sustainability

MDPI

Article

Participatory Policy Packaging for Transport Backcasting: A Pathway for Reducing CO_2 Emissions from Transport in Malta

Rosalie Camilleri [1,*], Maria Attard [1] and Robin Hickman [2]

[1] Institute for Climate Change and Sustainable Development, University of Malta, MSD 2080 Msida, Malta; maria.attard@um.edu.mt
[2] Bartlett School of Planning, Faculty of the Built Environment, University College London, London WC1H 0NN, UK; r.hickman@ucl.ac.uk
* Correspondence: rosalie.camilleri.04@um.edu.mt

Abstract: Significant emission reductions are needed in the transport sector to reach climate change mitigation objectives. Backcasting, a type of scenario-analysis approach, is a useful tool for the analysis of possible alternative transport futures and strategies to arrive at these futures when the business-as-usual projection is no longer sustainable. The backcasting approach consists of establishing desirable futures and examining the pathways by which those futures can be reached. This paper focuses on the policy packaging phase of a transport backcasting study carried out in the context of Malta as a case study. The aim of this paper is to contribute to the existing literature on transport and climate change using the case of Malta, which presents a context of high dependency on private cars and difficulty in transitioning to sustainable mobility. This paper tests the usefulness of a practice-based approach to transport backcasting. The results of this backcasting framework are a set of climate policies that target different elements of mobility practices and suggest that interventions for sustainable mobility should go beyond transport and target other spheres of social life. Collaboration between stakeholders and participation of citizens during the backcasting process was key to making the policy design process more participatory. Results of this study show how new approaches can open possibilities for a transition towards more sustainable mobility and contribute to widening the knowledge in the field of transport backcasting studies.

Keywords: transport decarbonisation; climate policy; foresight; backcasting; participatory approaches

Citation: Camilleri, R.; Attard, M.; Hickman, R. Participatory Policy Packaging for Transport Backcasting: A Pathway for Reducing CO_2 Emissions from Transport in Malta. *Sustainability* **2024**, *16*, 430. https://doi.org/10.3390/su16010430

Academic Editor: Wen-Hsien Tsai

Received: 31 October 2023
Revised: 20 November 2023
Accepted: 26 December 2023
Published: 3 January 2024

1. Introduction

There has been much research considering the role that transport can play in CO_2 emission reduction and climate change mitigation [1–3]. Several studies have examined different policy combinations for reducing CO_2 emissions [4–7] and have developed earlier work [8,9]. Amongst these studies, there is a general agreement that radical changes are required if transitions to more sustainable transport are to be achieved. Radical transitions necessitate strategic planning, which integrates systematic approaches and considers long-term futures [4,10].

Scenario analysis provides a set of tools that combine systematic perspectives with policy support approaches [6,11,12]. In particular, backcasting is one type of scenario-analysis approach that has been useful for the analysis of possible alternative transport futures and the strategies and pathways to arrive at these futures [13–15]. In principle, the backcasting approach consists of two stages, the first of which is envisioning alternative futures that are distinctive from the unsustainable business-as-usual (BAU) situation. The next stage involves the exploration of innovative policy pathways that have the potential to reach the desirable futures [16,17]. Backcasting has been used in the transport field including strategic transport planning [18–21] and the design of technological innovations in the transport sector [22–26]. Other studies have focused on backcasting to design policies for the achievement of CO_2 emission reduction goals [4–6,16,27–30].

This paper focuses on the policy packaging phase of a transport backcasting study carried out in the context of Malta as a case study. In Malta, transport is a significant contributor to the total national CO_2 emissions and accounts for 35% of CO_2 emissions. These emissions are dominated by emissions from road transport, which make up 87% of the transport sector's emissions and contribute to 25% of the total emissions from all sectors [31]. Emission trends for Malta have shown that CO_2 emissions from the road transport sector have continued to increase and projections for 2030 indicate further emission growth [32]. The growing emissions are a result of the high dependency on private cars as a means of mobility. Car ownership has reached its highest levels with 780 cars per 1000 inhabitants [33], and private vehicles have topped the modal share with 84.3% of all trips [34]. This context emphasises the need for more strategic planning and radical policy-making in transport to ensure effective reductions in emissions from the sector and achievement of climate change mitigation targets.

Current climate change policy is often carried out using a poorly integrated package of measures that target transition to low-carbon travel through market-based instruments and technological innovation. These dominant approaches are framed in economics and psychology, ignoring societal and cultural factors that may also be important in the required transition to more sustainable mobility [35]. One of the major limitations of current policy is the reliance on linear, rational, and individual concepts of human behaviour, which overlook the influence of existing institutional and socio-cultural structures [36]. A potential alternative could involve social practice theory [37–40], which conceptualises everyday activities, such as mobility, as routinised social practices that are mediated by an interplay of different elements and nested within broader socio-technical systems. This perspective is innovative and contrasts with other approaches in transport climate policy, as it explores the effects of structural aspects of the societal system in which mobility is embedded and that play a critical role in transitions to sustainability.

