had their weight in influencing the 2019 European elections and the political direction, at least, of the European Commission and Parliament. This paragraph will also serve to understand the social context in which the new European regulations were implemented.

The main one of these groups and movements is surely the one that has taken the name Fridays for Future. Its birth has already almost acquired an air of legend. The initiator of the movement, which in a few months was to acquire a European and worldwide dimension, was a fifteen-year-old girl. This teenager's name was Greta Thunberg, who one Friday morning in August 2018 decided to go protesting in front of the Swedish Parliament to demand policies aimed at environmental protection, striking from school (Stoecklin 2021, 1). From that day on, the young activist decided to take to the streets every Friday to demonstrate in support of the environment. Soon, many other students began to follow or imitate her. The movement grew exponentially and spread to other countries. As early as November 2018, seventeen thousand protesters took to the streets in twenty-four different countries (Murray 2020, 8). Within a few months, it became one of the most important ecological protest movements in history. The most impressive figure was recorded on Friday, 15 March 2019. According to data provided by the same organisation, more than one million six hundred young people protested worldwide, in over one hundred and twenty countries, in more than two thousand cities (Stoecklin 2021, 1; Jung et. al. 2020, 1). According to Fridays for Future, data from 2020, up to that point there had been one hundred and twenty thousand strikes worldwide, with over thirteen million participants in seven thousand five hundred cities, spread over two hundred and twenty eight countries (Scheitle 2020, 4).

A resounding participation, led by the youngest. Thunberg had managed to physically and, above all, emotionally involve masses of children and adolescents. And how is it possible that a young Swedish girl, hitherto unknown, was able to mobilise millions of people worldwide?

Thunberg, and her team, were extremely adept at tapping into the sensibilities of Generation Z children and their sense of abandonment and hostility towards the generations of their parents and grandparents. Indeed, Thunberg, in all his public speeches, such as the famous one at the UN Climate Summit in 2019, uses the rhetoric of 'us' versus 'them'. A ploy used by all the greatest orators in history. The identification of an enemy, of a person responsible for the misfortunes that affect the recipients of the speech. The 'they' identified by Thunberg were the politicians, the older generations, the institutions and governments around the world, guilty of having exploited resources and the environment for their own enjoyment for the past decades and then destined the climate catastrophe for their children and grandchildren (Han and Ahn 2020, 10). Thunberg, in fact, has always insisted on another fundamental point in his dialectic. Urgency. The need to act quickly if we do not want to

reach the apocalypse, the point of no return (Murphy 2021, 7). Rhetoric designed to stir the fear and anxiety of the interlocutor. The aim of Thunberg's oratory was to awaken the sense of injustice in the young people listening to it and, consequently, incite them to participate, to fight for their future. It was certainly a winning strategy, which brought young people around the world to the streets in a way that had not happened in decades.

This narrative also worked for two other reasons. Firstly, it was based on scientific data and proven by the international scientific community. For years, experts have been warning and publicising the need for action to prevent the world's average temperature from rising by two degrees compared to the pre-industrial age, which would lead to climatic, political and social upheavals that would impact all of humanity. Thus, Thunberg's rhetoric was reinforced by the scientific substantiation of his fears and anxiety.

Moreover, the media power of Thunberg and his words was enhanced by the tool that most characterises Generation Z, namely social media. In the spread of the Fridays for Future movement, they were crucial for several reasons. First of all, trivially, they were useful for word of mouth and the organisation of events, to call as many young people as possible to action (Stoecklin 2021, 13). In addition to this, through social networks, the movement and Thunberg were able to spread their message widely. Thunberg is extremely active on social networks, such as X, the fu Twitter, and Instagram. On these platforms, every Friday the young activist posts photos of her strike in front of the Swedish Parliament. Suffice it to say that on Instagram, her page is followed by more than fourteen million followers, while on X it reaches five million.

Another advantage brought about by social networks is the ease with which content featuring Thunberg can be disseminated. His figure has become known mainly due to the virality of many of his speeches or actions (Han and Ahn 2020, 6). The aforementioned speech at the 2019 UN Climate Summit accumulated tens of millions of views on YouTube and other sites, reaching people all over the world.

Thunberg did not, however, disdain traditional media. It is clear that in order to achieve effective results, his activism could not only appeal to teenagers. Thunberg also needed to speak to and interface with the adult population, trying to raise awareness. For this reason, she was invited and participated in several important television programmes over the years, such as 'The Late Show' or 'The Ellen Show' (Han and Ahn 2020, 6; Murphy 2020, 5). The print media has also always devoted a lot of space to the young Swedish activist and the movement she created. Major newspapers such as the New York Times and Al Jazeera have written about the events organised by Fridays for Future. Even, in December 2019,

the prestigious Time magazine dedicated its cover to her, electing her 'Person of the Year', an award dedicated to the most influential individual in the calendar year.

The award is explained by the fact that 2019 was the most important year for the Fridays for Future movement. Indeed, in 2019, the organisation became international in scope and involved millions of young people all over the world. As for Europe, it is indisputable that it played a role in that year's European elections. Studies have confirmed how, within the political and legislative dynamics of Germany, Fridays for Future events had a partial influence and brought environmental issues into the parliamentary dialogues (Schürmann 2023; Scheitle 2020).

Clearly, the parties closest to environmentalist demands and which actively supported the young people who took to the streets belonged to the centre-left and left-wing area (Berker and Pollex 2023). The progressive and ecological parties tried in the months leading up to the elections to exploit the strong environmentalist sentiment that was warming the hearts of millions of young voters. On the other hand, parties belonging to the populist right wing area tried to take advantage of the discontent of a section of the population that viewed ecological issues and activists with distrust.

Between 24 and 26 May, citizens throughout the European Union were called upon to elect the new European Parliament. As was to be expected, the awakening of environmentalist awareness led to a big result for the Green lists. In fact, the European Green Party recorded the best electoral success in its history. It succeeded in electing no less than seventy parliamentarians, far better than the fifty, however, who had been seated in the previous legislature. The result was the result of the excellent percentages taken in some countries such as France, thirteen per cent, Germany, twenty per cent, and Belgium, fifteen per cent¹¹. Studies in Germany have also confirmed a relationship between the Fridays for Future demonstrations that took place in German town squares and the increase in votes in national and European elections for the Green Party (Valentim 2023, 33; Fabel et.al. 2022, 25). It is therefore certified that this environmental movement has brought attention back to ecological issues and influenced part of public opinion and political dialogue.

The Greens will not be part of the composition of the Von der Leyen Commission, but it is undeniable that the Fridays for Future events have awakened strong environmentalist sentiment throughout Europe and had a great importance in the policies subsequently undertaken by the European institution. Decisions, which, as seen above, aim to

¹¹ il Post. 2019. "Chi avrà la maggioranza nel Parlamento europeo". il Post, May 27, 2019. <https://www.ilpost.it/2019/05/27/parlamento-europeo-elezioni-europee/>

revolutionise the political, economic and social approach and structure of the European Union.

In the following section, an attempt will be made to study the Fridays for Future movement in Italy, discerning its characteristics, composition and roots. How has environmental activism in Italy changed since 1990? How is it structured?

First of all, we must start from the assumption that the Italian Fridays for future movement has been one of the most popular and successful in Europe and the world. In over five hundred strikes throughout Italy, it is estimated that almost two per cent of the Italian population was mobilised (Bertuzzi et.al. 2021, 6).

At the first global strike in September 2018, the demonstration in Milan, with over one hundred and forty thousand participants, recorded the second highest number of protesters in the world, surpassed only by the one held in Montreal (Bertuzzi et.al. 2021, 9).

But to what do we owe these excellent results? Especially considering that in Italy, historically, environmentalist parties have never achieved much support.

The reason for these successes is due to the excellent organisation of the different ribs of the Italian movement (Bertuzzi et.al. 2021, 9). As of September 2019, there were over one hundred and seventy three divisions, scattered throughout the country (Bertuzzi et.al. 2021, 8). Moreover, from the earliest events, Fridays for future events were also attended by activists from other movements, what are called by scholars LULU (Locally Unwanted Land Use) (Bertuzzi et.al. 2021, 10). LULU movements have characterised environmental protests in Italy since the 1990s. Some important examples from the past decades can be the protests against the construction of the high-speed railway, called NO TAV; the demonstrations to prohibit the passage of cruise ships in Venice, which took the name No Grandi Navi; the protests to stop the construction of the Trans Adriatic Pipeline (TAP) in Apulia, called NO TAP (della Porta et.al. 2019).

These movements have a strictly local character and organisation, although they have also tried to unite and share goals, but with little success given the internal divisions within them (della Porta et.al. 2019, 26). Italian LULU movements are made up of a heterogeneity of actors and social groups, diversity of ideologies and generations (della Porta et.al. 2019, 26). At the political level, they hardly compactly supported a national party given a widespread distrust in institutions, which explains the poor results of Green lists in Italy. On the local level, however, they support lists that promise to fight against infrastructure, which

is, according to activists, guilty of destroying the environment. The only national political party that has managed to take on board the demands of the LULU movements has been the Five Star Movement (M5S), which in the first years after its creation was staunchly opposed to the TAV, the TAP and the passage of the Great Ships to Venice (della Porta et.al. 2019, 23). The promises and premises, however, were broken when the M5S formed a government first with the far-right party Lega and then with the Partito Democratico, both of which were in favour of the implementation of large-scale works.

The first demonstrations of the Fridays for future movement in the autumn of 2018 coincided with a period of great turmoil in the LULU movements. Thus, the two types of organisation decided to collaborate and influenced each other. During 2019, there were also two assemblies of the leadership of the various local FFF divisions, where support for the battles of the various LULU movements was emphasised (Bertuzzi et.al. 2021, 10). From the LULU movements, FFF activists learnt technical expertise as well as human and social capital (Bertuzzi et.al. 2021, 15).

This proximity and co-participation between the two movements is also evidenced by the data on the participants of the Fridays for Future events. Like their continental and international counterparts, a large proportion, thirty-three per cent, of the demonstrators were very young students between the ages of fifteen and nineteen, at their first demonstration (Wahlström et.al. 2019, 114). However, the twenty to thirty-five and thirty-six to sixty-five year olds, who made up thirty and thirty-two per cent of the participants, respectively, should not be excluded from the analysis. This figure, which differs from the age group of FFF movements in other countries, proves the presence of some activists from LULU movements (Bertuzzi et.al. 2021, 11).

Thus, the Fridays for future movement in Italy has been a success story in terms of participation that has taken the skills and tradition of Italian environmental movements of the last thirty years and succeeded in reinvigorating environmental activism. Despite this, the results from a political and electoral point of view for green or environmentalist views are poor, given a general distrust in the political class that characterises activists and younger people (Bertuzzi et.al. 2021, 16). An important outcome attributable to movements, however, is the declaration of climate emergency approved by the Italian Parliament in 2019 (Bertuzzi et.al. 2021, 16).

4.3. THE MONOPOLY OF CHINA

The previous section explained and narrated the window of opportunity related to the vigorous and reinforced environmentalist sentiment that gripped the whole of Europe just before the 2019 European Parliament elections. Following this, an attempt will be made to explain also the economic, political, industrial and strategic requirements that have led, and for certain reasons forced, the European Commission and European leaders to focus on all-electric mobility. In particular, the global situation of the value chain of the electric transport sector will be analysed, with a specific focus on the monopoly in battery production that China has built up over decades of investment and industrial and raw material procurement plans. This, added to the increasing demand for electric vehicles, can be seen as a second window of opportunity for the introduction of electric cars in Europe. The global road transport market is moving in that direction, given the growing demand and need to lower greenhouse gas emissions and Europe is still lacking to establish a secure supply chain for batteries. The European automotive industry, in the view of the European Commission, needed an incentive and a forcing to start structuring a systematic policy and strategy towards mass production of electric vehicles.

This section will be divided into two parts. The first section will show the apprehension and doubts of Italian public opinion, through a number of periodicals, with regard to the transition to electric mobility and thus with regard to the challenge to the entrenched Chinese monopoly. According to public opinion, the backwardness of the European automotive sector with regard to electrics is not a reason to bet totally on this technology, but rather a reason not to fall into the clutches of Chinese interests.

