Policymaking process based on an evidence-based approach. Case study, London: Using transport data to make carbon emission policies.

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Table of Contents

Abstract

Climate change has become one of the most significant challenges the international community has ever experienced. There are different approaches the countries worldwide have adopted to address the climate change problems. Nevertheless, some policies are more effective than others, depending on the city, country, population, geolocation. The current research will attempt to explore the process of how the authorities of London are using the data on the transport within the city and transforming it into carbon emission policies. Thus, the evidence-based policymaking approach will be the focus of the current research. Therefore, the research is based on the evidence-based policymaking theory, which has brought essential insight for the analysis of this specific topic. The paper is formed based on qualitative research. The analysis and the data collection were set from the exploration of the available documentation and statistics from the authorities of London on the transportation within the city and how or whether it was used for carbon emission policies.

Keywords: *data-driven policymaking, climate change, transport, decision-making, EBP, carbon emission policies, public policy, the evidence-policy gap*.

Introduction

Scientists have found that transport is one of the leading emitters of greenhouse gasses (GHG) worldwide (Schwanen, 2020). One of the main challenges is – implementing policies capable of minimizing the emission rate (Schwanen, 2020). CO_2 emissions caused by transport have been widely analyzed by researchers in the past (Zanni & Bristow, 2010). Climate change policies have been discussed in the context of the biased selection of evidence (Parkhurst, 2016, p. 47). According to the Institute of Climate Studies, the global warming skeptics have chosen a certain amount of evidence that shows no increase in global surface temperature (Institute of Climate studies, 2013 cited by Parkhurst, 2016, p. 47). However, in 2014 the Committee on Climate Change was accused by Whitehouse for selecting the part of the evidence which proved the increasing temperature trends (Parkhurst, 2016, p. 47).

The cities are producing approximately 70% GHG emissions, and the data collection on the usage of transport could contribute significantly to the creation of new policies that would reduce environmental pollution (Schwanen, 2020). In 2020, the city of London had expanded its infrastructure in urban rail (i.e., London Overground, trams in South London), cycling roads (i.e., "Mini-Hollands," and cycleways), and electromobility (i.e., more vehicle chargers are available to the public throughout the city) (Schwanen, 2020). Furthermore, transit-oriented development (TOD) has focused on the new strategy, which includes public transport as part of urban development (Schwanen, 2020).

The current research will focus on the ways how big data analytics are used in the policymaking process. The case study of the research is the city of London and how the authorities of the city are using the transport data to make carbon emission policies. London uses technological means to undergo a low-carbon mobility transition (Schwanen, 2020). This case study will be analyzed based on evidence-based policymaking (EBP) theory. EBP uses the available information (i.e., evidence, data, etc.) to address specific problems and, whenever possible, to fill in the gaps in the policymaking process (Head, 2008, p. 2). The evidence should be perceived as an objective factor in the research and assessment processes. However, there might be different perspectives and interests during the policymaking cycle. These aspects will also be discussed further, as they

might affect the problem resolution and approach. Various stakeholders react differently to the same issue.

EBP theory is not new. The idea was discussed by Lasswell as a "policy science" (Lasswell 1951, 1970 cited by Wesselink, Colebatch, & Pearce, 2014, p. 339).

Hammersley, for example, stated that:

"The idea that evidence should inform political and social practice can be traced back at least as far as Machiavelli" (2013, p. 1, cited by Parkhurst, 2016).

Sutcliffe and Court stated that:

"As far back as Ancient Greece, Aristotle put forward the notion that different kinds of knowledge should inform rulemaking" (2005, p. 1, cited by Parkhurst, 2016).

Nonetheless, the use of the evidence has become more common after the Second World War (Nutley, Walter, Davies, 2007, cited by Parkhurst, 2016).

Schutz (1967c, p. 250, cited by Gunderson et al., 2019, p. 45) has defined the problem of relevance as:

"The question of why these facts and precisely these are selected by thought from the totality of lived experience and regarded as relevant."

The relationship between social science and public policymaking has a long history of research (Cook op. cit.; Weiss 1995; Nutley and Webb 2000, cited by Sanderson, 2002, p. 5). Addressing climate change cannot be considered a straightforward task. The questions on the effects of climate change policies remain relevant. The countries are constantly seeking appropriate policies on the global level to reach the Paris Agreement requirements, reduce GHG emissions, and limit global warming. The questions of climate change have been addressed extensively by the international community.

However, the EBP is important because it allows the government to use and analyze the specific information, meaning the collected evidence from a particular area which may lead to more efficient policies, which in this case, the focus will be the city of London and transport. It will be discussed further in the theoretical framework how vital the proper selection of data and

its respective research are. This is an essential prerequisite for the sufficient production of the new policies. What “works there” “will work here" is not something that should be taken as a given unless the research and analysis of the data can prove it with the EBP approach.

The following section will present an extensive analysis of EBP theory. The theoretical framework is being discussed by covering the different angles of the ideas that the EBP is following. Therefore, the analysis will cover both the substantial parts of the EBP policy in practice and its limitations and critique. The following chapters of the research will present the methodology used for the data collection and its final analysis. The primary data and information used in the research are based on the official datasets and statistics published by the governmental institutional bodies of the United Kingdom (UK) and the city of London.

Research question – How does the evidence-based policymaking approach affect the policy-making process in the case study of the city of London: using transport data to make carbon emission policies?

Evidence-based policymaking has gathered significant attention in the United Kingdom in the process of modernization in the government (Davies et al. 1999, cited by Sanderson, 2002, p. 4). The term modernization in the government refers to the policymaking process, where the authorities focus on the forward-looking and strategic approach for the public policy. This way, the newly adopted regulations can be more effective, more responsive to citizens’ needs, and subsequently deliver high-quality standards (Cabinet Office 1999, cited by Sanderson, p. 4). Even though the term evidence-based policymaking is commonly used in the mass media and social media, it is still a vague and aspirational term (Cairney, 2016, p. 1).

Many of the reports shared by the International Panel on Climate Change (IPCC) include judgments that strongly suggest one or another policy, based on the assumption that it will be effective for the countries to reduce the carbon emissions (Cartwright & Hardie, 2012, p. 5). In these reports, one could see: “We are certain of…”, “We calculate with confidence that….”, “Our judgment is that…” (Risbey and Kandlikar 2007, p. 20, cited by Cartwright & Hardie, 2012, p. 5). While reading these statements, one could expect that the new policies will be effective. Nevertheless, what works in one country, does not necessarily work in another. Therefore, the current research focuses on the specific case study, the city of London, and how the local

authorities are using the existing data, evidence, and statistics to transform this information into actual policies.

Climate change has been observed since the early 20th century (NASA, 2021). Based on the existing data, climate change has been caused to a large extent because of human activities. Specifically, the use of fossil fuel burning led to the increase of heat-trapping greenhouse gas levels in Earth's atmosphere and raised the average surface temperature (NASA, 2021). Some of these practices are referred to as global warming. However, there is a number of natural processes that cause climate change (i.e., cyclical ocean patterns, volcanic activity, variations in Earth's orbit, etc.) (NASA, 2021).

CO_2 was responsible for 80% of GHG emissions in the UK in 2019 (Office for National Statistics, 2021). Nonetheless, it is important to mention that the CO_2 emissions have fallen by 36% during the timeframe 2005-2019 (Office for National Statistics, 2021). Most of the GHG emissions are caused by the production and consumption activities of cities (Kennedy et al., 2012, p. 774). The expected growth of urban populations will probably lead to greater GHG emissions from transport in the city of London (Metz, 2015, p. 369). The city has set a target to reduce carbon emissions by 60% by 2025 compared to 1990 with the proportional contribution of transport (Metz, 2015, p. 369).

Definitions

Greenhouse gas – All energy systems are responsible for emitting greenhouse gasses (GHG) and contributing to climate change (Weisser, 2007, p. 1543). GHG is carbon dioxide (CO_2) is a colorless, odorless, and non-poisonous gas which is formulated by the combustion of carbon and in the respiration of living organisms (Eurostat, n.d.). The emissions are the release of greenhouse gases and their precursors into the atmosphere during a specific timeframe and in a particular location/area (Eurostat, n.d.).

Climate change – is also commonly referred to as *global warming*. However, there is a difference in terms of weather and climate. Weather is referred to the atmospheric conditions that happen locally over short periods of time (i.e., minutes, hours, days) and is expressed as rain, snow, winds, etc. (NASA, 2021). On the other hand, the climate is referred to as the long-term regional and

global average temperature, the patterns of the rainfall over seasons, years, or decades (NASA, 2021). Therefore, climate change means the long-term changes in the average weather patterns that have been defined on planet Earth (NASA, 2021).

Evidence – in the current research is referred to the information that can be used in the development or the implementation of the policy through different means (Sanderson, 2002, p. 4). Evidence is an argument or a claim which is supported and justified by information (Cairney, 2016, p. 3). Plewis (2000) has emphasized the importance of the effectiveness of the evidence, which is used sufficiently to inform the policy options, and second, to use the proper evidence in the policy evaluation stage.

Policy – does not have a single accepted definition (Cairney, 2016, p. 2). In the scope of the current research, the definition which will be used for the term policy means – the sum of total government action, which is derived from signals and leads to the outcomes (Cairney, 2016, p. 2). The policy cycle includes different levels through which the final decision is shifted. The policy instruments include the level of spending, the existing regulations, laws, the provisions of public services, the funding of the scientific studies (Cairney, 2016, p. 3).

Policymakers – people who make policy; however, there are two differentiations that should be clarified. First, there are the government officials who are elected or unelected, as the civil servants are also the ones who can make essential decisions (Cairney, 2016, p. 3). Second, people and organizations can be referred to as "actors"; nevertheless, the organization refers to the group of people who collectively make decisions (Cairney, 2016, p. 3). Therefore, it is important to mention for the following analysis that there are different actors, the ones who *make* and the ones who *influence* the policy.

Theoretical framework and literature review

Social science is a complex field of study. Policymaking is an inseparable part of it. However, the policies are not always adopted based on the evidence. This research project will focus on the evidence-based policymaking process and how governments can utilize it to produce an effective policy for the specific social problem, which is climate change and carbon emissions. Climate change issues require a mix of policymakers in various levels of expertise, as the problem is affecting the different fields of societal existence. Citizens' behavior plays an essential role in

evidence-based policymaking, as policies are set according to the needs of the society but also based on the factors that will contribute to the fight against climate change. Evidence that can be collected and provided to the political arena might be misinterpreted because of various interests involved (Stoker & Evans, 2016, p. 15). The media also has a significant influence on the evidence interpretation, as it can be oversimplified sometimes (Stoker & Evans, 2016, p. 15). Therefore, the process of policymaking involves different elements that interact over time (Stoker & Evans, 2016, p. 15). Researchers are not always found in the position where they are looking for the solutions of the problem with the unilateral view on one or another issue (Stoker & Evans, 2016, p. 15). Thus, it is a rare phenomenon to have a particular problem, and the specific solution is to be accepted by all the stakeholders engaged (Stoker & Evans, 2016, p. 15). A clear definition of the problem is an essential starting point for any analysis and research.

The rise of evidence-based policy is essential as it helps government officials to reconsider and analyze the existing regulations about how effective and efficient they are (Head, 2008, p. 2). The study of Head focused on the importance of the NGOs and the collaboration of various stakeholders, which create a new network with the collective goal of setting an effective policy (Head, 2008, p. 3). Nevertheless, this does not mean that the evidence-based policy approach will undoubtedly lead to a good policy setting. Most of the time, the policy is affected by different value perspectives along the way (Head, 2008, p. 3). The relevant question that one could set refers to the ways the data is collected and used for the policy process (Wesselink, Colebatch, & Pearce, 2014, p. 339). Pearce and Raman (2014) noted that the change in policymaking is not just an evolutionary process (cited by Wesselink, Colebatch, & Pearce, 2014, p. 340). Still, what matters is the result of the particular support received by relevant stakeholders (cited by Wesselink, Colebatch, & Pearce, 2014, p. 340). The important factor is the cooperation of several actors that have as a goal to pursue certain policies, and the change does not come on its own (Wesselink, Colebatch, & Pearce, 2014, p. 340).

Wesselink and Gouldson (2014) have noted that the climate change policies were perceived by policymakers as a potential economic investment. Noteworthy, during the last decades, climate change has remained as one of the top priorities on the political agenda of the international community (UNFCCC, n.d.; Wesselink, Colebatch, & Pearce, 2014, p. 340). The aim of the evidence-based policymaking is to promote the specific policy according to the collected

data/evidence. Nevertheless, researchers believe that the evidence is often used as a means to promote certain political agendas (Wesselink, Colebatch, & Pearce, 2014, p. 341). Other scholars stated that only specific types of evidence can evolve into the actual policy recommendations Wesselink, Colebatch, & Pearce, 2014, p. 341). However, it is the way the evidence is introduced that plays a vital role in the policymaking process (Wesselink, Colebatch, & Pearce, 2014, p. 341).

Two sides of evidence-based policymaking

Boswell (2014) noted that the evidence is perceived by actors in different ways, and as a result, various policies can be established (cited by Wesselink, Colebatch, & Pearce, 2014, p. 342). Two main forms of evidence could be used to improve the effectiveness of the government (Sanderson, 2002, p. 3). The first one is addressed to accountability in terms of outcomes – proof that the government is working effectively (Sanderson, 2002, p. 3). The second refers to improvement through more effective policies and programs, the evidence of how well certain policies work in various circumstances (Sanderson, 2002, p. 3).

J.M. Keynes once famously said:

"There is nothing a politician likes so little as to be well-informed; it makes decision-making so complex and difficult." (Quoted in Davieset al., 1999, p. 3, cited by Sanderson, 2002, p. 4).