The articles useful for this purpose are the result of a research activity; in particular, two specific newspapers were chosen. *Il Sole24ore*, a periodical specialising in economic and managerial issues, owned by Confindustria, the main organisation representing Italian companies. The editorial line promoted by the newspaper is protectionist, i.e. a defence of the Italian industrial sector. As is logical, the view of *Il Sole24ore* is critical, or at least sceptical, of the obligation to sell battery-powered cars, because according to this view, it would favour Chinese companies to the detriment of Italian and European ones. The second newspaper chosen for this analysis of the public debate is the online newspaper *il Post*. It is a progressive newspaper, full of in-depth articles and analyses of international and economic issues. Although the editorial line is critical in that data unfavourable to the European

automotive industry is presented, it is not necessarily against the new European regulation. It merely presents the critical issues and emphasises the obvious need for the European industry to catch up. For this reason, it is interesting to compare the articles of this newspaper with an undoubtedly biased narrative such as that of Il Sole24ore.

To find these articles, the following keywords were used in the databases of the two newspapers: 'electric cars', 'electric cars china', 'batteries china', 'electric cars europe'. The articles collected and useful for the purpose of the following section are dated from 2019 to 2024.

The second part of this section will list some evidence from some scientific articles on the issue of Chinese domination of the entire supply chain for battery and electric car production. As will be seen, the evidence will partly justify the public's concern, justifying it, but it will also underline the need for European industry to invest convincingly and structurally in the supply of raw materials and skills for battery production, in order to be able to follow the market trend and environmental and social requirements.

What scares the Italian public? What are the arguments that justify this scepticism towards the transition to electric cars? Why is it that for the public debate the ban on sales of combustion cars will not be an incentive for European companies to invest in electric cars but a real leap into the void, or rather a leap towards a Chinese monopoly?

Some articles in il Post dated 2019, entitled 'We are losing the battle of batteries for electric cars' and 'How China dominates the electric car battery market', outline the situation as extremely problematic for the European car industry, compared to what is described as absolute Chinese dominance. They also tell how European and international companies are dependent on Chinese battery production. However, the underlying message of the articles is one of alarm, but the urgency on the European side to invest and catch up with China is also emphasised¹²¹³. Thus, one does not per se find a view against the transition to electric power. A similar argument can be extended to the article from June 2023, thus after the approval of Regulation (EU) 2023/851, entitled 'No electric car without China'. Here too, the

¹²Piscitelli, L. M. 2019. "Stiamo perdendo la battaglia delle batterie per le auto elettriche". il Post, February 6 2019. <https://www.il Post.it/2019/02/06/batterie-elettriche-francia-germania-cina/>

¹³ il Post. 2019. "Come la Cina domina il mercato delle batterie per auto elettriche". il Post, November 8 2019. <https://www.il Post.it/2019/11/08/cina-batterie-auto-elettriche/>

total dependence of the European and US industries is outlined and reiterated. It is described how, according to the author of the article, China has managed to create supremacy in the extraction and use of raw materials, and in the production of batteries, even at low cost. That is, thanks to state programmes that decades ago foresaw the economic and strategic potential of batteries and rare earths. Despite, the delicate landscape represented, there is no reference in the article to a specific position against a ban on the sale of petrol-powered cars. On the contrary, European and American plans to stimulate domestic battery production are specifically described¹⁴.

Instead, one can develop an almost opposite argument by analysing the articles on the subject in *Il Sole24ore*. In the article 'Europe lags behind on the electric car' from 2019, the disparity in sales and production of battery-powered cars between China and Europe is outlined. The position of the editorial line of *il Sole24ore* becomes extremely critical and alarmist in the vicinity of the approval of Regulation (EU) 2023/851. The newspaper's view is clear in the sentence 'The push towards forced electrification of the car imposed by the EU, with little technological neutrality, has as a "collateral" effect that of having thrown Europe's doors wide open to the Chinese', which we find in the article 'Electric cars, so the "Chinese syndrome" changes the geography of the world industry' of 2023¹⁵. The switch to electric, in the editorial line of the newspaper, which it is important to recall is owned by *Confindustria*, is seen as a surrender to the Chinese government and companies. Moreover, in many articles the word 'invasion' is used, both in the title and the body, in reference to the export of Chinese electric cars to Europe, as in the case of the article 'Export, China dominates with electric cars. What can stop the invasion?' or even "Chinese cars, an electric

¹⁴ *il Post*. 2023. "Non esiste un'auto elettrica senza la Cina". *il Post*, June 1, 2023. <https://www.ilpost.it/2023/06/01/auto-elettriche-cina/>

¹⁵ Cianflone, M. 2023. "Auto cinesi, una invasione elettrica che cambia la geografia dell'automotive". *Il Sole24ore*, December 14 2023. <https://stream24.ilsole24ore.com/video/motori/auto-cinesi-invasione-elettrica-che-cambia-geografia-automotive/AFZPsR3B>

invasion that changes the geography of automotive”¹⁶¹⁷¹⁸. Moreover, it is no coincidence that in some articles the dubious positions of the top management of ACEA, the European Automobile Manufacturers Association, are highlighted. In two articles, one at the end of 2023 and the other at the beginning of 2024, the journalists from il Sole24ore quote statements by ACEA Director General Sigrid de Vries, in the first, and ACEA President Luca de Meo, in the second. Both express concern about the current state of the European electricity sector, especially with reference to strong competition from China, and call for a common European plan to support the transition¹⁹²⁰.

So, as one might have guessed, there are fears and doubts in Italian public opinion regarding the definitive transition to electricity, given the dominant market position attributed to the Chinese industry. But do these concerns have a basis in truth? The short answer is yes, as will be seen below. But the European car industry's lagging behind the Chinese industry in the transition to electric engines may not be a brake on the industry. But rather, a window of opportunity. A train that if not taken now, will never be taken again, condemning the European automotive industry to a gregarious future. This is the position of the Von der Leyen Commission, and it is for these reasons that Regulation (EU) 2023/851 was launched. China has dominance over the entire battery value chain. The People's Republic has long anticipated its rivals by building and structuring the entire supply chain for the production of the cars of the future. In particular, the Chinese government has invested over the decades in the sourcing and refining of so-called rare earths (Schmid 2020, 3).

¹⁶ Annichiarico, A. 2023. “Export, la Cina domina con le auto elettriche. Cosa può frenare l’invasione?”. ilSole24ore, August 28 2023. <https://www.ilsole24ore.com/art/auto-cina-podio-esportatori-treinare-e-boom-modelli-elettrici-AFseDBe>

¹⁷ Cianflone, M. 2023. “Auto elettriche, così la «sindrome cinese» cambia la geografia dell’industria mondiale”. Il Sole24ore, May 16 2023. <https://www.ilsole24ore.com/art/auto-elettriche-cosi-sindrome-cinese-cambia-geografia-dell-industria-mondiale-AEA1z7TD>

¹⁸ Canali, C. 2024. “Boom di auto elettriche e di marchi cinesi in Europa nel 2023”. Il Sole24ore, February 15, 2024. <https://www.ilsole24ore.com/art/boom-auto-elettriche-e-marchi-cinesi-europa-2023-AFqtMXjC>

¹⁹ Il Sole24ore. 2023. “ACEA: Cina dominante nelle auto elettriche, serve una strategia europea”. Il Sole24ore, December 21, 2023. <https://www.ilsole24ore.com/art/acea-cina-dominante-auto-elettriche-serve-strategia-europea-AFrjFw8B>

²⁰ Il Sole24ore. 2024. “Luca de Meo: «In Europa costi troppo alti sull’auto elettrica. Serve un piano comune»”. Il Sole24ore, March 19 2024. <https://www.ilsole24ore.com/art/luca-de-meo-scrive-all-europa-l-automobile-e-cuore-economico-ue-AFXBRn6C>

The rare earths, this set of seventeen indispensable minerals, are needed for the production of, among other things, smartphones, photovoltaic panels and of course batteries for electric vehicles. Their geopolitical importance is crucial in world balances. Whoever has control over them will in the near future have a dominant position over many of the industries that are now developing rapidly, such as those related to the ecological transition. . It has been calculated that ninety-seven per cent of the world's mined rare earths are only processed in China, despite the fact that this nation possesses thirty-eight per cent of the natural supply of these precious minerals (Falfari and Bianchi 2023, 22).

Beijing's position of power in the rare earth supply chain comes from long-term planning that dates back to the 1950s. In addition, China has developed state-of-the-art methodologies in the processing of these materials, making Chinese know-how the most advanced in the world (Mancheri 2012, 2). The People's Republic started this process in the 1960s, reaching mass production of rare earths in the 1970s. Thanks also to foreign investments, China managed to organise an integrated and international supply chain in the late 1900s. The Chinese government understood the importance and cruciality that these resources would have in the future, so much so that President Deng Xiaoping said in 1992, 'in the Middle East there is oil, in China there is rare earths', and in 2003 they were declared a protected and strategic material (Jetin 2023, 10).

In its strategy China has also implemented a protectionist policy, restricting exports of the reserves within its national territory as much as possible, triggering proceedings at the World Trade Organisation by Western countries in the 2010, which was followed by a formal condemnation in 2014, forcing China to remove the restrictions the following year (Mancheri 2012, 6; Jetin 2023, 11).

In addition, China, through its "going out strategy" of 1999, has also established excellent commercial and strategic relations with some African countries, which are rich in natural resources and raw materials (Jetin 2023, 10).

In its strategy to establish itself as a leader in the economy of the future, the Chinese government also decided to invest heavily in the production of electric cars. However, European and American technological and know-how leadership made it difficult for the fledgling Chinese automotive industry to establish itself in the international context.

Therefore, the Chinese central government decided to focus on the car of the future, the zero-emission, electric car. The obvious aim was to get ahead of its rivals in time in order to ensure complete control of the supply chain and the development of state-of-the-art production techniques.

State support for the production of electric cars began with the Eighth Five-Year Plan from 1990-1995. State investment in research and development in this sector continued with the subsequent Eleventh Five-Year Plan, between 2006 and 2010, and Twelfth Five-Year Plan, between 2011 and 2015. In 2012, the 'Development plan for the new-energy automobile industry (2012-2020)' asserted that the transition to all-electric mobility was the long-term orientation to follow (Kalthaus and Sun 2021). Furthermore, in 2015, the production of electric vehicles became one of the ten key sectors the government would invest in and included in the 'Made in China 2025' programme (Jetin 2023, 10).

In addition to research and production incentives, the Chinese government also started subsidising the purchase of electric cars, starting in 2009. Over the years, it implemented a series of policies, both monetary, i.e. real incentives, and non-monetary, such as lotteries to obtain an electric car licence plate. In addition, the Chinese government has successfully implemented a plan to build charging stations throughout the country. By 2023, according to IEA data (2023), there would be over two million seven hundred thousand public charging stations in China. All these policies undertaken by Chinese institutions have been very successful with regard to the sales and spread of electric cars (Kalthaus and Sun 2021). In 2023 alone, five million four hundred thousand electric cars were sold in China, accounting for thirty-eight per cent of total sales in the country (IEA 2023). Nine million five hundred thousand electric cars were sold worldwide in 2023, so the Chinese market constitutes fifty-six per cent of the global market. There are sixteen million electric cars in China, making up seven and a half per cent of the national car fleet and fifty-seven per cent of the world's electric cars (IEA 2023). The sector remains in constant and exponential growth.

The European market on the other hand, with more than two million electric cars sold, is the second largest market in the world. Here, too, the sales figures for this vehicle category are rising steadily, with an increase of thirty-seven per cent compared to 2022. They account for around sixteen per cent of sales. Clearly, the situation in Europe varies greatly from country to country(IEA 2023). Leading the way on the old continent is Norway, where electric cars in sales by 2023 take up ninety two per cent of the total. In other countries, such as Italy,

the situation is quite different, with sales of electric vehicles well below ten per cent of the total (IEA 2023). In total, they still only account for just over three per cent of the total car fleet in the European Union (IEA 2023).

So, should the current dependence of the electricity transport sector be a hindrance and a brake on the green transition, as perceived by the journalists of *il Sole24ore*? For the European Commission certainly not. The data listed above certify the supremacy of the Chinese industry but also signal, in the Commission's view, a point of no return. In order to remain competitive in the car industry of the future, one must invest now, and the freeze on sales of combustion cars planned for 2035 is intended to give a precise timeline and to incentivise manufacturers to invest in research and production of electric cars. In spite of this, figures show a steady growth in sales of electrically powered cars throughout Europe, and if hybrid cars are also taken into account, electrified cars have been outselling combustion cars for years. This means that the European market, despite the diversity and disparities within it, is ready and demanding more and more electric models (Stocchetti 2023, Stocchetti 2024).

Moreover, as demand increases and also as battery performance increases, the supply of electric models on the market also increases steadily. Thus, in Europe both car manufacturers and motorists are responding affirmatively to the transition to electric (Stocchetti 2023, Stocchetti 2024). The European Commission's decision to ban fuel-powered cars only certifies this and seeks to set clear timeframes and a definitive operational direction, so as to eliminate uncertainty. Only the future will tell whether the time is ripe in Europe for a decisive and necessary transformation.

4.4. THE ITALIAN AUTOMOTIVE INDUSTRY AND ITS PERSPECTIVES TOWARDS THE ELECTRIC VEHICLES

What, on the other hand, is the situation in Italy? Is the Italian country system ready for this next revolution? How has politics received this decision by Brussels? How will Italians and industry react in the coming years to this imposed market upheaval?

In this paragraph it will be specifically analyse the points just listed. An attempt will be made to analyse how this measure by the European Commission will impact the Italian automotive sector, whether Fiat is prepared to invest in electric cars, and whether the country will be able to transform its mobility on the road in little more than a decade. The opinion of Italian consumers will also be studied, in order to excavate and understand the possible obstacles that could slow down the transition process. An attempt will be made to develop a parallelism with the Italian case in the late 1980s at the time of the compulsory adoption of the catalytic converter. As then, in fact, it will be seen that Italy lags behind other European countries in terms of research, infrastructure and distribution of the technology under study. The political class, even in this case, is unprepared, with no real scientific and programmatic preparation to resolve the issue. The aim of this paragraph is therefore to set out the Italian context and analyse it in order to understand the difficulties and the process for introducing a new technology, especially a revolutionary and impactful one.

In the first section through studies and previous literature, written at the turn of the 2020s, with the aim of gaining an overview of the Italian situation and the development of Italian infrastructure in terms of electric mobility. Another key point of the analysis to be developed will be the sentiment of the Italian consumer. Why are so few electric cars purchased in Italy? What are the fears and resistance of Italian motorists? An attempt will be made to understand this, so as to give an overview of the context in which Regulation (EU) 2023/851 will apply and to comprehend the point of view of one of the most important social groups, the consumers.

This first part will be preparatory to the next one. In fact, it will help to understand the cold, if not hostile, reaction of politics and industry to the new restrictions planned by the European Commission for combustion engines. This section will be developed using mainly newspaper articles and specialised motoring magazines as sources, selected after research. In particular, articles from three newspapers will be used to construct this analysis,

with the aim of identifying the different interests of editors and public opinion on the issue. The first newspaper chosen is *Il Sole24ore*, which, as explained in a previous section, is owned by Confindustria, the organisation that represents Italian industry at a political and social level. For this reason, it is easy to guess that the newspaper's editorial line will be to defend the interests of the Italian automotive industry, with a critical attitude towards the choices, in their view, harmful to the European Union and the immobility of the Italian government, guilty of not effectively supporting the Italian automotive sector. A similar position can be found in the editorial line of the second newspaper chosen for this analysis, *La Stampa*. Owned for decades by the Agnelli family, in its articles on the current state of the automotive sector on Italian soil there is a good-natured and extremely trusting attitude towards the Stellantis top management and their industrial policies. So using this paper will help to understand Stellantis' position and point of view towards the transition to electric in Italy, and the propaganda it tries to build in order to express confidence in the future of the Italian automotive sector. To complete the shortlist of newspapers used in this section, some articles from *il Post* were chosen. The editorial line of this online newspaper is definitely more critical of Stellantis and Fiat and its management of the automotive sector. These articles will be fundamental in closing the analysis because they present the opinion of a good slice of public opinion and, as we shall see, also of scholars in the sector. The keywords 'electric cars italy', 'fiat electric cars', 'Stellantis electric cars', 'Tavares electric cars' 'Urso electric cars' were used in the search. Articles from the very recent past were chosen in order to present as up-to-date a situation as possible. Hence, almost all the articles in the section relate to the period 2022-2024.

In addition, a number of articles from specialised journals on specific cases, such as the use of biofuels, have been chosen to delve into these topics.

Newspaper articles were also used to reconstruct the events that led to the approval of Regulation (EU) 2023/851, analysing them from the perspective of the Italian government. In particular, from two articles one from *il Post*, a newspaper already mentioned several times, and one article from *PagellaPolitica*, an editorial project known for its factchecking work. From these articles will be extrapolated the sequence of facts and statements that characterised the Italian government's political activity in the European forum when the new regulations were discussed.

Official documents from the European Parliament and the European Council will be used in order to better understand the role and position of Italian representatives, especially those belonging to the parties that make up the Meloni government, at the European level.

So, what is the situation of the Italian electric market? How widespread is the electric motor in the Italian car fleet?

As previously mentioned, Italian motorists have been and remain rather cold and uninterested in purchasing fully electrically powered vehicles. It is indisputable that, on a general level, there is something loosening and blocking the propensity of Italian consumers to buy an electric car. Fear? Lack of knowledge? Insufficient infrastructure? Probably a combination of the three reasons just mentioned.

The Italian electric car market still represents a small niche. Only sixty-six thousand electric cars were registered in 2023, out of a total of one and a half million vehicles purchased by Italians that year. Thus, new registrations of electrically powered cars in 2023 represent only four per cent of the total. A figure that demonstrates Italy's backwardness in comparison with other European nations. In fact, Italy is the fifth-lowest market in Europe in terms of percentage of new registrations of electric vehicles, ahead only of Slovakia, Croatia, the Czech Republic and Poland. The average of EU countries for this percentage is considerably higher than Italy's; in fact it stands at over fourteen per cent, with peaks of over eighty per cent in Norway, the European nation most projected towards complete transition to electric (REPower 2024, 4).

In general, there are just over two hundred thousand electric cars on the road in Italy, as of 2023, which represents less than one per cent of the car fleet in Italy.

Although these figures are small, they are nevertheless on the rise. In fact, new registrations of electric cars in 2023 grew by thirty-five per cent compared to the previous year, a growth rate higher than the general increase in registrations in Italy of nineteen per cent.

It is also interesting to look at the differences between different areas of the peninsula. In fact, there is a substantial difference in electric car sales between the North of the country, particularly the North-East, and the South.

In fact, data show that in 2023, two-thirds of battery cars were sold in northern Italian regions. In particular, analysing the figure of registered cars per million inhabitants, it can be seen that sales in the North double those in the macro-region of the South, Centre and Islands; in fact, they are one thousand five hundred and seven hundred and forty respectively. The regions with the most sales of electric vehicles are Trentino Alto-Adige and Lombardy, with over twelve thousand new registrations. This figure is the result not only of a higher average level of wealth of the inhabitants of these areas, but also of regional facilitation policies. In

fact, the Autonomous Provinces of Trento and Bolzano and the Lombardy region have organised state aid of up to four thousand euros for the purchase of an electric vehicle (REPower 2024, 6).

In order to better understand the panorama and future of the Italian electric car market, it is clear to outline and understand the state of diffusion and capillarity of the recharging column network in Italy.

Although Italy is behind and lagging behind other European and international countries, the situation in recent years has improved considerably, with a growing trend throughout the country.

First of all, a characteristic of Italian motorists must be stressed. They, for the most part, do not drive long distances in the course of a year. In fact, seventy-five per cent of Italian motorists drive less than ten thousand kilometres per year. Moreover, seventy-five per cent of Italians own a private parking space (Scorrano et.al. 2019, 9). Thus, the norm for Italians is to drive small, mainly urban stretches of road. Therefore, motorists with electric vehicles will prefer to recharge their car battery at their private parking space. In fact, the data confirm this. Eighty-nine per cent of electric car owners live and work in cities; half live in single-family homes. So car charging for these people is the most logical solution. In fact, fifty-seven per cent prefer to use the charging points in their homes.

Thanks to funds made available by Italian institutions for certain tax incentives, there are many private charging points in Italy. In fact, Motus-E estimated that in 2023 there will be more than four hundred thousand, which is ten times more than the number of charging points for public use (REPower 2024, 7-9). Moreover, it is important to emphasise that this figure is also far higher than the number of electric cars present in Italy.

On the other hand, as far as recharging points for public use are concerned, by 2023 they will have reached over fifty thousand. Last year there was a growth of thirty-eight per cent, with fourteen thousand new charging points. Here again, the north of the country is ahead of the other macro-areas of Italy. In fact, fifty-eight per cent of the charging stations are located there, compared to twenty-two per cent in the Centre and twenty in the South and Islands. Lombardy, Piedmont and Veneto are the regions with the highest number of columns. Nevertheless, the region with the highest growth in 2023 in terms of the implementation of new charging stations is Campania, which has more than tripled the number of columns.

The most worrying figure, however, is that of the power of the charging stations, and thus of the speed at which the batteries are recharged. In fact, more than eighty-six per cent of the columns have a power rating of less than fifty kilowatts. Fast' charging points, i.e. with a power of between fifty and one hundred and fifty kilowatts, make up nine per cent of the Italian panorama. Ultra-fast charging points, i.e. above one hundred and fifty kilowatts, do not exceed five per cent of the total (REPower 2024, 7-9).

So, the infrastructure, although lagging behind other countries, is there and is constantly growing in diffusion. What worries Italian motorists? What is stopping them from buying an electric car?

There is some promising data. According to an analysis²¹, one third of Italians are convinced that they will buy an electric car in the next three years. So why is Italy still so far behind the European average when it comes to the registration of electric vehicles?

Several factors influence and have influenced this attitude among Italian consumers. First and foremost, the high starting price of electric cars. In fact, the offer of electric cars is still almost entirely composed of high-end vehicles, which cannot be purchased by a large segment of the market with low spending power. In contrast to petrol- or diesel-powered cars, there is no major price differentiation, with opportunities for all wallets. In fact, generally for the purchase of an electric car, the initial outlay is around thirty-five or forty thousand euros. So, at the time of writing, electric cars remain a privilege for the few. The reason for the high price is twofold. Certainly it is conditioned by bottlenecks in the value chain, such as the restricted availability and difficulty in extracting key raw materials, the shortage of semiconductors, and the factual Chinese monopoly. But there is also another motivation. Car manufacturers currently sell their electrically powered models mainly in rich, industrialised countries. So countries where purchasing power is high on average. According to an analysis constructed by Stocchetti for CAMI (2024), the biggest brake on the purchase of electric cars is price. In fact, the big difference in purchase rates between northern European countries and Italy can be traced back to the difference in purchasing power in the different countries. In fact, to buy an electric city car in Italy you need almost fifteen

²¹ Il Sole24ore. 2023. "Un italiano su tre è convinto che nei prossimi tre anni acquisterà un'auto elettrica. Il sondaggio di Toluna". Il Sole24ore, August 6, 2023. <https://www.infodata.it/Sole24ore.com/2023/08/06/un-italiano-su-tre-e-convinto-che-nei-prossimi-tre-anni-acquistera-unauto-elettrica-il-sondaggio-di-toluna/>

average salaries, in Denmark eight. Almost twice as much. So the negative figures, compared to the European average, for sales of electric cars in Italy are understandable.

Necessary state intervention is needed to overcome this obstacle. Many studies (Scorrano et.al. 2019; Rotaris et.al. 2020; Giansoldati et.al. 2018; Danielos et.al. 2020) confirm that a state incentive scheme that helps and supports consumers in the purchase of electric cars is the main solution to overcome Italians' perplexity towards this new technology. As it was mentioned earlier, a good percentage of Italians seem predisposed to buying a model equipped with an electric motor, even in the short term. What is inevitable, in order to achieve the goals set and decided for the green transition, is a contribution from the state that accompanies this propensity of Italian motorists and also helps the less affluent to consider the electric alternative, abandoning the internal combustion engine.