The evidence-based policy is both an opportunity and a challenge for researchers and policymakers (Head, 2008, p. 1). The opportunity for governmental officials is that the policies can be evaluated and improved based on sufficient analysis (Head, 2008, p. 1). The cooperation of science and policymakers is promising for the progressive reform movements (Head, 2008, p. 1). However, this coordination was not always a given (Head, 2008, p. 1). The evidence-based policy approach is a relatively new movement that has helped governments address and resolve problems with the help of relevant knowledge (Head, 2008, p. 2). According to Head, this is a modern and rational problem-solving approach as it is focused on the "accurate diagnosis and knowledge of causal linkages" (Head, 2008, p. 2). Nutley and Webb (op. cit., p. 25, cited by Sanderson, 2002, p. 5) also supported that the evidence-based policy and practice are directly connected with the rational decision-making model of the policy process. Rationality is achieved through the precise assessment of the available alternatives on the table and the selection of the clear objectives that

should be followed when addressing one problem (Sanderson, 2002, p. 5). This way, the problem is evaluated from different angles, and only the important factors are selected in the formation of the needed path the government should follow in the decision-making process. If the policy is goal-driven, then the evaluation should be goal-oriented (Sanderson, 2002, p. 5). As a result, this kind of approach meets the criteria for sufficient assessment that leads to the improvement of the existing policy or the creation of the new one (Parsons, 1995).

Therefore, the process begins with the identification of the problem and the exploration of its cause. By establishing these fists steps, it becomes feasible to collect the necessary data for further analysis, which might propose the needed solutions to the problem. The evidence of the problem is essential (Sanderson, 2002, p. 4). This first step will define the next moves the government will follow in order to address the issue. The evidence will justify the relevance in the social context and will help in the better understanding of the problem that should be resolved by the government (Sanderson, 2002, p. 4). Having explored the issue properly, while collecting the applicable evidence, both the researchers and the government officials will be able to understand the problem, and thus, set the required plan of actions which will lead to the effectiveness of the policy response (Sanderson, 2002, p. 4).

The role of the evidence

Nevertheless, policymaking is a political process, where policymakers are not always able to use the collected data entirely (Stoker & Evans, 2016, p. 16). Evidence and policymaking decisions might be affected by different factors, such as systems, culture, institutions, the capacity of policymakers to "take the evidence on board" (Stoker & Evans, 2016, p. 16). These are the external factors that can create barriers to the collection of the evidence and alter its use (Stoker & Evans, 2016, p. 16). Evidence is considered a vital component for policy thinking and decision-making actors (Stoker & Evans, 2016, p. 16). However, evidence might be a "luxury" in some decision-making processes (Stoker & Evans, 2016, p. 16). According to previous studies, the evidence alone is not always sufficient for policymakers to take certain actions because of various barriers that arise in the policy-making process (Stoker & Evans, 2016, p. 16). In many cases, the public officials have used the evidence to back up the decisions that have been already taken, and not the opposite (Stoker & Evans, 2016, p. 16).

The power of the media, which is available 24/7, has emerged the need of public officials to take action on policy problems immediately (Stoker & Evans, 2016, p. 18). At the same time, evidence-based policymaking is considered a slow-thinking process that cannot immediately produce decisions and policies (Stoker & Evans, 2016, p. 18). Politicians are usually looking for quick, high-impact decisions-solutions to the problems that arise, and evidence-based policymaking cannot offer such a solution fast enough (Stoker & Evans, 2016, p. 18). On the other hand, there are different obstacles that make the evidence collection more complicated and demanding (Stoker & Evans, 2016, p. 19). And at the same time, there are institutional factors that limit the ability to make use of the collected evidence (Stoker & Evans, 2016, p. 19). According to Carol Weiss (1979, p. 431, cited by Stoker & Evans, 2016):

"There has been much glib rhetoric about the vast benefits that social science can offer if only policymakers paid attention. Perhaps it is time for social scientists to pay attention to the imperatives of policy-making systems and to consider soberly what they can do, not necessarily to increase the use of research, but to improve the contribution that research makes to the wisdom of the social policy."

The complexity of the decision-making process

There are certainly some barriers when the policymakers cannot use the evidence, despite their will to utilize it (Stoker & Evans, 2016, p. 19). This is another factor that shows the complexity of the decision-making process (Stoker & Evans, 2016, p. 19). One of the main questions the policymakers have refers to the reason why they should focus on the evidence to construct a policy when it is so complicated. Sometimes, policymakers think, why there cannot be a solution in this evidence, rather than just problems (Stoker & Evans, 2016, p. 20). Most of the time, the research focuses on identifying the issue of concern and not on the potential actions to intervene (Stoker & Evans, 2016, p. 20). The intervention from the researcher's perspective sometimes might not be feasible for implementation from policymakers' perspective (Stoker & Evans, 2016, p. 20). However, the evidence-based policy has become an innovative and alternative way for collecting specific knowledge for specific projects (Head, 2008, p. 3). This new approach has raised further questions:

"What kind of investment in data/information is needed to acquire the necessary knowledge?" (Head, 2008, p. 3).

This question was and still is essential, as the response leads to the next step when this knowledge is utilized in the process of understanding the problem and then in the setting of the viable solutions (Head, 2008, p. 3). Therefore, the use of technological means was increased, as they have become vital in measuring, assessing, and analyzing the impact of the problems and how the potential solution could work (Head, 2008, p. 3).

Naturally, the solution itself requires administrative, financial, and political feasibility (Stoker & Evans, 2016, p. 20). Thus, the policymakers having on the table a specific problem are raising questions: "Can this specific government do it at *this* specific time?" rather than a simple: "Can it be done?" (Stoker & Evans, 2016, p. 20). Policymakers are aware that the available resources to change things are very limited. Therefore, the selection of "things to do" must be in accordance with the ability of the government to implement them eventually (Stoker & Evans, 2016, p. 20). Each country has a specific agenda and certain priorities that can be ignored neither by the policymakers nor by the researchers (Stoker & Evans, 2016, p. 20). The question of the relevance of the piece of evidence, or making it a policy is not something fixed, as it may vary depending on the time, the circumstances, and the perspective of the policymakers (Gerring, 2001, cited by Stoker & Evans, 2016, p. 23).

The risk analysis is a relevant component of each decision taken by the policymakers. The evidence-based policy covers this requirement, as this kind of policy can foresee the potential issues and provide the needed plan of action (Head, 2008, p. 2). An example of the importance of the research is the government-funded research units which focus on the study of the specific problems (i.e., the European Research Council, the United Kingdom Research and Innovation, and others) (Head, 2008, p. 2). Another example of that is managing policy-research functions within the different governmental agencies (Head, 2008, p. 2). Finally, the government officials are approaching external consultants to perform specific research in the required area or issue (Head, 2008, p. 2).

This way, the government is directly supporting the research projects that are later implied into the policies (Head, 2008, p. 2). At the same time, the governmental influence can be indirect through the following ways: prioritizing some focus areas over others, providing rewards and

recognition for commercially focused knowledge and technical forms of scientific excellence (Head, 2008, p. 2). The data is not something that just appears out of nowhere. The large data sets are collected systematically, either from investments in certain projects, analysis, or management of the existing knowledge (Head, 2008, p. 2). The EBP approach covers the nuances of the process through which knowledge is being transformed into the policy (Head, 2008, p. 2). Thus, the EBP is believed to fill in the gaps that might be created during this process (Head, 2008, p. 2). Large organizations have adopted "knowledge management" plans to handle the difficult and complicated tasks of collection, inspection, and distribution (Head, 2008, p. 2). The management of the information that governments or organizations possess is very valuable as it helps monitor the trends and the needs at the specific time and area (Head, 2008, p. 2).

There are many different policies that policymakers focus on. Technical expertise is essential in the process of policy formulation (Head, 2008, p. 4). However, in some areas, technology has become one of the vital components (i.e., transport, energy, water supply) (Head, 2008, p. 4). Naturally, this does not mean that technological expertise can be the only solution to complex problems that governments are facing (Head, 2008, p. 4). Therefore, in order to address a complex inter-linked problem, the policymakers need a so-called network and partnership of different stakeholders who bring their input to the whole process (Head, 2008, p. 4). It then also affects the way we perceive the problem, the relevant knowledge, the policy, the program design, the implementation, and finally, the evaluation (Head, 2008, p. 4). Thus, the idea of evidence-based policy alters once the policymakers move from the technical approach towards the relational approach (Head, 2008, p. 4).

Initially, the evidence-based policy's foundation was the knowledge provided as a result of the respective research conducted by government agencies or external organizations (Head, 2008, p. 4). This refers to the general evidence about explanations of social and organizational phenomena, but also the data which is generated through evaluation programs (Head, 2008, p. 4). According to Head (2008, p. 4), the success of the policies does not rely solely on social science research. As was discussed previously, the relevant knowledge can have multiple forms. This might affect the result and the actual policy because of the complexity of the problem and the approach the policymakers have towards the collected data (Head, 2008, p. 4). The broader view includes not just one evidence-base but several bases (Pawson et al., 2003; Schorr 2003; Davies 2004, cited by

Head, 2008, p. 4). The information and the collected data work as the informer and influencer of the policy, but it does not determine the policy itself (Head, 2008, p. 4). Hence, each separate part of knowledge becomes multiple sets of evidence (Head, 2008, p. 4). According to Head (2008, p. 5), there are three important forms (lenses) of knowledge:

I. Political know-how
II. Rigorous scientific and technical analysis
III. Practical and professional field of experience

Political knowledge

These three lenses all work in a different way with applicable to them limitations (Head, 2008, p. 5). The first one is called *political knowledge*, the know-how followed by the analysis and selection by political actors (Head, 2008, p. 5). This phase includes the analysis and judgment of the selected data, which is important because the following strategies will be based on this evidence (Head, 2008, p. 5). The following steps include:

- undertaking agenda-setting
- setting priorities
- undertaking persuasion and advocacy
- communicating key messages and ideological spin
- shaping and responding to issues of accountability
- building coalitions of support
- negotiating trade-offs and compromises (Head, 2008, p. 5).

The political knowledge referred to politicians, parties, organized groups, and media (Head, 2008, p. 5). Naturally, not all the data is available to the public. However, an important part of it is "transparent" and is spread widely among the public by the mass media (Head, 2008, p. 5). The information is quite fluid, but on the political lens, it is about persuasion, and the data is not about objective honesty (Head, 2008, p. 5). The selective bias of the knowledge does not refer only to the political lens, the debates, the ideological affirmations (Head, 2008, p. 5). The selective use of evidence is regularly seen as "typical" political conduct and a piece of the "game" of political contention (Head, 2008, p. 5). Within this political game, it is broadly believed that pleading and deception are acceptable and normal (Head, 2008, p. 5).

Occasionally, the selective use of evidence is tactical, random, or opportunistic (Head, 2008, p. 5). Moreover, at times, it is systematic, as it is linked to ideological perspectives which are based on the politician's beliefs (Head, 2008, p. 5). Some aspects of the policy have become the subject matter of explicit government commitments (Head, 2008, p. 5). These commitments are not wide open for any debates, and the potential evidence becomes irrelevant in this case (Head, 2008, p. 5).

Therefore, certain policy positions are "data-proof" or "evidence-proof." This means that their "base" was already determined by political commitments, probably those linked to ideological beliefs of political parties or leaders (Head, 2008, p. 5). These political preferences allow only some kinds of "evidence" to be noticed and accepted (Head, 2008, p. 5). In this context, the research that will be conducted already has specific expectations coming from a formulated viewpoint. The problem is defined by "official" terms, which leads to a preferred collection of evidence, not the objective one (Head, 2008, p. 5).

Scientific (research-based) knowledge

Scientific knowledge refers to the systematic analysis of the existing and previous conditions and trends, the causal inter-relationships that can provide an explanation to these trends (Head, 2008, p. 6). The scientific lens includes many different ranges of knowledge and assessment programs: economics, law, sociology, public administration, evaluation, and others (Head, 2008, p. 6). All these contributions are essential as they cover a variety of important details for the policy setting, the complete understanding of the problem, and what could be the potential solutions and programs (Head, 2008, p. 6).

However, each scientific discipline has its own approach to data collection and different methodologies and might offer alternative perspectives on complex issues (Head, 2008, p. 6). The scientists rarely agree on the nature of the problem, of the trend, or what could be the best approach to set a viable solution (Head, 2008, p. 6). Therefore, during the previous decades, it is more common to meet the interdisciplinary approaches to multi-layered social issues (Head, 2008, p. 6). Scientific knowledge includes the work of professionals experienced in systematic approaches to collecting and analyzing information (Head, 2008, p. 6). The quality and the consistency of the data are vital for the scientific approach to the actual analysis (Head, 2008, p. 6). As was already

stated previously, the next important step is to choose the methodological approach (Head, 2008, p. 6).

Systematic reviews focus on the state of existing knowledge, analyzing the studies that explain the causal effects of certain interventions (Head, 2008, p. 6). In other cases, a few strategies related to a hermeneutic approach, counting an expansive extent of 'action-research' ventures, tend to respect approach and program evaluation as more associated with interactive social learning ventures than to the test sciences (Head, 2008, p. 6).

Practical implementation knowledge

Practical implementation knowledge represents the practical wisdom of professionals in their "communities of practice" (Wenger, 1998, cited by Head, 2008, p. 6); the organizational knowledge is related to managing program realization. These communities (professional and managerial) are frequently sectioned and not connected (Head, 2008, p. 6). They work inside and over the public, private, and nonprofit sectors (i.e., NGOs) (Head, 2008, p. 6).

Relevant occupational groupings consist of program delivery managers, contract managers, enterprise managers, and the diverse range of professionals and paraprofessionals who are working extensively in order to provide the expected service (Pawson et al. 2003) or who support services connected to the policy programs of the government (Head, 2008, p. 6). These professionals and managers are occupied with the everyday issues of the program realization and customer support (Head, 2008, p. 6). The role of these professionals is to manage the upwards, downwards, and outwards to external stakeholders (O'Toole, Meier, and Nicholson-Crotty 2005, cited by Head, 2008, p. 6).

It is believed that the evidence is being emphasized as it can be interpreted as a simple contribution to the legitimation of the policies and the political commitments (Sanderson, 2002, p. 5). However, Walker (2000, p. 62-3) supported that research of the evidence is just one influence on the policy process. Nevertheless, the research also stated that the evidence is not always that one factor that influences policymaking (Walker, 2000, p. 62-3). The power of political forces of inertia, expediency, ideology, and finance is sometimes more influential than the evidence in the policymaking process (Walker 2000, cited by Sanderson, 2002, p. 5). Kogan (1999) believed that the governments would look for ways to legitimize the policies adopted by them, with reference

to the notion of evidence-based decision making (cited by Sanderson, 2002, p. 5). Nevertheless, they use the research evidence only in cases where it supports the politically driven priorities (Kogan 1999, cited by Sanderson, 2002, p. 5).