Other concerns of Italian motorists relate to the reliability and functioning of the battery. In fact, what is called, 'range anxiety', the worry of not reaching the desired destination with the remaining battery charge, is widespread. It is a common fear among motorists, often influencing their purchasing decisions. However, in recent years, the technology and range of car batteries has improved drastically. It is estimated that in just over ten years, from 2010 to 2021, the average range of a full battery pack has increased from one hundred and twenty-seven kilometres to three hundred and fifty kilometres. An improvement that has led the batteries to last more than twice as long, in just a few years (REPower 2024, 24; Stocchetti 2024). The aspiration is to have batteries that have a comparable range with petrol cars by 2035, so that motorists no longer feel this worry. In addition, there is a need for a type of communication, on the part of government and car companies, that teaches and publicises these constant and important improvements in the state of infrastructure and technology for electric cars. If this is not applied, scepticism and fear of change will always play an important role in consumer choice.

One issue, closely related to the previous one, concerns the speed of battery charging at current stations. As mentioned, most public charging points have limited power and therefore take several minutes to charge an average electric car. Charging stations with a power output of less than fifty kilowatts, which are by far the most common in Italy, can take up to hours to charge an average battery. On the other hand, by using 'fast' and 'ultrafast' charging stations, i.e. with a power output of more than fifty kilowatts, motorists can fill up their battery in a matter of minutes (Enel X n.d.), minimising the loss of time and comparison

with petrol alternatives. This topic is also central to consumers' evaluations when choosing to buy a new car.

As shown in the study by Giansoldati et.al. (2018, 7), if one were to actively intervene on the three points just mentioned, i.e. lowering the price with state aid, improving the performance of battery autonomy and reducing recharging times, Italians' propensity to purchase an electrically powered vehicle would increase considerably.

So, given this information on the general and current situation of infrastructures and consumer attitudes, it is important to understand, as a next step, how Italian politics and industry are moving towards the ecological transition of road transport. In order to understand the future prospects of the Italian system, which road is being taken and whether there really is a chance of achieving the sustainability targets set by the Von der Leyen Commission.

After analysing consumer sentiment and the state of the Italian market, the analysis moves on to analyse the political debate and Stellantis' point of view, combined with a snapshot of the health of the Italian automotive industry. This will be done using a series of newspaper articles, mainly from three newspapers: La Stampa, il Sole24ore and il Post. How has Italian politics reacted to the Commission's proposal to ban internal combustion cars by 2035 and to oblige citizens to use cars with electric motors? As can be easily guessed, there has been a clear split of opinion according to political colour. The parties most sceptical about the need for energy and ecological transition, with even climate change denier components, took an extremely hostile stance towards the new European regulation. Parties such as the Lega and Fratelli d'Italia, especially the former, have ingrained a strong Eurosceptic sentiment and have taken the opportunity to feed and enrich their propaganda against European summits, which they claim are against Italy's interests. In particular, the Secretary of the Lega, Matteo Salvini, Minister of Transport and Infrastructure in the Meloni government, has increasingly insisted in his personal battle against the Commission's measure.

Specifically, Salvini has repeatedly lashed out at the Socialist Environment Commissioner Frans Timmermans, guilty, according to him, of being moved only by ideological and fundamentalist motives, as reported in a La Stampa article²². Even the more moderate

²² Grignetti, F. 2023. "Salvini, attacco all'Ue: "Timmermans? Da ricovero coatto. Il successo del Btp dimostra che il Mes non serve"" La Stampa, June 10, 2023. https://www.lastampa.it/politica/2023/06/10/news/salvini_attacco_allue_archiviare_la_folle_ideologia_euro7_il_successo_del_btp_dimostra_che_il_mes_non_serve-12850780/

Forza Italia has always opposed a ban on petrol car sales in 2035, despite the fact that this party is part of the same European political family to which Commission President Von der Leyen and most of the Commissioners belong, namely the European People's Party.

In contrast, Italian parties with more progressive ideals, such as the Democratic Party or the populist Movimento Cinque Stelle, have always supported the Commission's proposal.

This clear division of the Italian political landscape can be seen in the European Parliament's final vote on Regulation (EU) 2023/851 dated 14 February 2023, in which the regulation was approved with three hundred and forty votes in favour, two hundred and seventy-nine against, and twenty-one abstentions. The MEPs of the Lega, the largest group among the Italian representatives, Forza Italia and Fratelli d'Italia voted en bloc against the measure. It is curious to note that the vast majority of MEPs ascribed to the European People's Party, which as mentioned is the most represented European party in the Von der Leyen Commission, voted against the adoption of the regulation. On the other hand, in the votes in favour, mainly MEPs belonging to the centre and centre-left parties, thus also MEPs from the Democratic Party and the Movimento Cinque Stelle, will be found (European Parliament 2023g).

Lega and Forza Italia MEPs have also distinguished themselves with a number of parliamentary questions to the Commissioners to address them and discuss issues, which they see as critical, of the next ecological transition, such as European battery production and the use of biofuels. This last topic is crucial in Italian political and industrial dynamics. The two questions referred to were tabled one in 2021 and one in 2023. They asked for explanations as to why this special type of fuel was excluded from the European perspectives on the clean mobility of the future. Biofuels are mixtures that are obtained from organic, biomass residues. They are responsible for less pollution and lower greenhouse gas emissions than traditional fossil fuels, such as petrol or diesel. To have a reduced environmental impact, however, it is essential that they are produced from waste biomass, unused in other processes. This is the fundamental characteristic of second-generation biofuels, which differ from the former because they are not generated from biomasses cultivated and produced specifically for the creation of fuels.

Monocultures of organic material for the mere purpose of producing biofuel can have a major environmental impact, with regard to loss of biodiversity, land use, water consumption and competition with the environmental market (Fargione et.al. 2010; Rodionova et.al. 2016).

The Italian government and companies have invested considerably in the production of biofuels in recent decades. Eni, the multinational oil company under the control of the Italian state, has staked a lot of capital on the entire biofuel chain in recent years, making Italy an advanced nation in the research and processing of this fuel. Suffice it to say that in 2025 Eni aims to produce over two million tonnes of biofuels per year, rising to six million in ten years' time. This is still less than the seven tonnes of petrol and twenty three tonnes of diesel consumed in Italy in 2021.

According to statements given to ANSA, the most important Italian news agency, the company has converted several refineries in Italy, such as those in Porto Marghera and Gela, for the production of this special fuel. In them, waste biomasses are used, such as waste and frying oils or oils from crops that do not compete with agricultural production. Furthermore, Eni has also invested abroad, particularly in Africa, building a hub in Kenya in 2022, and two more are planned to be built in the coming years, including one in Congo²³. The 2035 stop on sales of internal combustion cars clearly hinders Eni's planned development projects to some extent. However, it must be emphasised that biofuels cannot only be used by cars, but will also be very useful in the transition to less polluting mobility in air and sea transport, in line with the European Union's 'Fit for 55' plan.

Fiat, and more generally the Stellantis group, have also moved to explore the biofuel alternative in recent years. A series of press articles testify and report on some of the attempts and projects Fiat has implemented in the recent past. In fact, the multinational company has implemented several research and experimentation plans to develop engines using biofuels²⁴. For example, Fiat engineers developed a highly efficient ethanol engine²⁵.

²³ Secondino, S. 2023. "Italia avanti su biofuel, ma pochi per l'auto". Ansa, March 4, 2023. https://www.ansa.it/canale_motori/notizie/analisi_commenti/2023/03/04/italia-avanti-su-biofuel-ma-pochi-per-lauto_cc33a4e5-6f1a-40dc-9c40-7ad8783f15e7.html

²⁴ Ansa. 2018. "Fiat Panda usa da un anno biometano ricavato da acque reflue". Ansa, March 15, 2018. https://www.ansa.it/canale_motori/notizie/eco_mobilita/2018/03/15/fiat-panda-usa-da-un-anno-biometano-ricavato-da-acque-reflue_1e10dbaa-a3af-485d-be1b-6e396d12a8c1.html

²⁵ Volpe, M. 2019. "FCA sviluppa un nuovo motore a etanolo ad alta efficienza. L'etanolo verrà scomposto per ottenere idrogeno". Passione auto italiane, November 15, 2019. <https://www.passioneautoitaliane.com/2019/11/fca-sviluppa-un-nuovo-motore-etanolo-ad.html>

Furthermore, Stellantis has invested heavily in biofuels in the Brazilian market, after these fuels are extremely widespread²⁶²⁷.

In fact, it is no coincidence that Stellantis CEO Carlos Tavares commented on the European Commission's decision to ban biofuels as a fuel for cars from 2035 as 'a wasted opportunity'²⁸.

It is therefore understandable why the Italian government has repeatedly insisted in the EU to include biofuels within the green solutions envisaged for consumers after 2035. In addition to the economic and strategic issue, given the advancement of the Italian supply chain, biofuels, in the Italian vision, would have been an excellent intermediate option to accompany the complete zero-emission.

The convincing action was perpetrated by Italian representatives regardless of the political colour of the executive.

As early as 2022, the Draghi government tried to broker the introduction of biofuels in Regulation (EU) 2023/851. The government, led by the distinguished economist Mario Draghi, was formed after a broad agreement within the Italian Parliament, with almost the entire hemicycle supporting the executive. The head of the Ministry of the Environment, then called the Ministry of Ecological Transition, was the physicist and business executive Roberto Cingolani. He was a technical figure, much appreciated on a bipartisan basis. Wanted as a minister by the Movimento Cinque Stelle, he later became energy advisor to the Meloni government. In February 2022, Cingolani, as minister, affirmed and reiterated the importance of biofuels for the government and his department. On 29 June 2022, the European Council, with the Union's energy ministers, thus including Cingolani, adopted a position in favour of banning petrol-powered cars²⁹.

²⁶ Giannetti, G. 2022. "Stellantis in Brasile scommette su auto ibride ad etanolo". *Gazzetta*, March 7, 2022. https://www.gazzetta.it/motori/la-mia-auto/07-03-2022/stellantis-brasile-scommette-auto-ibride-etanolo.shtml?refresh_ce

²⁷ Grassi, M. 2023. "Biocarburanti sì o no? Il caso del Brasile". *Motor1.com*, April 3, 2023. <https://it.motor1.com/news/660066/bioetanolo-pro-contro-brasile/>

²⁸ Gemelli, F. 2023. "Tavares, Stellantis: "Senza i biocarburanti perdiamo un'occasione"". *Motor1.com*, March 29, 2023. <https://it.motor1.com/news/659646/tavares-stellantis-biocarburanti-occasione-persa/>

²⁹ Canepa, C. 2023. "Anche il governo Meloni è responsabile dello stop alle auto a diesel e benzina dal 2035". *Pagella politica*, February 16, 2023. <https://pagellapolitica.it/articoli/governo-meloni-stop-auto-benzina-2035>

Since the end of October 2022, the new Meloni government, which is clearly conservative in its political orientation, has had a much sharper stance against the measure proposed by the European Commission. As mentioned, Transport Minister Salvini has mounted a strong media campaign against Europe and the decision, in his view, harmful to Italian industry. The new Minister of the Environment, Gilberto Pichetto Fratin, an expression of Forza Italia, attended the European Council on 27 October 2022 with his analogues. An occasion on which Pichetto Fratin, to tell the truth, did not veto or make excessive criticism. It is clear from his statements that he posed some general doubts to the other European representatives about the impact the new European regulation might have²⁹.

Since the beginning of 2023, the Meloni government has increasingly opposed the measure. On 28 February 2023, in view of the European Council scheduled for 7 March and the previous meeting of Coreper, the body composed of the ambassadors of EU countries that prepares Council meetings, the Ministry of the Environment and Energy Security issued a note. It sets out Italy and the Meloni government's decision to vote against the amendment to Regulation (EU) 2023/851. This choice is motivated by the Italian government's opposition to pursuing the ecological transition of mobility with only the electric solution, but through "an economically sustainable and socially equitable transition". Moreover, the benefits of renewable fuels, such as biofuels, are made explicit, which, according to Minister Pichetto Fratin, 'would contribute to the reduction of emissions, without requiring unfeasible economic sacrifices from citizens'.

A position that mirrors the sceptical and environmentally hostile sensitivities of the right-wing majority of the Meloni government. A stance that was followed by one, similarly critical of the Commission, from the German government. In fact, even Germany wanted to include in the European regulation a type of fuel in which its automobile industry had invested considerably, namely e-fuels. E-fuels are fuels of synthetic origin and are produced with energy from renewable sources. These fuels are still very difficult to produce, with high production and consumer costs³⁰.

Therefore, the two European industrial and automotive powers, tried in the final rush of the approval of the new legislation to include some measures in their favour, bringing their negotiating weight to bear.

³⁰ il Post. 2023. "Perché l'Italia è contraria al divieto di vendita di auto a benzina e diesel dal 2035". il Post, March 1, 2023. <https://www.il Post.it/2023/03/01/auto-elettrica-europa/>

As one can imagine, the influence and importance of German companies is decidedly greater than their Italian counterparts. In fact, the complaints of the Berlin government were heard by the Commission, with which it reached an agreement on 27 March. The pact stipulates that it will only be possible to sell cars with combustion engines if they are powered by e-fuel, which guarantees climate neutrality.

The news of the agreement triggered several angry reactions among politicians in the Italian government majority. As reported to ANSA, strong criticism came from Environment Minister Picchetto Fratin, who reproached the Commission for not listening to the needs of an EU founding country. Transport Minister Salvini, on the other hand, accused the European leaders of not thinking about jobs in the Italian automotive sector and of handing over the industry monopoly to China³¹.

In this climate, the twenty-seven environment ministers of the member states met at the European Council on 27 and 28 March 2023 to ratify the regulation. The Italian demands went unheeded. Regulation (EU) 2023/851 was approved with twenty-three votes in favour, Poland voting against, and three abstentions from Bulgaria, Romania and, predictably, Italy. In the official Italian statement during the Council meeting, the reasons for the Meloni government's vote are explained.

First of all, it is stressed that Italy supports the European will to decarbonise the road transport sector. What is criticised is the method. According to the Italian government, it is a mistake not to focus on sustainable fuels for a transition period, as it would be a more accommodating choice for consumers. Furthermore, Italy does not support the purely regulatory approach chosen, in their opinion, by the Commission. Therefore, it invites the European leadership to plan and invest in a stimulus programme project (Council of the European Union 2023).

But what have Italian institutions done in recent years at a national level? What investments, state aid have they provided for the irremediable transition to electric? Is enough being done?

During the economic upheaval caused by the consequences of the Covid-19 pandemic, the Von der Leyen Commission set up the Next Generation EU, a fund worth a total of seven hundred and fifty billion euros. The purpose of this initiative was not only to support the

³¹ Tibuzzi, E. 2023. "Patto Ue-Germania sugli e-fuel taglia fuori l'Italia". Ansa, March 27, 2023. https://www.ansa.it/canale_motori/notizie/istituzioni/2023/03/25/auto-ue-raggiunto-laccordo-con-berlino-sugli-e-fuel_4bd1cc45-77a3-4246-b1b7-e41ab11ec738.html

struggling economies of the member states, but to foster and facilitate a digital and eco-sustainable revolution throughout the European Union; to take advantage of the period of extreme hardship to completely transform the continent's economic and social structure.

The Italian reform and investment project to use the funds allocated by the NGEU, took the name 'National Recovery and Resilience Plan' or shortened P.N.N.R.. In this set of projects, as much as eight and a half billion euros are earmarked for the ecological transition of road transport. Of these, seven and a half billion have been made available for the development of electric charging infrastructures. In the ideas of the Italian institutions, these funds would be used to install more than twenty thousand fast charging points by 2030, divided into thirteen thousand in urban centres and seven thousand on motorways (Pnrr 2021, 142).

On the other hand, as far as state incentives to support the purchase of electric cars are concerned, the so-called 'Ecobonus' was approved in 2019, which allowed for savings six thousand euros at the time of sale (Danielis 2020). This incentive was also renewed in subsequent years, helping the gradual growth of electric car registrations in Italy. The fact is that sales of electric cars in the Italian market are still extremely low, especially compared to other European countries. So it is clear that what has been done so far is not enough.

For the Meloni government, given its conservative and critical orientation towards ecological policies, the issue of incentives is not at the centre of the political agenda. In fact, apart from the renewal of the 'Ecobonus', there are no other active policies to incentivise the purchase of electric cars, such as awareness campaigns or more restrictive traffic blocking programmes than those already in force.

According to Stocchetti (2023), incentives may also have a negative effect on lowering prices in the long run, as they inhibit the natural competitive and stabilising mechanisms of the market.

The editorial line of *il Sole24ore* is critical of the government as it defends the interests of the Italian automotive industry. It is no coincidence that an article in 2024 reports the accusations and threats of Carlos Tavares, CEO of Stellantis, to the Meloni government. The holding company was created in 2021 from the union of PSA, a French company that controlled brands such as Peugeot and Citroën, and FCA, or Fiat Chrysler. Tavares, challenged the Italian government for not investing enough public funds in state incentives to accompany the transition to electric cars. This, according to Tavares, risks causing the closure of some of Stellantis' plants on Italian territory. The manager referred to the plants

in Mirafiori, near Fiat's hometown of Turin, and Pomigliano, in the province of Naples³². This clash between Stellantis and the Meloni government is not an isolated case. As reported in an earlier article in *il Post*, a newspaper with a decidedly more hostile attitude towards Stellantis, Prime Minister Meloni had harshly criticised the actions of the car group, in particular the decision to decrease car production in Italian plants and to relocate activities. Furthermore, Meloni frowned upon the collaboration between Stellantis and the French state. In fact, French institutions have shares in the company, through the state-owned company Bpifrance, and have representatives on the board of directors, unlike Italy³³.

Tensions between the Italian state and Stellantis now, and before Fiat, are nothing new. In particular, the Meloni government has taken a defiant stance with the car multinational. Tavares and Meloni started to shift the blame for the state of little innovation and slowdown of the Italian car industry onto each other. Already in January 2022, in an article in the condescending *Sole24ore*, the words of Tavares were quoted that had admonished Italy, protesting the high production costs in the country's plants³⁴. And Urso, in 2023, had pressed Stellantis to produce at least one million cars in Italy³⁵.

Despite pressure and criticism from the Meloni government, the propaganda and statements from Stellantis and Tavares remain extremely optimistic about the Italian plants and the future of the Italian automotive sector. A series of articles from *La Stampa*, a periodical owned by the Agnelli family, will be used to understand the narrative created by Stellantis and to dive into their point of view. As will be seen, the articles collected are extremely benevolent and adherent with the propaganda proposed by the company's top management, so as to distance themselves with the narrative instead proposed by the

³² Greco, F. 2024. “Stellantis, Tavares: «Senza incentivi all’ elettrico a rischio Mirafiori e Pomigliano»”. *Il Sole24ore*, February 1, 2024. <https://www.ilsole24ore.com/art/stellantis-tavares-senza-incentivi-all-elettrico-rischio-mirafiori-e-pomigliano-AFBkj6YC>

³³ *il Post*. 2024. “La risposta molto piccata di Carlos Tavares al governo, su Stellantis”. *il Post*, February 2, 2024. <https://www.il Post.it/2024/02/02/tavares-governo-stellantis/>

³⁴ Cianflone, M., Pini, S. 2022. “Stellantis, Tavares: «In Italia costi di produzione troppo alti»”. *Il Sole24ore*, January 19, 2022. <https://www.ilsole24ore.com/art/stellantis-compie-anno-e-si-apre-nodo-fabbriche-italiane-tavares-dobbiamo-studiare-situazione-italia-energia-costa-troppo-AE3rsw8>

³⁵ Fotina, C. 2023. “Auto, Urso in pressing su Stellantis: deve produrre 1 milione di auto in Italia”. *Il Sole24ore*, June 11, 2023. https://www.ilsole24ore.com/art/auto-urso-pressing-stellantis-deve-produrre-1-milione-auto-italia-AEy29BeD?refresh_ce

Meloni government. For example, a series of articles list the economic and managerial efforts that Stellantis is, according to them, striving to develop in the present and future.

Some articles from 2023 and 2024 celebrate Stellantis' investment in the Mirafiori plant, which according to the company will become a cutting-edge, sustainable vehicle production hub. The titles of these articles are 'Stellantis: the Battery Technology Centre is born in Mirafiori, 40 million invested'³⁶, 'Stellantis unveils the new Mirafiori: the 55. 000 square metres will be ready in the autumn'³⁷, "Stellantis, 100 million for new batteries: "The way to make Mirafiori competitive"³⁸ and "Stellantis confirms: "Turin pole of sustainable mobility, we will increase production of the electric 500"³⁹. It is clear the company's attempt to show itself to be well disposed to invest in Italy, for the good of the supply chain and its employees, trying to put pressure on the government to do its part for the transition to green mobility. A clear example of this is the article entitled 'Tavares: "Meloni clarifies if he believes in electric"', where Tavares' request for a clear state strategy is reported⁴⁰.

³⁶ La Stampa, 2023. "Stellantis: a Mirafiori nasce il Battery Technology Center, investiti 40 milioni". La Stampa, September 08 2023.
https://www.lastampa.it/torino/2023/09/08/news/stellantis_mirafiori_battery_technology_center_40_milioni-13032823/

³⁷ Luise, C. 2023. "Stellantis svela la nuova Mirafiori: il polo green da 55.000 metri quadri sarà pronto in autunno". La Stampa, August 04 2023.
https://www.lastampa.it/torino/2023/08/04/news/stellantis_adriano_fabrizi_mirafiori_polo_green_55000_metri_quadri_autunno-12981537/

³⁸ Luise, C. 2024. "Stellantis, 100 milioni per le nuove batterie: "La strada per rendere Mirafiori competitiva"". La Stampa, April 11 2024.
https://www.lastampa.it/torino/2024/04/11/news/stellantis_100_milioni_euro_nuove_batterie_mirafiori-14210607/

³⁹ Molino, D. 2024. "Stellantis conferma: "Torino polo della mobilità sostenibile, aumenteremo la produzione della 500 elettrica"". La Stampa, February 20 2024.
https://www.lastampa.it/torino/2024/02/20/news/stellantis_torino_polo_mobilita_sostenibile-14086090/

⁴⁰ Luise, C. 2024. "Tavares: "Meloni chiarisca se crede nell'elettrico"". La Stampa, March 20 2024.
https://www.lastampa.it/torino/2024/03/20/news/tavares_meloni_chiarisca_elettrico-14160133/

Other articles in La Stampa underlining this goodwill extolled by Stellantis refer to other investments in Pomigliano and an increase in production at the plant⁴¹. In addition, numerous articles divulge the words of hopeful confidence of top management regarding the future of Fiat and Stellantis in Italy. Such as those of Tavares, 'All Italian plants have a future'⁴² or those in the article 'Stellantis, record profits and bonuses for workers. Tavares: 'Italian plants are safe'⁴³. Some articles quote the words of Stellantis chairman John Elkann, who in one case celebrates the past and future of the company Stellantis was a pioneer in the car industry. Now we want to build the mobility of tomorrow⁴⁴ and in the other case he celebrates the successes of the present, thanks also to the support of the institutions⁴⁵.

But how is the situation actually? How far is a sector in which Italy was one of the world leaders in the last century regressing? Will it be able to withstand the existential test of the energy transition?