The practical experience that these actors possess is usually underrated by political and scientific representatives (Head, 2008, p. 6). The lens of practice is interacting with the bodies of knowledge that are specific in each respective profession (Head, 2008, p. 6). The educational process of managers and professionals is associated with "best practice" and relevant research bases for evaluating the "effective" proceeding (Head, 2008, p. 7). In big organizations, the best practice may end up being overlaid with bureaucratic rules and protocols (Head, 2008, p. 7). The systemization and the new technical solutions are important; however, some areas of practice are not progressive enough (Head, 2008, p. 7). The human factor and the social realities create unique characteristics, and here, time is considered the needed puzzle for social improvement (Head, 2008, p. 7). Several examples could be the response of politicians to a crisis, and whenever there is a demand for urgent action and response, strict risk-management, and standardization (Head, 2008, p. 7).

The following figure presents the interconnectedness of the three lenses presented in the theoretical framework. Thus, it can be seen that the final policy is affected by different stages and

actors. The final outcome, the results of the study, which is implemented into the policy or regulation, is shifted by these three important lenses in the policy cycle.

Implications

Previously, it has been discussed that there are three lenses through which the policies and programs are evaluated and implemented (Head, 2008, p. 7). Nevertheless, the evidence base is not just one, but there are several bases (Head, 2008, p. 7). Each body of knowledge is connected to others, and thus, multiple sets of evidence are created, informing the policy and not determining it (Head, 2008, p. 7). The three lenses explained above represent three perspectives on the information that is both useful and usable (Head, 2008, p. 7). Each type represents its own protocols of knowledge, expertise, strategy, and everything that is seen as "evidence" (Head, 2008, p. 7).

Another important factor that should be mentioned is that each type of knowledge is shifted through an internal debate on the aspects which are relevant or not in accordance with the opinion of these actors (Head, 2008, p. 7). The managerial factor plays an important role when these three lenses are working together (Head, 2008, p. 7). However, this goes out of the scope of this paper, as here, the research focuses on the relation between public policy and the social sciences (i.e., the research). The government is expecting that the research findings will work as an additional help for the policy but not determine the policy direction and adjustments (UK Cabinet Office, 1999, cited by Head, 2008, p. 7). Subsequently, there is no widely agreed process of the social science research contributing and adding the most value to the policy process (Head, 2008, p. 8).

For instance, it is not clear which stage the research becomes most useful to the government (Head, 2008, p. 8). Is it at the early stage when the government is identifying the problem? Is it on the step when the government is examining various costs of the problem? Is it in the phase when the government is evaluating and checking the program's effectiveness? It is important to identify the causal process (Cartwright & Hardie, 2012, p. 107). At the same time, the scientists themselves are not experienced in communicating the results of the research to governmental officials timely, unless it is requested (Head, 2008, p. 8). At this stage, the government is expecting the managers and professionals to deliver the needed results of the research studies to work further on the policy-setting process (Head, 2008, p. 8). Effective implementation is considered to be the key factor in

public administration (Head, 2008, p. 8). Therefore, public officials should have a clear vision of the priorities set. According to Cairney (2016, p. 61), some frames can be identified quicker than others. This factor is essential for the effectiveness of the program implementation that was selected by a government (Head, 2008, p. 8). The lack of the government's commitment to collect the policy-relevant evidence usually leads to policy gaps and failures (Clare and Creed 2014, p. 243, cited by Cairney, 2016, p. 91).

Accountability plays a vital role in the contractual relations for the service to be delivered (Head, 2008, p. 8). In some exceptional cases, the groups that are working on the practical matters might be disenfranchised in cases where they are not fully aware of the prior discussion about how the programs have been designed and how they should be delivered (Head, 2008, p. 8). Usually, the political executives are not welcoming the feedback from the implementers, especially in cases when the program cannot deliver the desired goals or the resources are not enough (Head, 2008, p. 8). In other cases, the policymakers might be biased, and difficult to agree on the need to change the existing policies which contradict their own beliefs (Cvitanovic et al. 2014a; see also Kahan et al. 2012; Leviston and Walker 2012, cited by Cairney, 2016, p. 92). This does not mean that sharing additional ideas does not happen (Head, 2008, p. 8). However, as was discussed so far, the successful implementation of the program can be achieved if the public sector managers and political leaders have made the necessary judgments, have set required priorities, have gathered the support to act, and have persuaded the stakeholders about the trade-offs and preferred options (Head, 2008, p. 8). Policymakers expect from scientists: certainty and clear solutions (Cairney, 2016, p. 92). However, researchers and scientists can offer the "balance of probabilities" based on the collected data (Lalor and Hickey 2014, p. 10–12, cited by Cairney, 2016, p. 92).

Researchers usually believe that the definition of the issue and its analysis should be connected to the data collected through systematic research (Head, 2008, p. 8). Nevertheless, in reality, the government is the one framing the problem and agendas (Head, 2008, p. 8). The strategy is shifted through the debates about the problem and the government's agenda (Head, 2008, p. 8). Therefore, the policies are not created in a neutral and objective way or from the pure evidence provided after the research, but from politics, judgment, and debate (Majone 1989, cited by Head, 2008, p. 8). The policy debate and analysis are referring to the interplay of the facts, wishful action plans, norms, and the data (evidence) is varied and contestable (Head, 2008, p. 8).

Subsequently, different actors perceive the evidence in another way. The same information, or the question where the problem lies – can be comprehended differently by the business owners, NGOs, government officials (Head, 2008, p. 8). Since the scope of this research lies on the perception the government has on the evidence, here are the main cases when the government is ready to act:

- crisis or urgency
- the role of political mandates and priorities
- the part of expert judgment and advice
- organizational and issue histories
- the changing context of social values and public opinion (Head, 2008, p. 8).

What constitutes a problem is also seen differently through the three lenses presented previously (Head, 2008, p. 8). Policy learning includes the socially conditioned discursive or argumentative process of development of cognitive schemes of frames which puts under question the goals and assumptions of policies (Sanderson, 2002, p. 6).

Nevertheless, what remains stable is the need for efficient information that can work for an effective policy (Head, 2008, p. 9). This is one of the main reasons why social science could evolve in the program evaluation, analysis of the implementation, and expand research on complex issues (Head, 2008, p. 9). Scientists always stay focused on the "evidence," and the policymakers try to reconcile beliefs (Cairney, 2016, p. 92). Therefore, the provided information is interpreted based on the judgments that include different opinions of the interest groups (Cairney, 2016, p. 92). There are essential differences in the pure evidence, the collected data, or knowledge in comparison with the technical implementation and usage of this data in practice (Head, 2008, p. 9).

The critique of evidence-based policymaking

Climate change facts and the related policies were not always given the attention the issue has gathered today. Nevertheless, the previous studies have found that expert knowledge represents only one part of the policy process, and it may not always have a needed influence on the outcome (Wesselink, Colebatch, & Pearce, 2014, p. 340). Climate change problems have been interpreted and perceived as an economic investment opportunity for some, and as a result of that, the environmental problems have gathered more support (Wesselink, Colebatch, & Pearce, 2014, p.

340). Nonetheless, this swift of attention did not occur just because of the collected evidence and information on the damage it has caused to planet Earth (Wesselink, Colebatch, & Pearce, 2014, p. 340). The evidence alone does indicate nor suggest a policy. Therefore, in most cases, it is believed that the evidence is utilized as a tool by government officials to promote specific policies.

For example, the evidence does not "speak for itself" (Wesselink, Colebatch, & Pearce, 2014, p. 341). The evidence is always introduced by someone, be it scientific experts, politicians, or NGOs (Wesselink, Colebatch, & Pearce, 2014, p. 341). Thus, the same type of evidence or even the exact information can be presented in various ways, depending on its representative. Moreover, the framing stage of the problem and the proposal of certain resolutions and policies can be entirely opposite when observed in different situations (Wesselink, Colebatch, & Pearce, 2014, p. 341). This is why the previous studies have established the three factors that need attention when analyzing certain evidence, which eventually leads to a policy (Wesselink, Colebatch, & Pearce, 2014, p. 341). These factors and criteria are the quality, the context, and the discourse (Wesselink, Colebatch, & Pearce, 2014, p. 341). As was observed before, the three lenses of the policy cycle require the cooperation of different actors within a network through which a policy can be set. This cooperation can be successful if the actors involved can find a "common ground" in the process (Wesselink, Colebatch, & Pearce, 2014, p. 342). Some of the common ways the actors cooperate together are the meetings and the negotiations. This leads to the conclusion that the evidence cannot be neutral and unproblematic, as it depends on the context, perception, and analysis (Wesselink, Colebatch, & Pearce, 2014, p. 342).

As was stated previously, there are certain barriers when it comes to the use of evidence by policymakers (Stoker & Evans, 2016, p. 17). There are four "constraints" that could explain these barriers: "construction" barrier refers to the way the evidence-based policymaking is perceived and implemented; "environmental" barriers are usually the ones out of control of the policy officials, but impacts directly their work; "institutional" barrier includes the impact of organizational structures, resources, and roles that prevent the use of evidence; "system" barrier refers to norms, rules, and processes which are part of the governance that prevent the evidence-based policymaking (Stoker & Evans, 2016, p. 17-18). These will be explained in-depth in the analysis of the collected data for this specific case study.

Time and money are some of the vital prerequisites for the generation of research of evidence (Parkhurst, 2016, p. 55). Thus, it is a value-based exercise to make a decision towards where and what the scientists need to study, even if it is not commonly discussed in such terms (Douglas, 2015 cited by Parkhurst, 2016, p. 55). Some argue that scientific knowledge cannot be claimed to be objective. The research does not simply provide the information to the policy developers but plays an essential role in promoting the broader "enlightenment" of policymakers (Sanderson, 2002, p. 6). The constructivist perspective supports that the policy development is perceived as a "process of deliberation which weighs beliefs, principles, and actions under conditions of multiple frames for the interpretation and evaluation of the world" (Dryzek 1990, cited by Sanderson 2002, p. 6).

The following section presents the two hypotheses that will be tested in accordance with the collected data on public transport in the city of London.

Hypotheses

The theoretical framework has discussed the different angles of the evidence-based policymaking process. Different stakeholders and aspects of the policymaking cycle were addressed by various scholars in the past and were elaborated in the previous section. This knowledge will help me in the analysis of the collected data on the case of London and how the officials are utilizing transport data for carbon emissions policies or not.

***H_1**: The evidence-based policymaking derived from the transport data has a positive effect on the carbon emission policies in the city of London.*

Based on the theoretical framework, the government officials would utilize evidence-based policymaking as it is believed to be a reliable and effective approach. However, as was discussed previously, it is not always the case. Therefore, in the following sections, different aspects of the problem will be addressed. Next, it will follow the analysis of it based on the decisions the government officials of London have been taking to resolve the existing problem of transport and GHG emissions. As discussed previously, the first steps are to identify the problem and then explore the data (evidence, information), which will detect the roots of the issue and how it can be addressed.

***H_2**: The evidence-based policymaking derived from GHG emissions caused by transport has a positive effect on the alternative ways of transportation offered to citizens of London.*

Evidence, meaning the data on the transport in the city of London, will be explored in the case description section. As will be seen, the collected evidence will provide a spherical view on the existing problems and how they have been addressed or not by the government. Therefore, the main variables that lead the research are climate change, transport GHG emissions, and how these problems are addressed with the EBP approach.

Operationalization

Variables/ Concepts	Definition	Indicators	Data Sources
Independent Variables			
Alternative ways of transportation	Walking, biking, public transportation, hybrid vehicle travel, and carpooling.	The statistics and collected data on the choices the citizens of London are making towards alternative ways of transportation. This will be tested along with the policies taken by government officials of the city in this field.	UK government's datasets observed during a specific timeframe 1990-2020.
Transport greenhouse gas emissions	The release of greenhouse gases and their precursors into the atmosphere is caused by transport.	The reports by the Transport for London on the introduced policies. This data will be observed during a	UK government's datasets observed during a specific timeframe 1990-2020.

		specific timeframe in order to detect if there was any positive change in the previous policies.	
Dependent Variable			
Evidence-based policymaking	Information/data from specific research areas which are used as a basis in policymaking.	The use of the EBP approach in the policymaking cycle.	Annually reports on transport emissions and governmental action plans.

Methodology

The research focuses on the single case study, the city of London, and how the government is utilizing the transport data for greener policymaking. The analysis lies in the collection of multiple types of evidence related to transport in the city of London and how this data is used by the authorities. This analysis is performed within and not across cases (Toshkov, p. 285). Thus, the focus is concentrated on the related observations regarding a specific case study (Toshkov, p. 285). The case study research design is about the detailed study of a single case (Toshkov, p. 286). The current research aims to determine whether the data collected on the transport regulations in London could be an effective approach to use it for the policymaking process.

Qualitative approach

The data collection is only part of the whole policymaking cycle, as there are different stakeholders involved, and the data is being filtered through different stages, as was discussed previously. The research is based on the qualitative data collection approach. It aims to analyze the certain documentation and numbers on the progress made regarding the public transportation means in London and how it has been affecting the reduction of carbon emissions.

The case study research is focused extensively on the investigation of many details about the specific issue addressed (Neuman, 2014, p. 42). The current research is examining the internal details of the case (existing policies, transport), but also the external factors (Covid-19 pandemic, other factors that cause GHG are taken into consideration). The qualitative data in the current research will be based on the observations and the documents on the transport data in London, the conferences and meetings held by the government officials of the city. The EBP theory will be used to explain the collected data and perform the required analysis.

Therefore, the collection of facts and figures will be the basis for the analysis. The research will conduct the analysis of the documentation on the transport changes that have been performed during the last thirty years and detect whether this data has affected the governmental policies. Therefore, I will explore whether there is a causal relationship between the evidence collected on the transportation changes within the city of London and the policies the government has adopted to reduce further carbon emissions. The specific case has a substantive relevance as it explores the real world's societal concern on carbon emissions. Whether the hypotheses can be checked and proved, the results of the current research can be applied to different cities, and London could serve as an example. If the new policies are effective, other cities and states might adopt this approach in the future.