It is certainly a downturn for the Italian automotive industry. And the causes cannot be attributed solely to the moment of transition that the entire automotive sector is going through

⁴¹ La Stampa, 2024. "A Pomigliano la Fiat Panda si produrrà almeno fino a 2027. Nella fabbrica di Stellantis la produzione aumenterà del 20%". La Stampa, February 29 2024.

https://www.lastampa.it/cronaca/2024/02/29/news/stellantis_fiat_panda_produzione_pomigliano-14108753/

⁴² Chiarelli, T. 2024. "Stellantis, parla l'ad Tavares: "Tutti gli stabilimenti italiani hanno un futuro"". La Stampa, February 15 2024.

https://www.lastampa.it/economia/2024/02/15/news/stellantis_tavares_automotive-14073427/

⁴³ Chiarelli, T. 2024. "Stellantis, utili record e bonus ai lavoratori. Tavares: "Stabilimenti italiani al sicuro"". La Stampa, February 16 2024.

https://www.lastampa.it/economia/2024/02/16/news/stellantis_utili_record_e_bonus_ai_lavoratori_tavares_stabilimenti_italiani_al_sicuro-14074772/

⁴⁴ Di Paco, L. 2023. "John Elkann: "Stellantis è stata pioniere dell'industria dell'auto. Ora vogliamo costruire la mobilità di domani"". La Stampa, October 07 2023.

https://www.lastampa.it/economia/2023/10/07/news/john_elkann_ginevra_cern_stellantis-13710337/

⁴⁵ Chiarelli, T. 2023. "Mirafiori nuovo hub dell'economia circolare. Elkann: "È il successo della buona politica"". La Stampa, November 24 2023.

https://www.lastampa.it/economia/2023/11/24/news/mirafiori_nuovo_hub_delleconomia_circolare_elkann_e_il_successo_della_buona_politica-13883977/

globally. In fact, what is leading to the loss of Italy's competitive advantage and expertise in the automotive sector is the decision of FCA, first, and Stellantis now to produce less and less in Italy, given the high production costs. In fact, car production on Italian soil has definitely decreased in recent decades. In 1989, plants in the country produced almost two million cars per year. In 2021, on the other hand, less than five hundred thousand cars were built, the latest in a downward trend that has led to a decrease in production of one and a half million cars, or seventy-eight per cent, in little more than twenty years (Motus E 2022, 18). This underlines the strategic direction taken by Fiat's top management, initiated by former FCA CEO Sergio Marchionne. Under his management, Fiat, which became FCA with the acquisition of Chrysler, overcame a time of recession and sales crisis, which affected the entire European automotive industry. In order to do so, Marchionne began to relocate the production of Fiat models to countries with lower production and personnel costs and to move part of the research and development processes to America, to Chrysler's Detroit facility (Bubbico 2023). This has certainly led to a consolidation of FCA's accounts, but has created damage to the Italian automotive industry. *Il Post*, with its very harsh editorial line against Fiat's policies, outlines in its articles an extremely difficult situation for the entire Italian automotive industry. An example of this approach is the narration of Magneti Marelli case story, one of the Turin group's main suppliers and research companies sold in 2018 of to the Japanese group CK Holdings. A decision that expressed, from the perspective of *il Post*, the company's desire to also outsource its research and development departments⁴⁶. Now Marelli, after the name change, finds itself in a situation of deep crisis, given the low investment by the American fund KKR, which controls CK Holdings⁴⁷.

In 2010, *The Post* is also critical of Marchionne's actions and his 2012 plan called 'Fabbrica Italia'. An ambitious project, which at its basis, at least in words, had the will to reaffirm Fiat's desire to remain in Italy and to invest in Italian plants. According to the initial intentions, twenty billion was to be invested in the Italian sector, so as to increase production by one million cars in five years, bringing it to one million six hundred thousand in 2014. But due to the European economic crisis of those years, the project was no longer developed, and

⁴⁶ Invernizzi, I. 2024. "Stellantis sta lasciando nei guai decine di aziende". *il Post*, April 10, 2024. <https://www.il Post.it/2024/04/10/stellantis-crisi-fornitori-torino/?homepagePosition=9>

⁴⁷ *il Post*. 2023. "La mobilitazione contro la chiusura della Magneti Marelli a Crevalcore". *il Post*, October 1, 2023. <https://www.il Post.it/2023/10/01/magneti-marelli-crevalcore-licenziamenti/>

already in 2012 Fiat withdrew its investment plan. From then on, according to the article, there has been no real effort by FCA to reverse course and actively focus on Italy⁴⁸.

According to *il Post* the situation, despite Tavares' latest optimistic and confident words, has certainly not improved with the birth of Stellantis in 2021, quite the contrary. What is emerging, in their view, from the first years after the merger between FCA and PSA is a substantial imbalance of forces. Stellantis is not a joint Italian and French-led multinational, but in fact the strategic direction is mainly in the hands of PSA.

What has been happening in recent years is defined as a concrete abandonment by Fiat of its offices and factories in Turin. It is reported that in the 1960s, Fiat produced more than one million cars in Turin, while in 2019 there was a negative record of twenty-two thousand cars built⁴⁶. In another article in *il Post*, the story of the Grugliasco plant is described instead. In October 2023, the Maserati plant in Grugliasco was decommissioned and put up for sale after only ten years of opening for no particular economic reason, in the view of the journalist, given that the brand enjoys good health, especially in markets such as China and the United States, where luxury cars are in high demand⁴⁹.

The contrary narrative perpetrated by the newspapers *La Stampa* and *Il Sole24ore*, on the other hand, emphasises that in 2023 car production in Italy grew by ten per cent to over seven hundred thousand cars leaving the Italian plants, and that Tavares has announced the goal of returning to producing one million cars in the country⁵⁰. Also highlighted is Stellantis' investment in the opening of the Termoli Gigafactory. Through Automotive Cells Company (ACC), a joint venture with Mercedes and TotalEnergies, Stellantis wants to convert a former factory into a large battery factory for electric vehicles with an investment of more than two billion. The first start-up work started in January 2024, and production is

⁴⁸De Luca, D.M. 2012. "Che cos'è Fabbrica Italia, o cos'era". *il Post*, September 16, 2012. <https://www.ilpost.it/2012/09/16/cose-fabbrica-italia/>

⁴⁹ *il Post*. 2024. "Stellantis sta abbandonando Torino". *il Post*, January 7, 2024. <https://www.ilpost.it/2024/01/07/declino-stellantis-mirafiori-torino/>

⁵⁰ *La Stampa*, 2024. "Stellantis, Uliano: con 751.384 veicoli chiude il 2023 a +9,6%". *La Stampa*, January 05 2024. <https://finanza.lastampa.it/News/2024/01/05/stellantis-uliano-con-751-384-veicoli-chiude-il-2023-a-+9-6percento/MTE5XzIwMjQtMDEtMDVfVExC>

expected to begin in 2026, with more than one thousand eight hundred employees when the plant is fully operational⁵¹.

However, the narrative carried by the articles in *il Post* makes it clear that the critical situation portrayed by their editorial line does not only concern the employees of Stellantis, who are steadily declining given the zero recruitment to replace retirees, but also all the companies in the supply chain, all the companies that have been supplying Fiat with all the components for decades. It is recounted in an article from 2024 that starting in the 1990s, Fiat decided to outsource the production of eighty per cent of the components. For this reason, industrial clusters have been created in the vicinity of the Fiat plants with numerous companies that have created a dependency relationship with Fiat over the years.

So, since Fiat massively delocalised production abroad, supplier companies have faced a period of crisis.

The journalist from *il Post* gives the examples of the Lear in Grugliasco, a seat manufacturer, and of the Delgrosso, a supplier of air filters. Due to the very low production volumes at the Mirafiori plant, the two companies are in extreme economic difficulty. Lear has significantly reduced production and had to lay off its four hundred employees until the end of 2024, before being forced to make them redundant. Delgrosso, on the other hand, declared bankruptcy in March 2024, leaving more than one hundred people unemployed. It is also written that these are not isolated cases, and the entire industrial district of Turin risks major repercussions if the situation does not change in the near future⁴⁶.

The main reason for the crisis in car production, according to the articles in *il Post*, is the production monopoly maintained by Fiat, which has controlled all Italian brands in the sector for decades. In fact, there are no other foreign brands that produce or have plants in Italy. In the view of *il Post*, this forces the entire industry to maintain a close dependency on the decisions and results of Stellantis. If Stellantis decides to produce less in Italy, the whole sector goes into crisis. The Meloni government has repeatedly declared the need to increase competition in the Italian automotive industry by trying to attract a new manufacturer. There had been talk of negotiations, for example with BYD, a leading Chinese company in the

⁵¹ Il Sole24ore. 2024. “Acc, lavori in fase di avvio per la gigafactory di Termoli”. *Il Sole24ore*, January 17, 2024. <https://www.ilssole24ore.com/art/acc-lavori-fase-avvio-la-gigafactory-termoli-AF1xukMC>

electrical sector⁴⁶. Other rumours from Bloomberg, on the other hand, indicate talks between the Italian government and the Chinese car manufacturer Dongfeng⁵².

Probably the narrative told in the articles in *il Post* does not deviate much from the real situation in the automotive industry. Many of the arguments stated earlier can be found in Bubbico's analysis (2023). In his opinion, too, the *Enti Centrali* in Turin now have less and less importance in research and development than the plants located in France or the United States. Moreover, his article also blames the decline in employment of Stellantis employees on outsourcing and the closure and relocation of plants to Eastern Europe. Bubbico also finds a substantial monopoly in the Italian industry and identifies this as the main reason for the low level of production that has characterised the automotive sector in recent decades. According to his analysis, without the inclusion of new players in the Italian sector and without real active state intervention, Fiat and the other Italian companies in the sector will certainly struggle in the transition to electric cars.

The lack of competitiveness and the situation of subordination to Stellantis will irreparably slow down the transition to electric. Fiat has never actively invested in the electric. By the early 2000s, the Turin-based company had only created four models equipped with an electric motor: the Panda Elettra, the Ducato Elettra, the Cinquecento Elettra and the Seicento Elettra (Brusaglino et al. 2004, 72). During Marchionne's leadership, the 500E was developed solely with the intention of fulfilling the emission requirements introduced in California. As can be seen, even recently, the strategy for electrics of Fiat and its associated brands has remained that of adapting existing models, replacing the internal combustion engine, with a battery engine (Sovacool et al. 2018, 11). Fiat has increasingly focused on diesel engines and recently on biofuels. Fiat's less than proactive attitude towards electric models may certainly be an obstacle to the transformation and ecological transition of the Italian automotive industry.

The crux of the matter, however, is not what to produce in Italy, but how much to produce. As mentioned, with low production volumes, the entire Italian automotive industrial system is collapsing. The skills to produce electric cars are present in Italy, as demonstrated by

⁵²Lepido, D. 2024 "China's Dongfeng Mulls Making 100,000 Cars a Year in Italy". Bloomberg, April 16, 2024. <https://www.bloomberg.com/news/articles/2024-04-16/china-s-dongfeng-in-talks-with-italy-to-make-cars-to-build-europe-hub>

Motus E and CAMI's study of 2022 (2022). Of the forty-three thousand current employees working on internal combustion cars, fourteen thousand are at high risk of losing their jobs because they have skills specific to petrol and diesel engines. Therefore, of the remaining thirty thousand workers, a large part can be reconverted to the production of components for and of electric cars. To these people, one must add over two hundred thousand workers already specialised in the production of electric cars, skills that are distributed among many small companies. In fact, it is estimated that the biggest setbacks from the transition to electric will affect the large companies in the sector, which account for the bulk of the turnover. This data means that the transition to electric car production will certainly have strong impacts within the industrial and social fabric. However, if it is supported by a major industrial plan and the right investments, the skills that are currently latent and relegated to a multitude of small companies can generate a new competitive advantage for the Italian automotive sector. Of course, it will also be important what the global socio-political and economic developments will be, if the European and American industry manages to catch up with the Chinese industry in terms of production and development of the electric car value chain. If this happens and there are the right investment plans, both public and private, the Italian industry is ready for change.

For market penetration, however, lower prices and improved performances will be crucial. The steady development of production of this technology will probably bring these desired effects in the near future. As far as the state of development of the road infrastructure for electric vehicles is concerned, the steps taken in the recent past have led to a steady improvement in the supply of recharging stations. In this case, the direction taken seems to be the right one, especially if fast charging points are increased.

5. ANALYSIS AND COMPARISON OF THE TWO CASES

As has become clear from the previous two chapters, the establishment of a technology over the alternatives is part of an extremely complicated process that is more complex than an outside observer might think. The two cases narrated and discussed are characterised by a continuous dialogue and struggle of positions between different actors.

In both cases, the opposing national interests of the European Community member states were pitted against each other, interests that reflected and defended the interests of their own automotive sectors. It is also easy to construct a parallelism between the two cases because both historical periods were characterised by an important involvement of public opinion towards environmental issues thanks also to the action of ecological movements that involved the European citizenry. In this mingling and interweaving of social, environmental, economic and political interests, the three-way catalytic converter emerged in the 1980s as the winning technology, and nowadays the electrically powered car is emerging instead.

The theory of the Social Construction of Technology, and the accompanying theories of the Consumption Junction and the Multi level perspective, manage to give us an interesting angle of analysis to study and compare the two cases under examination.

As already stated several times in this thesis, the deterministic view of technology is now an antiquated and unrealistic approach. It is unthinkable that in a highly interconnected world, progress and innovations are driven and determined by technological factors alone. They interact with economic, social and political forces. The cases presented in the preceding chapters are precisely proof of this. The various 'relevant social groups' have tried to make their own vision and interpretation of the sustainable automobile of the future prevail, which is clearly also determined by selfish logics and personal gain.

When analysing the introduction of the catalyst in Europe, the leading role played by Germany, in its political, social and industrial components, in negotiations with the other European partners is evident.

The late 1980s and early 1990s were a period of transition for the European institutions. The European Union as we know it today was being born, with its pillars being the European single market. The standardisation of the market and the rules, including on emissions, of the automotive sector would be a crucial step towards this goal. All continental governments were aware of this; it was the only way to remain internationally competitive. In fact, the

world's other automotive powers, such as the United States and Japan, had already moved towards more sustainable road mobility regulations, mandating the use of catalytic converters. Conforming to these rules would have been crucial for the European industry to remain competitive in other markets. Germany, the true European export power, had already invested heavily in the development of the three-way catalytic converter, becoming a de facto monopolist. Furthermore, the German automotive sector would be favoured by the possible introduction of the catalytic converter, compared to other European automotive industries. In fact, medium-sized and large cars, the flagship of German car manufacturers, would be less sensitive to price increases due to the adoption of the new technology. Another factor that led the German representatives to strongly insist on stringent regulations forcing the use of the three-way catalytic converter was environmental concerns. The German government exploited the popular discontent due to the deterioration of forests caused by acid rain, electing itself as the champion and promoter of a policy in defence of the environment.

Opposed to German interests, we find the other major European automotive industries, namely France, Italy and England. The automotive sectors of these nations specialised in the production of small cars, which were more prone to increased production costs due to the implementation of the catalytic converter. Furthermore, the target market of these companies was domestic, with relatively few exports to countries with stricter environmental regulations. This led to these industries falling behind in research and development in the technologies required to produce the three-way catalytic converter. Furthermore, Italian and British companies had invested in the lean burn engine, the true technological alternative to the catalytic converter. Therefore, the governments of these countries tried to defend their national interests and find a downward squeeze that would favour their own industries.

Therefore, using the terms of the Social Construction of technology, it can be said that there was an interpretative flexibility between the different actors, between the different 'relevant social groups'. Hence, there was heterogeneity in the interpretations on the automobile with less environmental impact, on the perspectives of emissions regulation.

But the bargaining power wielded by the German government and its industry, combined with the urgency on the part of the European institutions to comply with international legislation and to definitively create the single market, got the better of French and Italian doubts.

Already after the Luxembourg Compromise of 1985, a certain consensus was created among the members of the European Community on the direction to pursue. It can be said that from that moment on, we entered the second phase of the SCOT, the 'closure' phase. The last critical step is the reception of the innovation by the end user, as taught by the Consumption Junction theory. The catalytic converter was successful among motorists throughout Europe, mainly for two reasons. Firstly, it was not a technology that would revolutionise their habits. It was essential for Italian governments to implement an effective network of pumps for unleaded petrol, the only one that could be used for cars with catalytic converters. It is true that cars with the three-way catalytic converter implemented were also more expensive than previous models, but governments across Europe implemented tax incentives to help consumers buy them. So, this is a case of successful transition to a more sustainable technology.

Similar premises can be developed if the European ban on sales of cars with internal combustion engines from 2035 is analysed under the lens of the Social Construction of Technology.

Here again, it is essential to mention the role of environmental movements, in particular Fridays for Future, which involved young people all over Europe in numerous events. In particular, the activities of this environmental movement awakened environmentalist sentiment in the run-up to the 2019 European elections. This certainly influenced the work of the new Von der Leyen Commission, despite the fact that it was Christian Democrat-led. In fact, one of the cornerstones of the policy undertaken by the European leaders during the five-year period 2019-2024 was the European Green Deal, a series of environmentally-oriented reforms with the goal of decarbonisation by 2050. These include Regulation (EU) 2023/851, which contains an obligation to sell electric cars. Here again, European policies clearly also concealed economic reasons, which were independent of ecological ideals. China, since the turn of the century, has been intelligently investing in building the entire value chain for the development and production of electric cars, realising their potential. So Europe, the land of some of the world's most powerful automotive groups, is lagging far behind in the battery car sector, even from a strategic point of view. One must therefore also interpret Regulation (EU) 2023/851 as an attempt by the Commission to boost the production and sale of electric cars in Europe.

But will this innovation be as successful as the transition to the catalytic converter? Are there any 'relevant social groups' that are doubtful or opposed to the introduction of this technology?

The situation is certainly still confused and in flux. But one can register the hesitancy of the German government and the hostility of the Italian government. As almost forty years earlier, the national representatives tried to defend the interests of their respective automotive industries. The German industry insisted, successfully, on including in Regulation (EU) 2023/851 also the possibility of using so-called e-fuels after 2035, in which the Teutonic companies had invested considerably. Italy, too, tried to include biofuels, produced from biomass, in the European project, since the Italian oil and car industries had invested and bet on this technology. In this case, however, the negotiating power of the Meloni government was not enough.

Added to these interpretations are the problems and critical issues identified by other 'relevant social groups' in their personal representations of the car of the future.

The manufacturers, the European car manufacturers, are struggling to make this transition and to cope with the very strong competition from China, especially given its monopoly in the supply of raw materials and battery production. Therefore, automotive companies are asking Europe for a big effort, a structured and structural plan to overcome this backwardness.

But even more important in the social construction of technology and the evolution of an innovation is the end user's point of view. At the moment, sales of electric cars in Europe are still at a low level, due to high prices and battery performance that is still not perfectly comparable with petrol cars. In some countries, especially in southern Europe, i.e. those where consumer purchasing power is on average lower, electric cars do not even account for ten per cent of new car purchases. So we are still in a primordial state of transition, and it is still too early to decide whether the conversion to electric will be a success or a failed attempt. Crucial will be the end-user reception in this decade towards 2035 and, above all, the policies that the various national governments will implement to encourage the purchase of electric cars. It is still far from a climate of 'closure', there are still many concerns within the various 'relevant social groups'. The danger is that electrically powered cars will be experienced by motorists as an imposition from above, with no real improvement in utility for users. If not effectively accompanied by this change, consumers may consider themselves abandoned and harmed by institutions. Electric cars currently entail inconveniences that internal combustion cars do not, such as long waits at charging stations

and poor battery life. Moreover, at the moment, the distribution of charging infrastructure for electric cars is not comparable to the ubiquity of petrol pumps. If these aspects are improved in the near future, if states structure effective purchase incentives, and if European manufacturers concretely invest in the supply chain, it can be expected that the transition to electric can be as successful as the transition to the catalytic converter was. The political, economic, social and technological process of implementing this technology has yet to be completed, and history teaches us that if the right foundations are laid, it could be the right “consumption junction”, the time and place may be ripe for this step towards the decarbonisation of road transport.

Instead, the Multi Level Perspective (MLP) model can be useful to understand the reasons why the European institutions imposed the two different regulations, through the concept of a window of opportunity. A window of opportunity is defined as that change in the highest and most heterogeneous level of the MLP, the macro level, which can generate the space for action for the introduction of radical innovation. This alteration in the socio-technical landscape allows an innovation latent in a niche to emerge, thanks to the pressures present at the intermediate level. If it finds fertile ground, it can then impose itself at the macro level, thanks to the alignment of the three levels.

In the case of the introduction of the catalytic converter in the 1980s, two windows of opportunity can be identified. Firstly, the movements and strong environmentalist sentiment in Germany due to the acid rain that damaged German forests, which was then used by the German government as leverage to impose itself in Europe. And international regulations, in particular the US83 standards, which were the forerunner for the standardisation of emission limits worldwide. In addition, there is also the need for European industry to remain competitive and be able to export to all international markets and the desire of the European institutions to create a single European market with shared rules.

Regarding the ban on combustion car sales, we can find windows of opportunity of a similar nature: environmental and economic. Shortly before the European elections, as already mentioned, there was a strong ecological mobilisation involving all the nations of the continent. Undoubtedly, the demand for a political commitment to decarbonisation influenced the direction of action of the European Parliament and the Commission. Moreover, the steady increase in demand for electric cars in Europe, coupled with the need to catch up in the challenge with China on the supply of raw materials and the development of skills for battery production, prompted the Commission to take a radical decision. The

point of no return had been reached; it was necessary, according to the vision of the European leaders, to give the automotive industry a clear timetable in order to stimulate the development of the sector.

And how can the Italian situation be analysed specifically? Are there actually parallels between the introduction of the three-way catalytic converter and the obligation to sell electric cars? How can the Social Construction of Technology be useful in defining this?

In both cases under scrutiny in this thesis, the Italian automotive sector found itself unprepared, lagging behind and thus damaged in comparison to continental and international competitors.

With reference to the 1980s, this was also explained by the peculiarity of the Italian market and the specificity of the models produced by the Fiat group. In Italy, during the 20th century, the Turin-based group had a true monopoly and did not have large export volumes. Moreover, Italians preferred small cars. Therefore, Fiat's production consisted of vehicles with limited engine capacity, i.e. those most sensitive to a price increase if the catalytic converter was implemented, and mainly sold in the domestic market. Therefore, until the European regulations, the Italian automobile industry had no incentive to invest considerably in the research and development of the components necessary for the implementation of the three-way catalytic converter in their models. However, it must be emphasised that at the time, Fiat was already exporting a few hundred thousand vehicles to foreign markets equipped with electronic fuel injection, a key component for catalytic converter operation. So it had already adapted some of its models to the new technology. The missing piece was, if it did not want to surrender to German technological hegemony, to build up its own supply chain of component manufacturers that could cope with the production volumes of millions of cars a year. Thanks to an investment plan, also supported by the government, the Italian industry prepared for this small revolution, before the Small Car Directive was approved in 1989, legislation that would have regulated precisely the market segment in which Fiat was the leader.

Instead, the current state of the Italian automotive industry is rather more dramatic. The entire supply chain in Italy has been going through a crisis for years, with production significantly lower than in past decades, a lack of structural investment and supplier companies in great economic difficulty. The cause of this critical situation has been a gradual withdrawal of FCA, first, and then Stellantis, from Italy. In fact, over the years, both much of

the production and design of models has been delocalised, leaving the Italian supply industry without large production volumes.

Moreover, Fiat has never focused on or invested in specifically electric models. Its strategy has been purely defensive and passive, adapting existing models and motorising them with battery propulsion. The perceived sense of abandonment does not allow the entire industry to take that step, consisting of concrete investment plans, towards the transition to electric power, which will be mandatory from 2035. The skills, human and technological, would be there in Italy. The Italian state needs to be aware of this, and in order not to fail in the transition to electric power in our industry, it is crucial not to get caught up in the strategies of Stellantis. The danger is to see one of the country's most important industries go out of business.

As mentioned earlier, there is another analogy between the two cases concerning the state of Italian industry. On both occasions, Fiat had invested and bet on an alternative technology to the one on which most of the 'relevant social groups' had or agreed. In fact, prior to the Luxembourg Compromise of 1985, the Italian industry had invested in cars equipped with lean burn engines, instead of retrofitting its models with catalytic converters. Since the early 2000s, Fiat had wanted to focus on biofuel-powered cars, thinking it could be an excellent sustainable alternative to traditional fuels. Little, however, has been invested in electric mobility.

In order for cars equipped with catalytic converters to penetrate the Italian market, an extensive distribution of unleaded petrol pumps, the only suitable fuel with catalytic converters, was crucial. Similarly, for a satisfactory penetration of electric cars within the Italian car fleet, a widespread network of battery charging points must be created. Integrating and modernising recharging infrastructures has been and will be crucial to removing certain doubts and concerns from the end user's point of view, such as range anxiety.

In the late 1980s, state institutions were able to implement this project, partly due to the fact that European countries had agreed since 1985 on the mandatory use of unleaded fuel. And in fact, it was a matter of retrofitting the existing infrastructure, without building new ones. It will be more complex to meet the demand for recharging stations throughout Italy in the near future. What's more, most of the columns are currently of low power and therefore not compatible with fast recharging.