Thus, the case study will allow studying in-depth the details of a specific case, which will determine the causal mechanisms useful for future research (Toshkov, p. 291). Therefore, the research aims to collect the available documentation and statistics shared by the already established institutions that monitor the transport in London. Secondly, I am going to analyze whether the collected data has affected the existing policies on the reduction of GHG.

The city of London provides extensive statistics on transport and travel, which are publicly available and will be utilized in the analysis of the current study (Metz, 2015, p. 370). Specifically, it is feasible to construct a timeframe with the specific developments needed for the analysis of this case. By its nature, the case study will be able to focus on a single city that offers limited space for a critical assessment of the whole scale of policy regulations (Metz, 2015, p. 370). For the scope of a larger research project, it would have been necessary to include a larger sample of cities and a certain timeframe (Metz, 2015, p.370).

Research design and data collection

Climate change constitutes one of the most significant global challenges in human history. It is vital that the countries around the world achieve the decarbonization of all sectors enabled by a socio-technical transformation (Otte, 2021, p. 132). This research focuses on the various dimensions of the climate change problems and how the government of London is using the evidence from transport within the city to transform it into an effective policy. It is true that to achieve the transition towards a low-carbon society, a number of climate policies have to be addressed at different stages of the decision-making model (Otte, 2021, p. 132). These include the mix of short-term fix policies such as incentives and carbon pricing and long-term policies, which will support social change by addressing the societal values that redefine social well-being and happiness (Otte, 2021, p. 132).

The validity of the research should suggest truthfulness (Neuman, 2014, p. 212). The current case study will be assessed based on the practical numbers and statistics derived from the changes that happened in public transport in London in regard to climate change. This way, the validity of the case should be fulfilled as it relies on pragmatic data which can be representative of the real-world example.

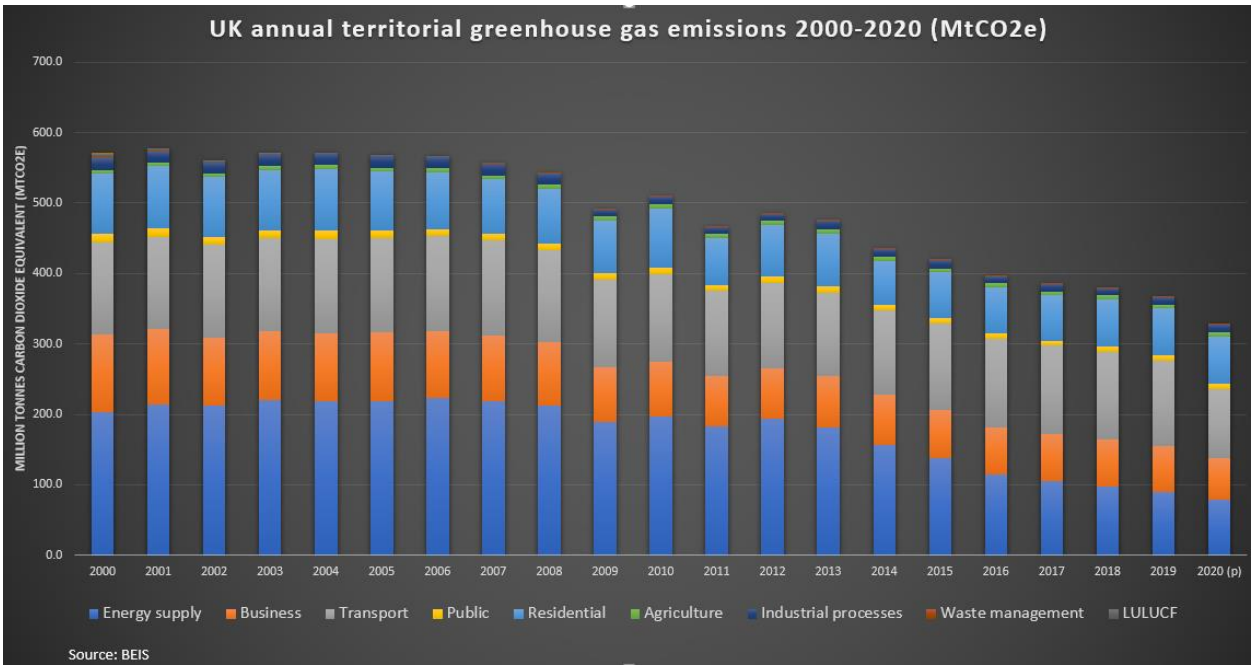
Reliability also refers to the credibility of the findings (Neuman, 2014, p. 212). It suggests dependability or consistency (Neuman, 2014, p. 212). The representative reliability of this case can be limited, as it was seen from the theoretical framework that the measured adopted in London might not have the same results if applied in a different city. However, with the correct adjustments and analysis, the findings of this research might prove useful for a different case study or even the implementation of certain policies in other cities.

Even though the climate change consequences are severe, the design of effective policies is still slow (Otte, 2021, p. 132). There are several reasons for this. One reason is that the decarbonization of the economies worldwide is socially and culturally a complex process (Otte, 2021, p. 132). Therefore, climate change is also called a “social dilemma,” as the reduction of GHG emissions requires great changes in day-to-day social practices, such as driving or heating buildings (Otte, 2021, p. 132).

It was a great challenge to tackle the GHG emissions from London's buildings, transport, and industry (Authority, 2020). The reality is that the GHG emissions are not affected solely by transport; the impact is affected by the goods people purchase, the food consumed, and the clothes produced globally (Authority, 2020). However, the authorities of London have explicitly focused on the effects the city is facing and how they can be stopped, or at least reduced (Authority, 2020). This way, the city of London can set a certain plan based on the collected data, which will be more effective (Authority, 2020). The data on the consumption-based emissions of London has been used by the Mayor of London, Sadiq Khan, to form further policies on the reduction of GHG emissions (Authority, 2020). These studies have focused on the analysis of the data for the period 2001-2016) (Authority, 2020).

It is known that climate change will lead to more extreme weather conditions and will become the cause of significant risks to food security, biodiversity, health and ecosystems, infrastructure, and food systems (Otte, 2021, p. 132). It is known that in 2016, the world leaders signed the Paris Agreement to reduce GHG emissions and to achieve the global temperature rise below $2^{o}C$ (Otte, 2021, p. 132). Nevertheless, the renewable energy system, which is an important factor in achieving climate change goals, still has significant social, political, and financial limitations (Otte, 2021, p. 132).

The key findings have shown that London's consumption-based emissions in 2016 were approximately 110Mt CO2e (Authority, 2020). The analysis presented by the government officials has revealed that they have fallen by 5% since 2001, even though the city's population increased by 1.5 million during that period (Authority, 2020). Britain's GHG emissions have been reduced consistently for the last eight years in a row achieving a 48.8% fall compared to 1990 levels, as is seen in the data collected in the table below (Twidale, 2021).



Case description

London is historically known as a smoggy city of the 20th century (Perry, 2020). One of the main priorities the Mayor of the city of London has – is to neutralize environmental impact and slower climate change (Perry, 2020). One could ask how can it be achieved in a city which is full of traffic and carbon-emitting processes and structures?

London is growing, and by 2050 it is expected to be home to over 11 million people (London Environment Strategy, 2018, p. 8). Unless action on the environmental issues is taken now, the problems will become much worse in the future (London Environment Strategy, 2018, p. 8). Climate change is already causing high temperatures worldwide, and the urgency to take action is emphasized more than ever. Moreover, there is a great change of energy shortages and overflooding (London Environment Strategy, 2018, p. 8). Improvements in London's environment are essential for the wellbeing of the citizens and the economy, as the city is a home for many huge businesses (London Environment Strategy, 2018, p.8).

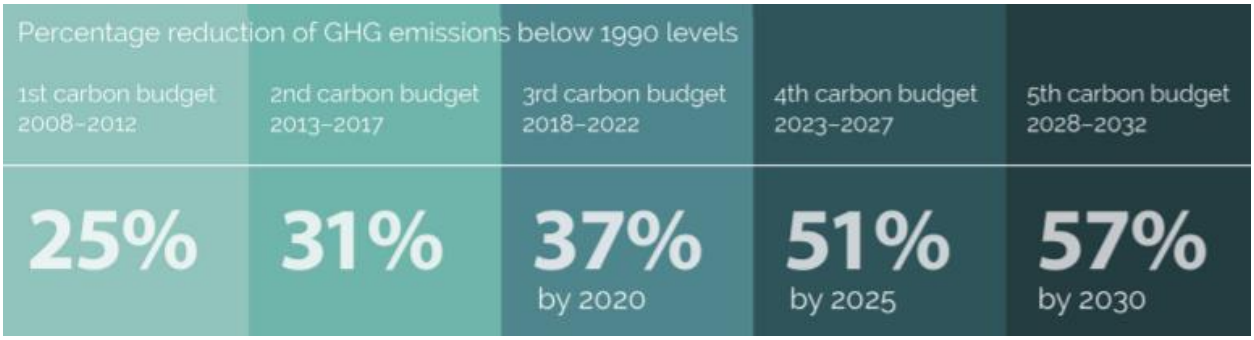
The goal of zero emissions by 2050 could be achieved if the car mileage will be reduced by 60%, given the fact that all cars will be low emission by 2035 (Perry, 2020). One of the soonest changes in the policies about carbon emissions is the London Underground which is planned to be a zero-carbon source by 2030 (Perry, 2020). Another important factor for the city to adopt

completely emission-free transportation, which is cycling, is the need to invest in the city's infrastructure (Perry, 2020). This has been taken into account by London Cycling Campaign's chief executive Ashok Sinha (Perry, 2020).

Urban areas have been constantly concentrated on the impact of climate change and the ones that "consumed" carbon (Dawson et al., 2007, cited by Harwatt et al., 2011, p. 3). Element Energy released a report in January 2021 that revealed a need for additional actions by City Hall to reduce the use of vehicles in London (Intelligent Transport, 2022). The report results have shown that the Mayor does not have the required funding at the moment to deliver the initially set results (Intelligent Transport, 2022). Mayor Khan is calling for additional help from the UK's government (Intelligent Transport, 2022). Without this assistance, it will be more difficult for the authorities of London to achieve the zero-emissions goal by 2030 (Intelligent Transport, 2022).

According to Christina Calderato, Director of Transport Strategy and Policy at Transport for London, the new programs have been planned across TfL that will reduce the carbon emission caused by transport in the city of London (LDN_gov, 2022). The charging schemes established for the last 20 years have been effective in the congestion problem but also in tackling air quality in London (LDN_gov, 2022).

Carbon budgets for the United Kingdom (Marsden et al., 2020):



Nevertheless, it should be noted that during the timeframe 2000-2018, London achieved a 7% reduction in emissions caused by transport in the city (Intelligent Transport, 2022). According to the report, zero-emission by 2030 could be achieved if London could significantly reduce the use of petrol and diesel vehicles (Intelligent Transport, 2022). The alternatives described in the

reports are walking, cycling, greater use of public transport, and “greener” cars (Intelligent Transport, 2022).

The more the government provides citizens walking and cycling solutions for everyday transportation, the fewer vehicles on the streets. This way, the traffic noise can be significantly reduced, and the air quality can be improved. Moreover, the carbon dioxide emissions will be diminished, and the city is more likely to achieve the zero-emissions goal that is set to be achieved by 2050. The environment of the city, in this case, London, is affecting every detail of the life in the city (London Environment Strategy, 2018, p. 7). The current issue requires attention as it is the air Londoners breathe, the water they drink, and the parks where many citizens spend time (London Environment Strategy, 2018, p. 7). The state of the city’s environment is affecting everyone who lives or visits London (London Environment Strategy, 2018, p. 7). Climate change affects citizens’ health. The city of London remains a good place to work and keeps the city functioning on an everyday basis (London Environment Strategy, 2018, p. 7).

Electromobility

It is stated that only two percent of vehicles in London are electric (Intelligent Transport, 2022). Some of the critical actions taken by the Mayor of London are introducing and expanding the Ultra-Low Emission Zone (ULEZ) (Intelligent Transport, 2022). Another essential factor is the tightening of the Low Emission Zone (LEZ standards), which will further reduce CO_2 emissions caused by vehicles and vans in this specific zone, along with the thirty percent cut in toxic nitrogen oxide emission caused by road transport (Intelligent Transport, 2022). ULEZ measures have proven to be an effective way to reduce roadside nitrogen dioxide concentrations in the city center of London (LDN_gov, 2022). As the report of 2000-2018 has shown, this policy led to a 44% reduction in dioxide emissions in central London (LDN_gov, 2022).