However, it must be emphasised that the number of charging stations for public use in Italy is constantly increasing. In addition, there are more than four hundred thousand charging

stations for private use in Italians' homes. The latter are probably the most important, as on average Italian motorists do not drive many kilometres daily and mainly in urban areas, without undertaking long journeys. One can therefore be optimistic about the success and implementation of an effective network of charging points on Italian territory. A fact that, as mentioned, could help convince Italian motorists to buy an electric car.

As already mentioned and for the reasons we have just mentioned, another similarity between today's case and the introduction of the catalytic converter is the original low penetration of the new technology within the Italian market. The characteristics of the industry and infrastructure, the problems encountered in the personal interpretation of the technology by consumers combined with a certain degree of 'path dependency' led to few sales of cars that complied with the newly introduced standards.

In 1991, barely a year after the compulsory sale of cars with three-way catalytic converters in early 1993, the share of clean vehicle sales was a paltry five per cent of the total. What made the turnaround possible, i.e. the 'closure' and 'stabilisation' of the artefact, was a series of state policies that convinced motorists to buy the new models. First and foremost, as mentioned above, a better spread of unleaded petrol filling stations. In addition, the Italian government in those years made a series of agreements with Fiat to encourage the production of models that complied with the new regulations and to create subsidies and reliefs for consumers to lower the price of such cars. Another initiative aimed at boosting sales of cars with catalytic converters was the establishment of traffic jam days for the most polluting models. This project involved the largest Italian cities and thus effectively forced motorists to adapt and convince themselves of the usefulness of that technology. This accompaniment put in place by Italian institutions was effective, and removed the doubts and reluctance of motorists in a concrete way. In fact, as early as 1992, sales of green cars stood at sixty per cent of the total, marking a clear turnaround.

Today's situation, although similar, is certainly more complex. It is a more complicated transition to implement, also given the Chinese monopoly. It is not just a matter of adapting existing models or infrastructures to the new requirements. The transition to electric will radically change the approach to road transport for drivers, manufacturers and legislators. It will therefore be a longer process with an uncertain fate, particularly in Italy. Currently, cars equipped with an electric motor account for only four per cent of total sales in 2023. Clearly, Italian institutions and manufacturers have more than ten years to adapt and implement the policies necessary for the transition envisaged by European regulations. But it is clear that

this will not be easy. It will be necessary to overcome the reluctance and brakes of Italian motorists, the real 'relevant social group' that will decide whether the time and place, whether the 'consumption junction', is suitable for this technological revolution.

For a successful transition from one technology to another, especially in such an impactful field, it is crucial that there is also the support of the political class. In both cases, the Italian political class proved, at least at the beginning, to be unprepared and insensitive to the issues of ecological transition and environmental protection. Environmental issues have never particularly warmed public opinion or influenced the political agendas of rulers. In the 1980s, an ecological consciousness had not yet been created in the political class and there was a lack of expertise in this regard. This is why a programmatic vision on environmental protection and the renewal of road transport was lacking for many years. In fact, policies aimed at the transition to catalytic converters came late in the day, however effective they were.

Instead, today's political class uses ecological issues as an ideological and propagandistic battleground. There is no real debate in the Italian political scene based on perspectives and concrete data. The parties that form the Meloni government are hostile to the ecological transition, and this can certainly influence the success of the transition to electric power in Italy. In order not to fail, there is a need for concreteness, to help companies in the supply chain and consumers to fully accept this new technology, so as to move on to the 'closure' phase and real consensus between the parties.

6. CONCLUSION

Studying progress means understanding what forces manoeuvre and regulate the world in which we live. Analysing the innovation process allows us to grasp the social, economic and political mechanisms that govern development.

As has been stated several times in this thesis, it is illogical to think that the introduction of a new technology is a simple and linear process. The deterministic theory of technology is based on fallacious assumptions, namely that the development of an innovation is not watertight, isolated from the external social world, but is influenced by multiple forces and agents. It is quite wrong to think of engineers and scientists as the sole drivers of innovation. It is also wrong to think that technology is superior to the other forces at play. The scholar must analyse the dynamics that lead to the emergence of an innovation with a super partes orientation, so as to better understand all the facets and stages of that process.

This is the foundation of the Social Construction of Technology, codified by researchers Wiebe Bijker and Trevor Pinch in 1984. According to this theory, different groups of agents, called 'relevant social groups', interact for the formation of an innovation. Agents of different natures: political, legislative, social, economic, industrial, scientific and technological. Furthermore, according to the SCOT, technological progress is made up of different parts, consisting of failures and attempts, changes and agreements on the design that the artefact will then have. This is because each 'relevant social group' has a different interpretation of the artefact, recognises different problems and characteristics in it, depending on the interests of that social group. This phenomenon is called "interpretative flexibility". The final stage of the final process is called "closure", i.e. the moment when a certain consensus begins to form between the "relevant social groups" on the characteristics and properties of the innovation.

Also derived from this theory is the so-called Multi Level perspective, described by Frank Geels and Johan Schot, an approach that divides the environment into three levels, micro, meso and macro, depending on the complexity of the forces at play. For there to be successful innovation and transition, it is necessary for the new technology to pass through all three stages, influencing itself with the multitude of social and economic forces that characterise them.

The Social Construction of technology, defined as multidirectional, was the method used in this thesis, in order to adequately describe and capture the complexity of the innovation process.

The case studied within this thesis concerns the European introduction of two environmentally friendly technologies in the road transport sector; the obligation to sell cars equipped with catalytic converters from 1993 and cars with electric motors from 2035. Both innovations were imposed by regulations decided at European level: the first by means of three different directives between 1985 and 1991 in the then European Community; the second, more recent, was regulated by Regulation (EU) 2023/851, proposed by the Von der Leyen Commission in 2021 and approved in 2023.

Given the complexity, the presence of numerous actors and the intertwining of different interests, the choice of using the approach defined by the Social Construction of Technology proved to be correct and essential in order to dissect these cases.

In the previous chapters, we wanted to analyse both the introduction of the three-way catalytic converter and the future ban on the sale of internal combustion cars through two perspectives.

Firstly, both events were studied from a European perspective, attempting to explain the different national interests of the member states of the European institutions, the different situations of the continent's various automotive industries and the social forces that interacted.

In addition, an attempt was made to analyse the Italian case specifically, examining the political, social and industrial situation at the time of the two European legislations. In order to develop these analyses, it was necessary to research and utilise newspaper articles describing the sentiment of Italian automotive companies and motorists with regard to the ongoing technological transition. Previous literature on the introduction of catalytic converters in Europe lacked an in-depth look at the Italian situation. In addition, by analysing the current state of the Italian automotive industry, parallels could be drawn with the previous catalytic converter obligation in order to understand the real prospects of the ban on internal combustion cars in Italy.

In the cases under analysis, several common points can be found. As mentioned, at the European level, several agents were involved and influenced the final decision. Each government tried to defend the interests and investments of its automotive companies. The

diplomatic and negotiation game is complex, as it not only involves economic and strategic elements, but also social ones. In fact, in both cases we can see a heated environmental movement that certainly contributed to the legislation that was later defined by European representatives.

Both the legislation of the late 1980s and Regulation (EU) 2023/851 were born out of a need for the entire European automotive sector not to lag behind its international competitors. In particular, the post-Luxembourg Compromise directives of 1985 were the European attempt to match the US standards of 1983. The obligation to sell electric cars by 2035, on the other hand, is intended to counter the dominant position of China, the undisputed leader of the entire battery value chain.

Studying the process that led to the introduction of the catalytic converter in the European Community, understanding all its phases and the role of each actor, can be fundamental to discerning the present and future situation of European and Italian road transport. In particular, it is crucial to emphasise the importance of consumers, the motorists, the real decision-makers in the success of an innovation.

In order for motorists to accept and be willing to buy the new electric cars, states and Europe, the imposters of this transition, must accompany this change with active policies. This requirement refers to the 'Consumption Junction' theory, outlined by Ruth Schwartz Cowan, which makes explicit the importance of place and time in the success of an innovation. If the time is not ripe for the introduction of such technology, it is difficult for it to be accepted by the end user. The customer may have doubts, worries and fears about the artefact, which may hold him back and drive him away from the purchase. For this reason, it is important that institutions help motorists in such a revolutionary approach to road transport and do not perceive it as an unnecessary and harmful imposition.

This transition was successful, leading to the 'closure' phase on cars equipped with catalytic converters in the early 1990s. Thanks to state incentives, interventions in the refuelling infrastructure and awareness-raising activities, the transition to the new, cleaner models was quick and painless in the eyes of motorists. This case can be of great help in structuring future moves by national and European institutions if the transition to electric cars is to be convincingly implemented. The past can be an example for the future.

As already expressed in the previous chapter, the current situation is more intricate and more difficult to interpret. The big unknown concerns the possible battery production

capacity of European companies and their ability to respond to the Chinese monopoly. The European industry is in a difficult situation in the electrical sector, it has difficulties in finding the precious rare earths, which are essential for building batteries, and it is behind its Chinese competitors in the skills for the production of electric cars.

Thus, the future of the European automotive sector remains an unwieldy question. As the representatives of the European car manufacturers demand, a structural and comprehensive investment and strategic plan is needed in order to undermine China's dominance and meet the European Commission's justified ecological demands.

From the consumer's point of view, however, electric cars are still significantly more expensive than petrol and diesel alternatives. Thus, in northern European countries, where the average income is higher, electric cars are already fairly widespread.

In the south of the continent, the situation is different, with very low sales levels. Therefore, effective incentive schemes and subsidies are needed to lower the selling price of these models. Furthermore, if European companies do indeed invest in the electric chain, it is logical to think that they will also offer cheaper cars on the market, so as to cover the segment of consumers who cannot afford to spend exorbitant sums.

Added to this is a certain mistrust of the performance of electric cars on the part of motorists, such as the short battery life and long waits for recharging.

These are probably minor problems. Improvements in the performance and development of recharging infrastructures are evident in the recent past, and it is likely that these efficiencies will bring the performance of electric cars on a par with those with internal combustion engines within a few years.

If one studies the situation in Italy specifically, both in terms of the market and the industry, one finds that the country is potentially ready to embark on this transition, despite the very low sales of electric cars. As repeatedly stated in this thesis, recharging infrastructures, both public and for private use, are increasingly widespread throughout the country. Moreover, the Italian motorist does not drive long distances on average, so will not be drastically affected by 'range anxiety'. Italian consumers would also be quite favourable to the transition to electric cars; one third of motorists said they were ready and willing to buy an electric car in the near future. So, the market has the latent convictions to successfully embrace a greater share of electric cars. But, as mentioned, lowering prices to make them competitive with petrol models will be crucial.

Shifting the focus to the automotive industry, as recounted in the previous sections of this thesis, the Italian supply chain is going through a difficult period and there is little, if any, investment by Stellantis and the government to facilitate and boost the transformation of production. The skills and people trained and specialised in the production of electric cars are there in Italy, especially in small and medium-sized companies. The crux of the matter is not really what to produce but how much, because car production in Italy in recent years is at an all-time low. The competent people to develop and produce vehicles, both electric and internal combustion, are there in the Italian industry. But we must not abandon them and focus on their skills, on a sector for which Italy has always been one of the leading countries in Europe and internationally.

To conclude, this thesis has attempted to contextualise the introduction of sustainable technologies in the road transport sector by understanding the complexity of the system of negotiations and conflicting interests. By drawing parallels between the European regulations of the late 1980s and early 1990s and the very current Regulation (EU) 2023/851, the aim was to emphasise the commonalities of these two transitions in order to contemplate possible future implications. For the ecological transition to succeed, the involvement of every 'relevant social group' will be needed, in order not to risk the blockage and retreat of the powerful European automotive industry. The challenge that awaits the entire European Union, and in its own small way Italy, will be a thermometer to test the strategic ability of our political and managerial class and will also be important in defining the future strengthening relations between superpowers. Only in the near future will we be able to understand this. The basis and skills to work on are there, Europe has already managed in the past to conform to international innovative and regulatory drives. We will have to see whether the institutions are now ready to seize this opportunity.

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