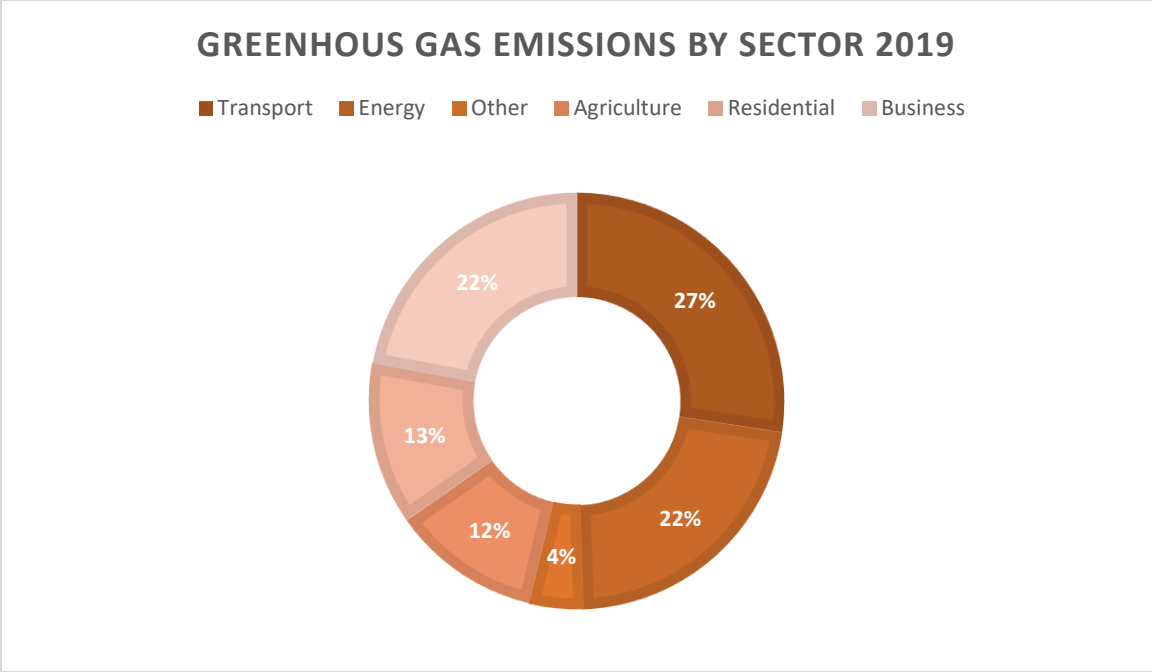
Based on the report analysis on the action taken on carbon emission policies derived from the transport data, the Mayor of London stated that the cost of inaction is higher for the economy, the environment, and the inhabitants of London, rather than the cost of the implementation of the needed policies for reducing carbon emissions (Intelligent Transport, 2022). Almost half of Londoners do not own a vehicle (Intelligent Transport, 2022). Nonetheless, the damage of the consequences of having one is not distributed proportionally in the city (Intelligent Transport,

2022). The poorest areas are the ones that are affected negatively by air pollution; its inhabitants do not own a car but are the victims of the disproportionality (Intelligent Transport, 2022). This unjust factor was emphasized by Mayor Khan (Intelligent Transport, 2022).

The Mayor of London is taking urgent actions to introduce the less polluting buses and prevent the most polluting vehicles from driving through London (London Environment Strategy, 2018, p. 12). The main goal is to establish a zero-emission public transport system in the entire city by 2050 (London Environment Strategy, 2018, p. 12). The Mayor of London has set a plan of action to "clean" the city's transport from fossil fuels, such as diesel, so the entire bus fleet to meet zero-emission by 2037 (London Environment Strategy, 2018, p. 23). The previous goal was to achieve the Ultra-Low Emission Zone by 2019 and prevent the most polluting vehicles from entering the city of London (London Environment Strategy, 2018, p. 23).

Greenhouse gases and air pollutant emissions originating from road transport are still one of the main causes that increase climate change and negatively impact health and the ecosystems (Sfyridis & Agnolucci, 2021, p. 1). The statistics shared by the UK government show that by the end of 2018, out of approximately 39.4 million vehicles registered in the UK, 0.2 million (0.5 percent) of all vehicles in the country were ultra-low emission (Clarke & Ainslie, 2019, p. 2). In 2019, the carbon dioxide emissions from road transport constituted 34 percent of the UK's total GHG emissions, which is the largest source of carbon dioxide emissions in the country (National Statistics, 2020, p. 2). Additionally, in 2019, the carbon dioxide emissions from the transport sectors decreased by 2.8 percent compared to the data of 2018 (National Statistics, 2020, p. 10).

The government of London has presented recent statistics on the impact transportation has on the environment (Department for Transport, 2021). The greenhouse gas and air quality data were provided by the National Statistics (Department for Transport, 2021). Transport has caused 27% of the UK's total emissions in 2019 (Department for Transport, 2021). 91% of this data came from road transport vehicles (i.e., cars, taxis, heavy goods vehicles, vans) (Department for Transport, 2021). Road transport is the biggest reason for greenhouse gas emissions in Europe, and since 2014, it has been responsible for 70% of all GHG emissions (Europa EU, 2016). Furthermore, the big cities are responsible for more than 70% of GHG and thus should reduce air pollution and continue the decarbonization policies (Burgelman, 2021).



Several studies have focused on GHG emissions damaging air pollution, which is a direct consequence of road transport (Sfyridis & Agnolucci, 2021, p. 1). Nonetheless, there were some limitations to the diversity and the application of the collected data (Sfyridis & Agnolucci, 2021, p. 1). For example, the emission rates are often calculated by country, or city, which means that the data may vary from one research area to another (Sfyridis & Agnolucci, 2021, p. 1). The current research is analyzing the case of the city of London, as the case study, and the specific policy measures which were adopted upon the collection of the transport data in this particular city. The data-driven analysis has shown that during the last years (2012-2017), the City of London has achieved a reduction of the usage of cars by 30% (Schwanen, 2020).

The three main proposals based on the transport policies that the Mayor of London has discussed are the following:

- The improvement of the operational efficiency, and consequently, the minimization of the damaging CO_2 emissions
- To provide efficient support and encourage the development and the use of low carbon vehicles, the technology, and the energy that have a vital outcome on the reduction of the CO_2

- Carbon efficient mode highlights the investment in the new strategies expected to attract citizens to low carbon modes. The alternative ways of transportation are the following: cycling, walking, public transport, movement of freight by water and rail (London GOV, n.d., p. 237).

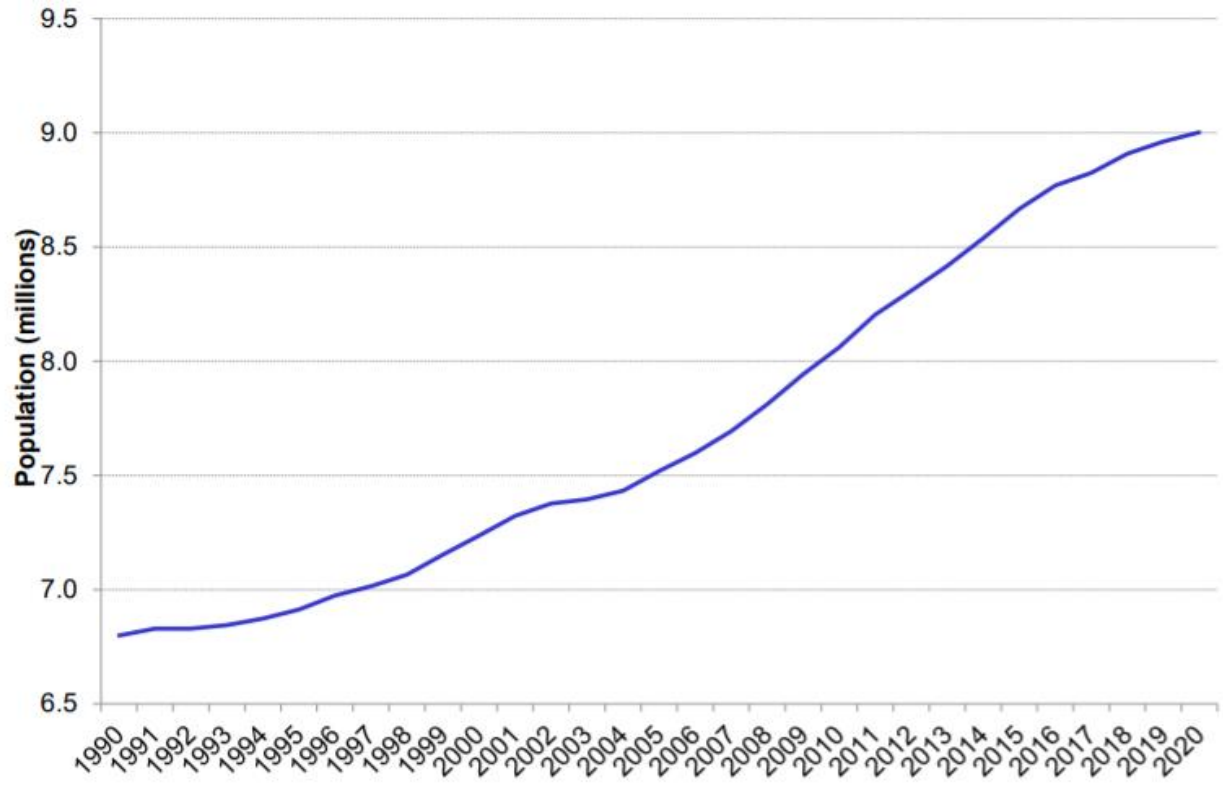
The 2000-2018 report stated that in order to achieve a 27 percent reduction in car vehicle kilometers, London authorities need to introduce an alternative charging system by the end of 2030 (Intelligent Transport, 2022). The new system idea is that the drivers could pay per mile, with different rates that depend on the vehicle's polluting scale, congestion level in that specific area, and access to public transport (Intelligent Transport, 2022). This new plan will take into consideration the exception that might be needed (Intelligent Transport, 2022). Some of the exceptions that might be implemented will depend on the citizens' income, disabilities, small businesses, or support for charities (Intelligent Transport, 2022).

The newly introduced strategies by the Mayor of London aim to reduce CO_2 by 60% in the next five years, compared to 1990 statistics (London GOV, n.d., p. 237). Nonetheless, one of the prerequisites for the success of this plan is the cooperation and investment of various stakeholders and not only the influence of governmental officials (London GOV, n.d., p. 237). Road vehicles account for approximately 72% of ground-based transport CO_2 emissions in London (London GOV, n.d., p. 245). This is why the reduction of the emissions caused by road transportation can be achieved in several ways: improved internal combustion engine efficiency, hybridization, biofuels, hydrogen, and electric power (London GOV, n.d., p. 245). It is expected in the long term that the mix of these diverse policies will contribute significantly to the decarbonization of car use (London GOV, n.d., p. 245). These new measures aim to improve the environmental needs and maintain the societal and economic benefits, as currently, London offers affordable private motorized travel to its citizens (London GOV, n.d., p. 246).

The city of London is bigger than it has even been (Transport for London, 2017, p. 10). The city is growing rapidly, and the demand for public and private transportation is being increased too (Transport for London, 2017, p. 10). It is expected that the population of London will reach 10.5 million city inhabitants by 2041, which is 28 percent higher than it was in 2011 (Transport for London, 2017, p. 10). This massive demand from the citizens of London requires some structural changes in the transport networks and the composition of the city (Transport for London,

2017, p. 10). Moreover, employment is expected to expand in the city; therefore, more than a million new jobs will be created by 2041 (Transport for London, 2017, p. 11). This factor will increase the movement around the city (Transport for London, 2017, p. 11). Noteworthy, agglomeration of the employment growth is expected in the central area of London (Transport for London, 2017, p. 11).

The long-term trend in London's resident population 1990-2020:



Source: Office for National Statistics.

Alternative ways of transport

The collected data has revealed that currently, Londoners are not practicing enough alternative ways of transportation such as cycling or walking (Transport for London, 2017, p. 15). However, it is true that traveling actively by walking or cycling can significantly improve these results (Transport for London, 2017, p. 15). Traveling by public transport requires from citizens more physical activity rather than traveling by car, as they will have to walk to and from the bus/train

station (Transport for London, 2017, p. 15). An important additional adjustment that will contribute essentially to environmental sustainability is the safety of the streets and their inclusiveness (Transport for London, 2017, p. 16).

The experts believe that if the roads are "convenient," it will be more attractive to more visitors (Transport for London, 2017, p. 16). As a result, it is expected that this approach will boost the economy, as the shops and other services might get new customers (Transport for London, 2017, p. 16). Social values play an important role in the policymaking process. Thus, previous studies suggest that the new policies should be framed according to the population's background, relevant geographical factors, political ideologies (Otte, 2021, p. 133). Promotional messages which call for moral and civic engagement tend to be more effective (Otte, 2021, p. 133).

More research results have detected that the 2.4 million trips that could be walked were made by car, and 1.2 million journeys made as part of a trip by another mode could be walked (Transport for London, 2017, p. 18). More than 8 million trips that could be cycled were performed by other ways of transportation (Transport for London, 2017, p. 19). However, the positive results of the studies revealed that cycle travel had been increased by 133% in London and 221% in the central area of the city between 2000-2015 (Transport for London, 2017, p. 19). The collected data shows that there are more than 9 million journeys that are motorized but can be cycled (Transport for London, 2017, p. 19). Therefore, the next governmental plans will focus on the ways to increase the cycling possibility for Londoners (Transport for London, 2017, p. 19).

According to Transport for London (2017, p. 25), three-quarters of car trips can be performed in a more sustainable model. Thus, it is important that the current and potential changes in policies along with the new ways of transportation through the city attract the citizens (Transport for London, 2017, p. 25). Under other conditions, the policies will not be effective (Transport for London, 2017, p. 25). Thus, it is essential to appeal to citizens towards the use of more sustainable modes of travel, which will be beneficial for their health and the environment (Transport for London, 2017, p. 25). Poor air quality damages health and causes approximately 9,400 deaths per year (Transport for London, 2017, p. 27).

As was already stated, transport is one of the most significant sources of GHG emissions. The city of London is an example of such a case (Transport for London, 2017, p. 27). The new immediate policies that could reduce carbon emissions are needed more than before in the city of

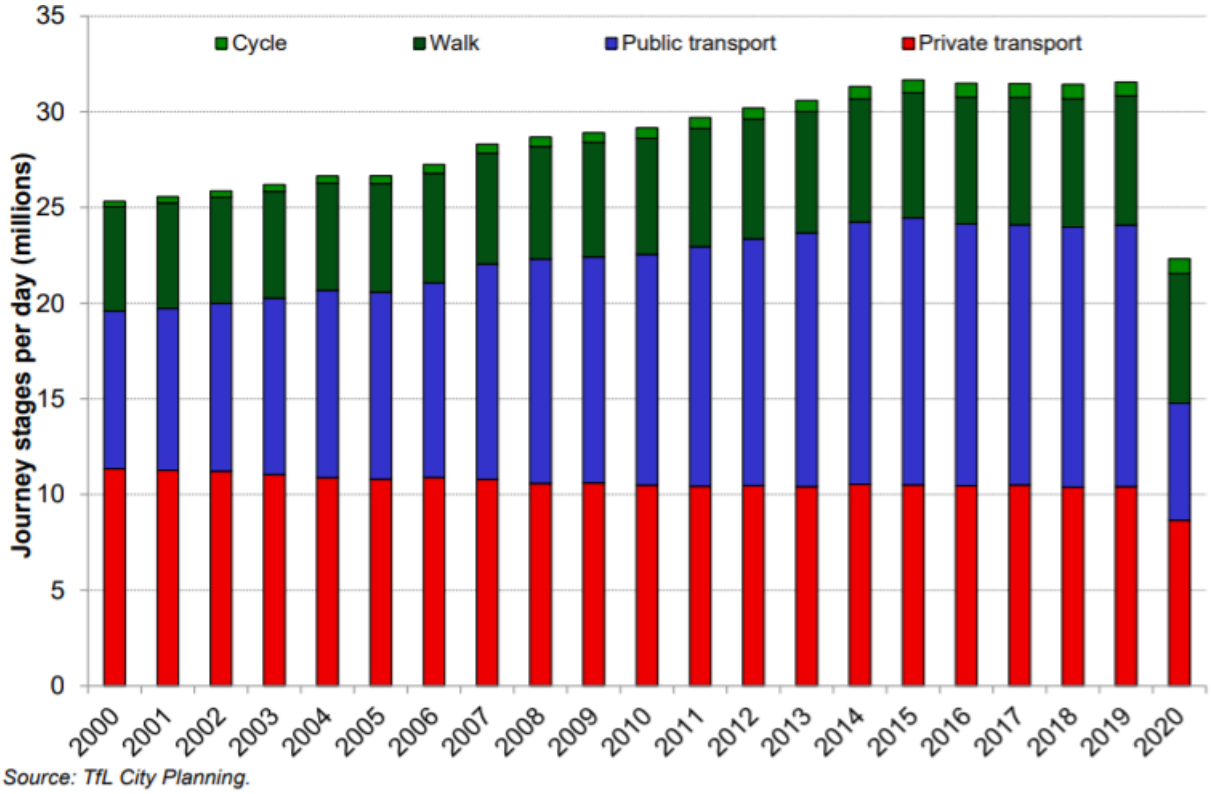
London, so it could be feasible to tackle climate change (Transport for London, 2017, p. 28). The Mayor plans to achieve a zero-carbon city by 2050, and the CO_2 emissions to fall by more than 2 million tons by 2050 in comparison to 1990 basis (Transport for London, 2017, p. 28). This goal requires the reduction of emissions. London needs at least a 40% reduction in road traffic (Transport for London, 2017, p. 28).

Another essential aspect that will help attract citizens to use more public transport, not the private, is to sustain the good level of customers' experience. Progress, innovation, investment in improvements, reliable journeys which are easy to plan, stress-free, and person-friendly are the important prerequisites that will attract the citizens of London to the alternative ways of transportation (Transport for London, 2017, p. 33). Nowadays, citizens have a new expectation from transport because of the technological progress. For instance, this means that customers would like to have access to real-time information about the routes and journeys the public transport is offering. The government action plan includes launching the mobile application, which will provide citizens with this essential information (Transport for London, 2017, p.33).

Buses, taxis, and private hire fleets in London are close to reaching zero emission (Transport for London, 2017, 28). London's rail services are primarily electric (Transport for London, 2017, p. 28). Thus, the CO_2 emissions are expected to be reduced because of the decarbonization of the energy supply (Transport for London, 2017, p. 28). The government aims to electrify all the remaining diesel lines (Transport for London, 2017, p. 28). However, any improvement in the transport system should also be efficient when it comes to extreme weather conditions. Thus, the government should ensure that the transport network is resilient to extreme climate effects (i.e., flooding, extreme heat, humidity, drought, storm winds, snow, and ice) (Transport for London, 2017, p. 30).

The adaptability of the transport system directly impacts the environment and the economy. Therefore, the government must ensure the citizens have access to the transport system under any weather condition and remain safe while using it. For example, during the last three years, major flooding has caused significant disruption to transport and negatively affected the economy (Transport for London, 2017, p. 30).

Estimated daily average stages by mode, timeframe 2000-2020[1]:

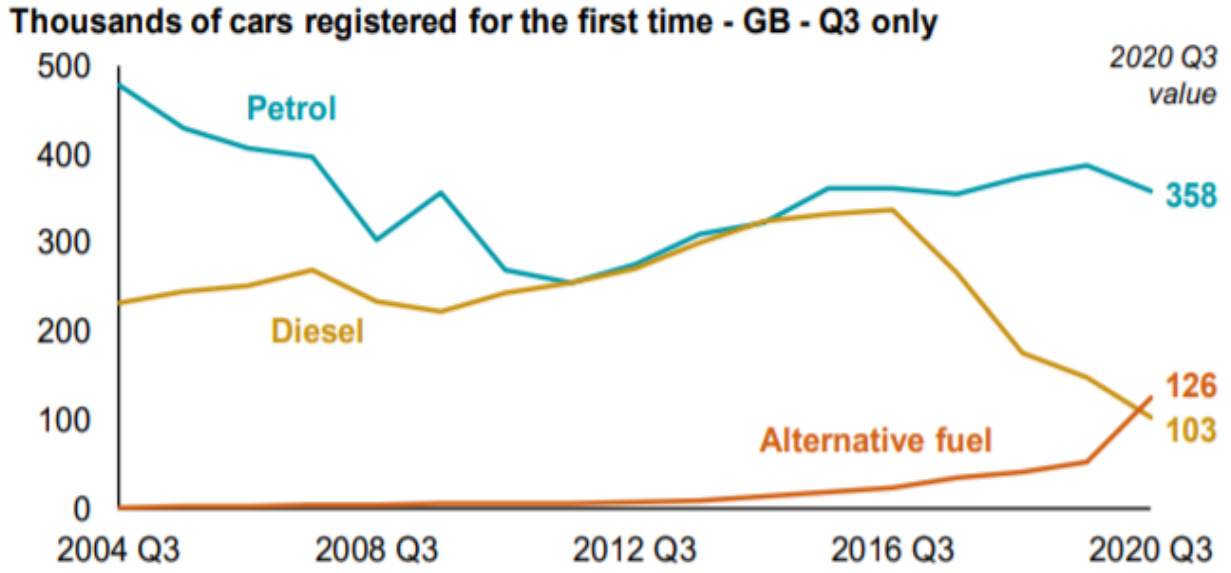


The difficulty that can be faced in the research based on the new statistics is that it is not clear if the reductions in car usage was because of the improvements done in public transport or because of the impact that the COVID-19 movement limitations have caused in 2019-2020 (Parry, 2020). However, it is essential to emphasize that the number of diesel vehicles registered in the UK has been decreased by 31%, and petrol vehicles by 8% in the Q3 in 2020 (Parry, 2020). Moreover, citizens have made a choice towards alternative fuel vehicles; the statistics have shown that in 2020, the number was increased by 137% compared to 2019 (Parry, 2020).

For instance, in 2020, during the Q3, there were 59.057 newly registered ultra-low emission vehicles (ULEVs), representing an increase of 162% in compassion to 2019 (Parry, 2020). Moreover, in 2020 Q3, there were 63,000 hybrids electric (HEVs), 36,000 battery-electric (BEVs),

[1] Following the data shown in the graphs, it should be stated that the trips in 2020 have been largely affected by the COVID-19 pandemic.

22,000 plug-in hybrid electric (PHEVs), and less than 500 alternative fuel types of vehicles (Parry, 2020). Nevertheless, the data shows that more than 80% of citizens in Central London, workers, and nonworkers preferred rail-based transport for their movement in this area (Kronberg & Weekes, 2019).



Because of the decision of the Mayor of London, there were established more than 500 rapids and 5,500 residential charging points in the city (LDN GOV, 2021). Furthermore, approximately 4,000 electric taxis operate in London (LDN GOV, 2021). The Government Office for Zero-Emission Vehicles (OZEV) has invested in the establishment of more charging points for taxi drivers (LDN GOV, 2021). The International Council on Clean Transportation has leased the report stating that London was one of the top cities with the most effective policies to eliminate the use of petrol and diesel vehicles (LDN GOV, 2021). Currently, the charging infrastructure meets the demands (LDN GOV, 2021). Nonetheless, the authorities expect that in the nearest future, this demand will be more elastic (LDN GOV, 2021).

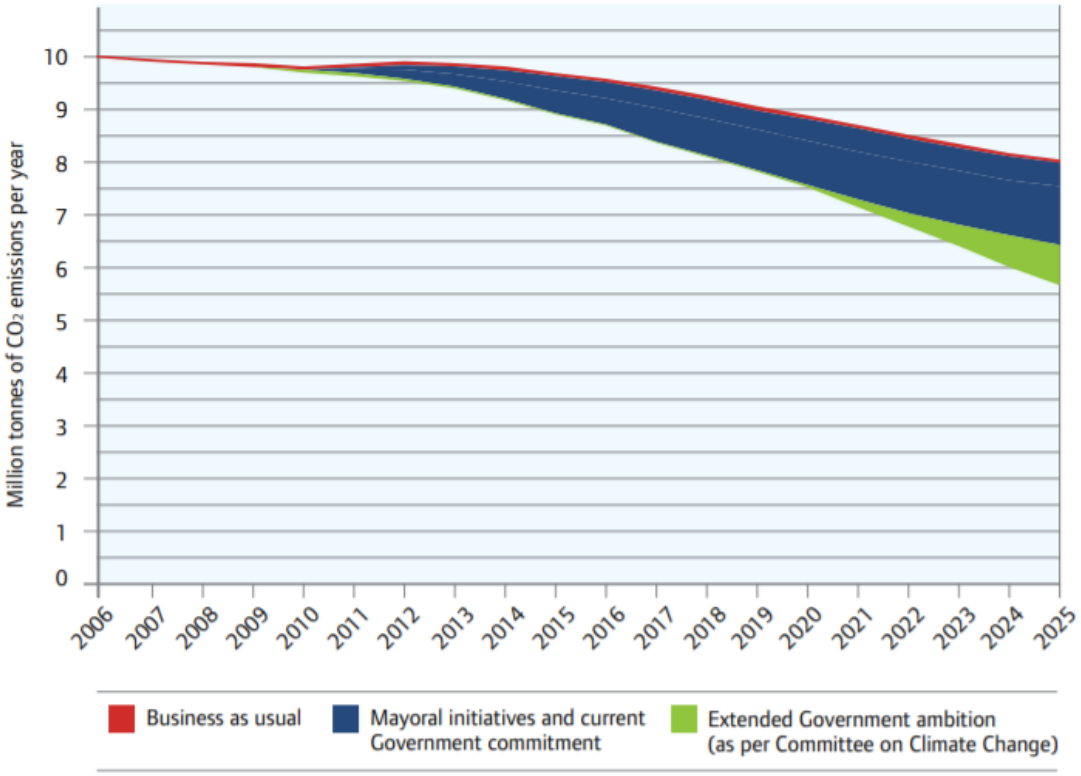
Mayor's Electric Vehicle Infrastructure Delivery Plan estimates that by 2025, the capital might require 4,000 rapid and 48,000 residential chargers (LDN GOV, 2021). The City Hall, in cooperation with the Transport for London (TfL), the Department for Transport, London Councils have agreed to set a new plan for the new infrastructure constructions (LDN GOV, 2021). This

plan falls under the broader agenda to achieve "zero pollution and zero-carbon city by 2030" (LDN GOV, 2021).

Alex Williams, TfL's Director of City Planning, stated:

"Rapid charging points will play a key part in decarbonizing transport and shifting to cleaner vehicles. To help drivers make the switch from older, more polluting vehicles to electric, they need the confidence that plugging in will be convenient and hassle-free. We have hit our target of 300 rapid charge points, which along with the capital's extensive wider network, make London a city that is showing bold leadership on the global issue of cleaning up toxic air" (LDN GOV, 2021).

Plan for the transport sector CO_2 emissions to 2025 (London GOV, n.d.):



Mayor has also requested assistance from TfL, as the role of technology will be essential in the implementation process of the new policies (Intelligent Transport, 2022). Currently, the level of required advanced technological means is not available (Intelligent Transport, 2022). The damage the climate crisis is causing, and the significant impact of toxic air pollution do not stop (Intelligent Transport, 2022). Since some of the policies that relied on technological progress

cannot be implemented at the moment, the Mayor has focused on different policies. Therefore, the Mayor called for immediate action on the new policies that could contribute to reducing carbon emissions and encourage citizens to use alternative ways of transportation (Intelligent Transport, 2022).

As explained earlier, the policymaking process requires funding and a viable implementation plan. Otherwise, it might not be easy to achieve the required efficiency level. The new proposal for Londoners for cycling has not gained much support from all the citizens of the capital; only a specific group of 24-25 aged is more likely to adopt this way of transport (Schwanen, 2020). This leads to the conclusion that the government should look back at the collected evidence and fix the policy gaps if needed to attract more citizens to choose this way of transportation. As was discussed previously, the citizens' acceptance plays a vital role in the progress and efficiency of the new policies. Electromobility is not among the first choices for many households because of the high cost; however, as was seen earlier in the experts' reports, the demand is expected to be drastically increased in the following five years (Schwanen, 2020; LDN GOV, 2021).

The process of policymaking includes the voices of Londoners. This way, the Mayor of London, along with TfL, will begin the consultations with citizens of London, local government, and businesses regarding the way the collective actions could achieve a clean, green, and healthy future (Intelligent Transport, 2022). Mayor Khan supports that the future policies will be just and equal to all citizens of London (Intelligent Transport, 2022).

Mayor Khan said:

"This new report must act as a stark wake-up call for the government on the need to provide much greater support to reduce carbon emissions in London…The climate emergency means that we only have a small window of opportunity left to reduce carbon emissions to help to save the planet and, despite the world-leading progress that we have made over the last few years, there is still far too much toxic air pollution permanently damaging the lungs of young Londoners." (Intelligent Transport, 2022).

Based on the collected data, the TOD policies, in many cases, seem to leave limited options for the poorer households; public transport (i.e., bus stops, railways) is located closer to these areas (Schwanen, 2020). In the central part of the city of London, the government has performed many

transport changes, in contrast to outer London, where there were more minor changes (Schwanen, 2020). Nonetheless, it is important to emphasize that the unjust location of public transportation means is already included in the agenda of Mayor Sadiq (Schwanen, 2020). Therefore, the agenda formed in 2018 had one of the main focuses – the improvement of these strategies, as the important objective of these new policies is to make public transport more accessible to all the citizens of London (Schwanen, 2020).

Meetings, cooperation, and stakeholders

Scientific experts and policymakers have studied thoroughly how the "London Congestion Charge was implemented as a ''stick'' in a wider package of ''carrots'' (including investments in public transport) and sought to understand whether and how its successful implementation can be replicated in cities elsewhere" (Schwanen, 2020). London Congestion Charge (LCC) has introduced a policy that obliges those who drive within the Congestion Charge zone 07:00-22:00 every day, except Christmas Day, to pay higher fees (Schwanen, 2020). Surprisingly, London is an example where this kind of system had a positive effect (Schwanen, 2020). Because, compared to other cities where there was an attempt to introduce this policy, the residents, businesses, and other stakeholders have expressed great resistance (Schwanen, 2020). It should be stated that this policy prevents unnecessary motor movement through the central areas of the city of London and avoids the new carbon emissions that are caused by vehicles.

Since 2016, the government has introduced an alternative method of testing cars (Department of Transport, 2018, p. 47). This way, it is possible to make sure the standards are met as was approved by the Market Surveillance Unit in Driver and Vehicle Standards Agency (DVSA), which aim to prevent harm to the environment through air pollution to the greatest extent possible (Department of Transport, 2018, p. 47).

City Hall is constantly monitoring the data on transportation in London and how the carbon emission policies are working based on this information (LDN_gov, 2022b). The recent results have shown that the emissions of toxic air from road transport in outer London are not reducing at the same speed as in the center and inner London, which means that there is a need for additional actions from the government (LDN_gov, 2022b). However, there was a significant improvement in the air quality in London compared to 2016, specifically in the central and inner-city (LDN_gov,

2022b). These results have been achieved based on the policy measures implemented by the Mayor, which contributed to the transformation of the capital's air (LDN_gov, 2022b).

The newly collected data has helped the expert in the analysis of the information, which has become a basis for future improvement and the new policy suggestions and implementation. Additionally, the government of the UK is a member of the United Nations Economic Commission for Europe (UNECE) working group research that tackles the emission limits on the national level (Department of Transport, 2018, p. 47). The other decision of the government was to reduce the charging rate of VAT of the electric cars; for example, 5% for electric vehicles users and 20% for other fuels (Department of Transport, 2018, p. 51).

The newly introduced programs initiated by the government provide sufficient information to the citizens regarding the facts and benefits of electric cars; this way, the consumers can proceed with confidence to the decision-making point about what is right for them (Department of Transport, 2018, p. 58). This knowledge is useful for the citizens, as it explains the advantages that electromobility offers (Department of Transport, 2018, p. 58). At the same time, it informs the citizens of the environmental impact the electromobility has, but also the differences compared to the other fuel and vehicle alternatives (Department of Transport, 2018, p. 58).

The Mayor, along with the TfL, is working with London boroughs, transport operators, and other stakeholders to promote behavioral change and smarter travel measures that have as a goal to decrease carbon emissions through eco-driving (London GOV, n.d., p. 240). Moreover, through TfL, the mayor will initiate the training on energy-efficient driving modes for London's bus drivers (London GOV, n.d., p. 240). Additionally, the Mayor is willing to initiate the automatic train control, which can optimize the energy efficiency through driving style in the Tube network (London GOV, n.d., p. 240).

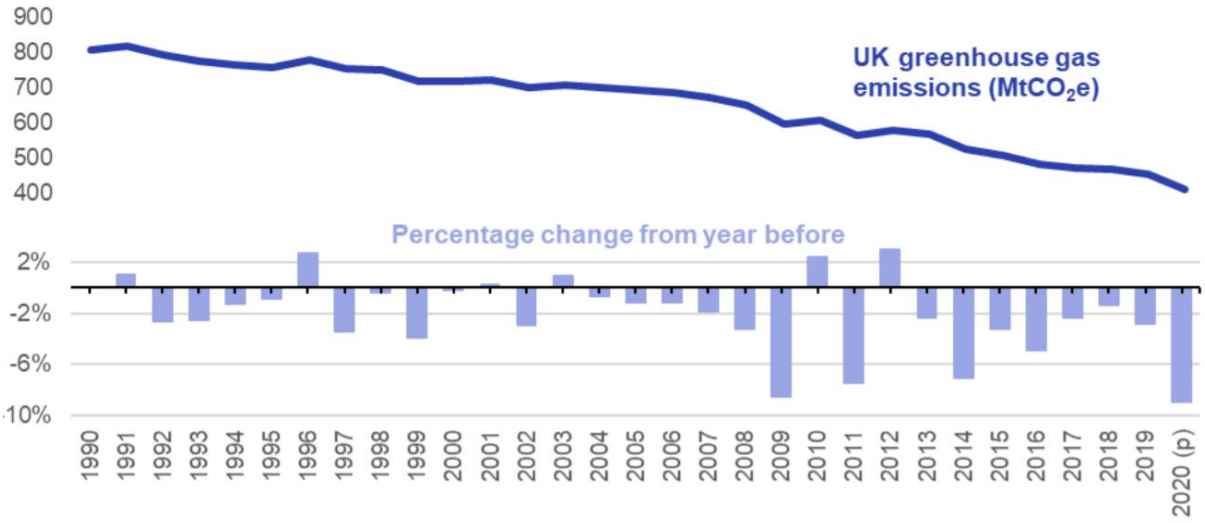
Previous studies have shown that the growth in rail travel has contributed positively to the reduction of carbon emissions (Campaign for Better Transport, 2019a). The rail system is the greenest form of transport in London. It released up to 85% fewer carbon emissions per passenger kilometer than any other transportation in the city (Campaign for Better Transport, 2019b). However, the government's cancellation of rail electrification schemes might lead to difficulties in the process of achieving the zero-emission goal by 2050 (Campaign for Better Transport, 2019b).

Analysis

This section of the research will perform the analysis of the collected data based on the EBP theoretical framework. The hypotheses will be answered in accordance with the study results.

However, the analysis first will draw attention to the correlation of the collected evidence with the EBP approach discussed in the theoretical framework section. One of the obvious factors that were discovered during the research is that the Mayor of London is constantly working on the improvement of the transport policies in the city, which directly affect the carbon emission damage caused by transport. Therefore, what is important to explore, is the way this data is analyzed by the authorities of London and implemented in the policies affecting the carbon emissions level in the city.

UK territorial greenhouse gas emissions, 1990-2020:



***H_1**: The evidence-based policymaking derived from the transport data has a positive effect on the carbon emission policies in the city of London.*

The first hypothesis assumed that if the government uses the EBP approach from transport data, it will positively affect the carbon emissions policies in the city of London. According to the theoretical framework presented previously, the EBP is a modern and efficient way of

policymaking. This approach is believed to improve the existing policies by filling the possible gaps. At the same time, the detailed analysis and the collection of the required data is a valuable tool for the creation of new policies. Therefore, in the case description section, I have focused on the collection of the indicators that could confirm or reject the established hypothesis.

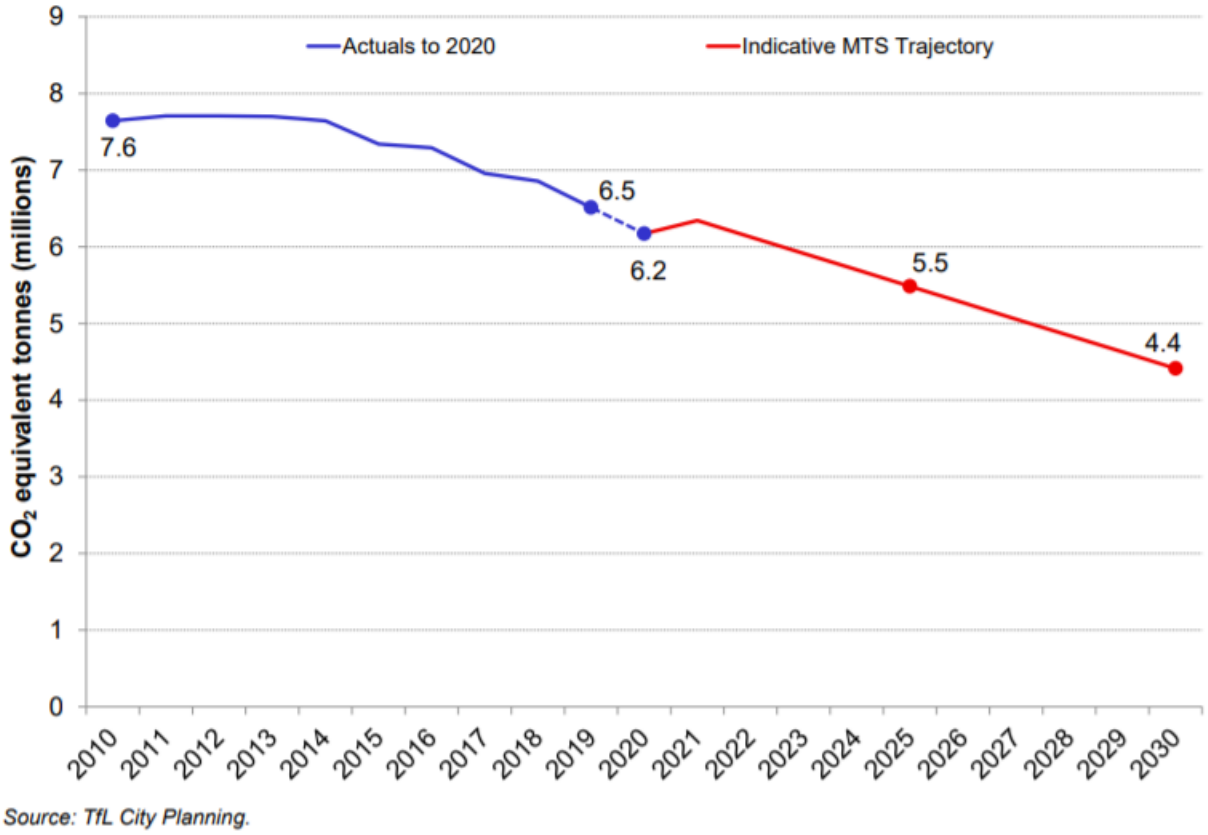
The collected data shows that the city of London has invested in its infrastructure, which will lead to sustainable modes of transport. At the same time, it is essential to mention that the new policies' results have already brought promising development. The collected data has shown that the policymakers with the new regulations have contributed to the reduction of the trips made by cars by 30% (Schwanen, 2020, p. 132). According to the data shared by London's transport authorities, the journeys that were made by car or van per person were decreased from 414 to 289 every year for the time frame 2002-2017 (Schwanen, 2020, p. 132).

CO_2 emissions caused by transport have attracted the attention of transportation and climate change policymakers, as the emissions were growing persistently (International Transport Forum, 2007, p. 5). Another important factor that is taken into consideration during the policymaking process is the just distribution of infrastructural changes in London (Schwanen, 2020, p. 133).

The collected data and the analysis led to the conclusion that the three lenses (political know-how, rigorous scientific and technical analysis, practical and professional field of experience) of Hood (2008) were present in the case study of London. In this case, the policymaking cycle included the expert knowledge, which is collected constantly by the TfL; this knowledge is analyzed and presented to the authorities of London. The following step is the evaluation of the existing transport data and the shifting of the policies which would minimize the harm to the environment. The evidence, which was collected through the reports presented in the case description chapter, was analyzed by professionals of the infrastructure and mobility areas of London. Therefore, the problem was addressed from different angles: economical, practical, environmental, and inclusive (Schwanen, 2020, p. 133).

The recent initiatives that helped reduce the CO_2 emissions are the ULEZ in central London electromobility, which makes London one of the top cities in the shift to electric cars (TfL, 2021, p. 138). Despite the pandemic, the citizens of London have preferred the BEVs, which led to 117% growth (TfL, 2021, p. 138).

London's historical trend and indicative trajectory on CO_2 emissions based on the collected data, time frame 2010-2030 (TfL, 2021):

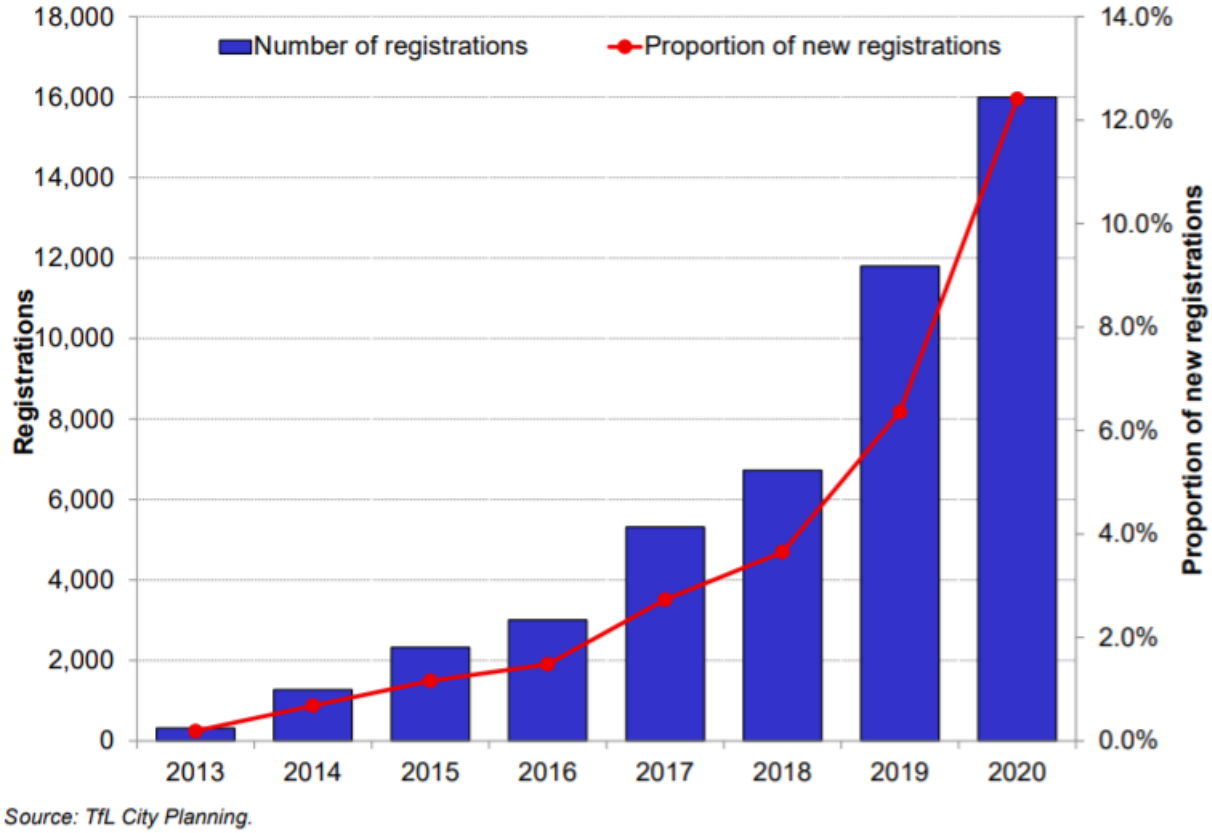


Source: TfL City Planning.

The Mayor's Transport Strategy plans to prioritize space-efficient modes of transport to avoid congestion which is also one of the greatest problems in London (TfL, 2021, p. 143). The collected data shows that the strategy of the Mayor has followed the EBP approach. At the same time, the new policies have been adjusted based on the statistics derived from transport data. The missing gaps were filled in order to improve the transportation in the city of London and replace more and more petrol and oil vehicles.

The following graph is presenting the progress of electric vehicles in the city of London during the 2013-2020 timeframe. There is significant growth which is undeniably a result of government policies to a great extent. This leads to the conclusion that the authorities of London have acted in accordance with the collection and analysis of the transport data in the city.

First-time registrations of electric cars, timeframe 2013-2020 (TfL, 2021):



***H_2**: The evidence-based policymaking derived from GHG emissions caused by transport has a positive effect on the alternative ways of transportation offered to citizens of London.*

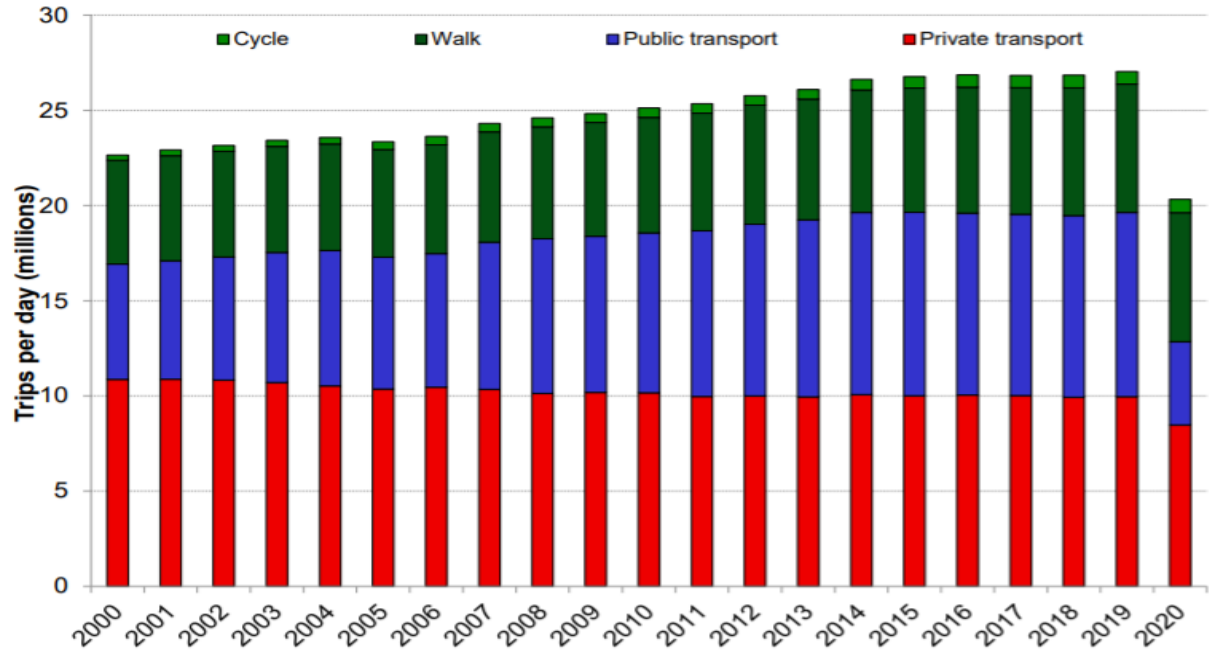
The second hypothesis suggests that the EBP from GHG emissions derived from transport has positively affected the increase of the alternative ways of transportation in London. Therefore, the case description gas gathered the data on the alternative ways of transportation in London and whether they were increased or not. As was seen in the case description chapter, the acceptance of the citizens plays a vital role in the progress and the effectiveness of the new policies.

It is the citizens who can make the difference by following or not the alternative ways of transportation. Some of them are cycling, walking, smart-mobility, public transport. Smart-mobility development is another step towards low carbon emission policies in transport (Schwanen, 2020, p. 133). As was seen previously, the authorities of the city have focused extensively on the changes in the infrastructure that could support this new plan. Nevertheless,

despite the effort made by the government, what is important, is the response of the citizens to the new measures. As was seen before, the population of London is growing fast, and the city is expanding rapidly. Thus, if the citizens are not choosing eco-mobility, walking, cycling, or public transport instead of the private ones, the regulations will not be effective enough.

The following graph was presented previously in the case description. I have decided to include it in this section of the analysis. It clearly shows the increase of cycling, walking, and public transport up to 2020. However, the results of 2020 might not be fully representative for the city of London because of the travel restrictions imposed during the COVID-19 lockdown. The alternative ways of transportation have been increased from 59.6% in 2010 to 63.2% in 2019 (TfL, 2021, p. 11).

Further research will be important to detect the correct correspondence of cycling, walking, and public transport progress after 2020. I have decided to limit the data collection until 2020, as the next results are not formulated yet.



Source: TfL City Planning.

One of the top priorities is to promote electromobility in the city, which is contributing essentially to the reduction of carbon emissions in London. The promotion of ultra-low emission

cars is expected to replace diesel and petrol vehicles in the nearest future. This action proved necessary after the research, as the diesel and petrol cars are harming the environment. The data collection has shown that the ULEV produces less than 75g of CO_2 in comparison to other types of fuel per kilometer (Parry, 2020).

However, the government officials have addressed these concerns too. The information on the positive results of electromobility has been shared among the Londoners; the infrastructure is expanding towards the benefit of all citizens, as was assured by Mayor Khan. Nonetheless, this aspect is yet to be fully addressed by the city's authorities.

The EBP approach is seen in the data collected on the number of newly registered ULEV vehicles (Parry, 2020). Each year, more ULEV cars are being reported in the city of London (Parry, 2020). The demand of citizens is growing; therefore, it can be seen that the actions of the Mayor and investors are focused on the rapid developments in the city, specifically to establish more charging points for electric cars throughout the city (LDN GOV, 2021).

According to EBP, the greater research of the information and data can improve the existing and set new effective policies. In the case study of London, the authorities of the city along with the experts have been working on the transport system exploring the ways it could be improved. This led to sustainable measures of transportation which were introduced to Londoners. The continuous investment in support packages for transitions to eco-friendly cars has brought promising results. The UK is among the top low emissions vehicle markets in Europe (Department of Transport, 2018, p. 42). There is no claim that the system is perfect. This was also not the scope of the paper, rather than to explore whether the evidence-based policymaking is present in the case of London and transport data.

Moreover, the carbon emissions policies cannot be diachronic. What worked yesterday might not work today and might be outdated tomorrow. This is what one could encounter if looking back on the carbon emissions policies adopted by the international community. Yes, there are certainly some basic regulations that the countries have agreed to follow. However, with time, the government have explored new improvement to the existing policies. In the case of London, the experts have identified the gaps in the real-world emissions, which could and probably will bring new difficulties in the policy approach (Department of Transport, 2018, p. 48).

Nonetheless, the results of the tests and the new data contribute to further analysis of the gaps that should be addressed by the policymakers. The current goal is to reach zero emissions by 2050. However, as was seen in the case description, the government officials have also set certain short-term goals to be achieved by 2025, 2030. Thus, the constant data collection and the evaluation of it contributes positively, as the needed adjustments can be developed on the early state if one or another policy is not working as planned.

Moreover, the EBP model referred to various perceptions of how the problem could be framed, and thus, addressed differently by the parties involved. This research has attempted to present and analyze the different perspectives and approaches the problem has by different actors (London authorities, government, investors, citizens). Therefore, the city of London can be considered a good case study example where the collected data is publicly available and utilized for the improvement of the current regulations (Metz, 2015, p. 370). The scope for the collection of the data is clearly stated by the city's authorities, meaning the decarbonization of transport in London.

There is a direct change in the way the government pursues greener transportation for Londoners. The constant investment in cycling roads and the expansion of the railway system are aiming at the reduction of carbon emissions in the city.

Limitations

It should be taken into consideration that the provided results of the studies, based on the collected data, met some limitations, which will be elaborated further below.

During this research, one of the most significant challenges was the lack of prior research studies on the specific topic, meaning the transport data evidence transformed into carbon emission policies. However, the literature review on the theoretical framework was a helpful basis for the analysis of the topic and the documentation which was used for the construction of this paper. Nonetheless, the results of this work could be a basis for further studies in different geographical areas. This way, after adequate evaluation and research analysis, this kind of policy approach that worked in London to some extent could be helpful in other cities or even countries.

The results of the research cannot be generalized to any other city of the United Kingdom, nor the rest of the world, without further research and analysis, as each city could have different results. Nevertheless, the mindset and the approach of the evidence-based policymaking process is something that could bring great results to many other countries of the world that lean towards electromobility and technological progress.

The data collection was analyzed and evaluated based on the information and the progress available for the last ten years. To some, these results might not be representative. Nevertheless, the reason why this exact timeframe (1990-2020) was selected is that the technological progress in public and private transportation has become a reality for a great majority of citizens. Electromobility, the new chargeable stations, the cost of using these new technologies became something that more and more people could afford. At the same time, as stated previously, this cannot be overgeneralized, as in some other countries, even in Europe, electromobility remains an unaffordable transportation alternative.

There is no certainty that the statistics collected during the COVID-19 pandemic would have existed despite the travel restrictions that were imposed during that specific timeframe. Indeed, there was progress already, and there were particular policies in force to minimize carbon emissions. However, it cannot be claimed that the pandemic did not play its role in the reduction of the carbon emissions rate.

The collected documentation was mainly derived from the institutions like the European Union and the authorities of the United Kingdom (i.e., TfL, London Gov, City Hall, Europa EU). To avoid any bias in the selection of data, whenever it was possible, the data was cross-checked with environmental institutions. However, since the analysis focused on the specific city, most of the data collection is based on the reports shared by the authorities of the city of London (i.e., TOD, TfL, etc.). Despite the relatively low variety of sources in this data, it was necessary for the research of the specific case. As expressed earlier, the data collection sources could have been expanded for future research in different geographical areas. It also depends on the scale of the study and the available resources for the conduction of such research.

Overall, the research has attempted to fulfill the validity criteria through the practical data, which was analyzed in accordance with the theoretical framework. It is rare to have perfect reliability in the research (Neuman, 2014). Therefore, I have attempted to use as much precise

level of measurement as possible to reach reliable results. As was stated before, the study is a representation of a specific case. However, it does not mean that the outcome of this research cannot be utilized for further studies. On the opposite, this example is a good basis for replication of similar research. At the same time, it has presented the weak and the strong parts of the conducted study, which might prove helpful for further development on bigger scale research.

Conclusion

The evidence-based policy and the increased interest in this approach is optimistic progress in the policymaking field. The application of reason has contributed tremendously to social progress. This paper aimed to present the evaluation of the case study of the city of London when it comes to the use of data from the transport for carbon emission policies through the lenses of the EBP theoretical framework. The results of the research have shown that the policy learning phase is one of the essential parts of the EBP model. The evaluation of the existing policies along with the new data is important, as they lead to the new, more effective policies.

Naturally, any change is hard. Nevertheless, evolution and progress are necessary and inevitable. Throughout the research, two critical factors have been identified. As was discussed previously, in the "chain of actions," the understanding and the framing of the problem play a vital role because these steps will affect all the following. The sufficient framing of the problem is the prerequisite for the collection of quality evidence. This data can be further explored by the experts and used for policy-setting. The research has attempted to gather important information and datasets on the transport data from the city of London, which was closely monitored by the city's authorities in order to produce effective policies and reduce carbon emissions.

The policy-setting process is complex as it depends on a variety of additional factors. The research has identified the main parameters such as evidence, interests, political actors, the relevance of the collected data to the place or time; these factors affect the policy process. Policymaking is shifted throughout the whole process. The evidence is being processed on different levels and by different actors. These variables determine whether one problem will be taken the necessary attention and what further actions will be taken in the policy-setting (Wesselink, Colebatch, & Pearce, 2014, p. 342). The results of the research have revealed that the evidence is not always neutral, as there are different perceptions of it (Wesselink, Colebatch, &

Pearce, 2014, p. 342). However, the studies have shown that the evidence should be perceived as a "rhetorical format" and not as guidance to policy practice (Wesselink, Colebatch, & Pearce, 2014, p. 343). The current research has discussed the limitations, the evaluation of the collected data has, and the perception the involved actors had.

Nevertheless, the EBP approach was a significant contribution to the understanding and the analysis of the case study of London and how the local authorities have used the existing data on transport to produce new carbon emissions policies. Furthermore, technological progress was one of the important factors that contributed to the data collection, which is constantly helping the government officials and the experts of the respective field of studies set the pragmatic plan of action that could improve social life and prevent harm to the ecosystems. The attention to each detail in the policy-setting process is vital, as these new policies will affect citizens, the environment, and the economy. The EBP theoretical framework has been useful in this case analysis, as it has taken into consideration the different and important angles of the policymaking cycle.

The future research question could focus on the policy transformation on a grander scale, for instance, the UK, and not just London. The results of this research have attempted to fulfill the practical implications. This kind of research can be reproduced in different cities. It helps establish the whole puzzle and indicates missing gaps that could be filled by the EBP approach.

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