The aim of this paper is to contribute to the existing literature on transport and climate change using the case of Malta. The context of this case study, where the dependency on private cars is high and a transition to sustainable mobility has proved to be difficult, makes this island state an interesting case to test the backcasting framework for sustainable transport. This study builds on previous research that aimed to develop a participatory practice theory-based policy pathway for reduced transport CO_2 emissions [41,42]. It reports on the outcomes of the policy pathway design phase of the backcasting framework. The objectives of this paper are to (i) demonstrate the applicability of the backcasting framework in a difficult context with rising emissions and high car dependency; (ii) show the validity of alternative approaches to policy for reducing emissions from transport; and (iii) present an innovative methodology that combines backcasting with emerging theoretical frameworks.

This paper begins by giving an overview of the literature on transport backcasting and the theoretical framework in Section 2. Section 3 provides the context of the study and outlines the research design and the methods for data collection and analysis. Section 4 presents the main results of the research, whilst Section 5 discusses the main findings of the study and highlights the lessons learnt.

2. Literature Review

2.1. Participatory Backcasting

In transport policy, backcasting has become a valuable tool that enables policy-makers to envision longer-term futures and create alternatives that break the current unsustainable trends [43–46]. Although backcasting studies in transport research do not follow one standard approach, several stages can be recognised. Establishing the baseline and the long-term (25–30 years) business-as-usual scenario is typically the initial step [4,7,18,47–49]. The visioning process, which comes next, entails creating a number of potential futures [50]. The creation of policies or policy packages capable of achieving the normative scenarios created during the visioning process is the next stage [51]. This final stage not only specifies

the policies that should be implemented to attain the desired future but also determines the timeframes for their implementation. Following this phase, the package of measures is often evaluated with respect to the final goals of the backcasting study. The objective is to test the effectiveness of the measures in terms of achieving desired future transport goals.

There is a growing trend towards adopting participatory approaches in the field of transport planning. These approaches emphasise the active involvement and collaboration of various stakeholders, rather than relying solely on the input of experts or a single group [52–54]. The key focus of participatory approaches is to encourage participation, promote stakeholder learning, and facilitate the reconciliation of diverse ideas from a wide range of actors. By adopting participatory approaches, the transport planning process can be transformed from one that is solely driven by instrumental rationality to one that prioritizes discussion and consensus-building [55,56]. This shift is crucial, as it helps to address the challenges posed by socio-technical lock-in and system inertia, which arise due to the lack of dialogue between stakeholders who have a vested interest in specific socio-technical systems [57,58].

A more participative process is produced when a diverse variety of stakeholders, including non-experts, are involved, as opposed to a more limited process involving a small number of experts. According to Banister et al. (2013) [51], this type of transportation planning is also acknowledged to be crucial for bridging the knowledge gap between academics and decision-makers in the field of transportation. The gap between scientific knowledge needed to support policy and the actual implementation of policy measures is closed when various stakeholders participate in strategic planning [21].

This research builds on the existing knowledge from transport backcasting studies and further explores the impact of the participation of different stakeholders, including citizens, in transport policy-making and their importance in closing the gap between knowledge and policy implementation. The research makes use of a range of methods that are available for engaging participants in the transition phase of backcasting. These include face-to-face workshops, interviews, and Delphi surveys [18,21,24,51]. Whilst workshops and focus group discussions are the preferred methods used for backcasting analysis [21,51,59], semi-structured interviews are also a common method of stakeholder engagement for the policy pathway development phase in a number of backcasting studies [7,22,60–62].

2.2. Social Practice Theory

Practice theory offers a unique approach towards understanding of the social by analysing practices as the fundamental and smallest unit of society [37,63]. According to social practice theory, a practice is an intricate arrangement of several elements. Social practices are defined as a configuration of material elements with interconnected meanings and competencies [64]. Competencies, or skills, are kinds of knowing and knowledgeability, while meanings are socially accepted ideas or concepts within a practice that provide justification for participation in the activity. Materials include things like infrastructures, hardware, tools, and the body itself. In practice theory, individuals are not the central unit of analysis. However, they play an important role as the carriers of practices [37]. People are the carriers and performers of practices and are key for changes in practices by adapting, improvising, and experimenting in changing circumstances of everyday life [39].

The literature on transport and climate policy has acknowledged the importance of incorporating multiple perspectives in transport research to better understand the complexities of modern mobility [65]. The social sciences, particularly the theory of social practices, can provide valuable insights into how transport is embedded in social processes, offer a wider range of research methods, and enable alternative research questions [35,66,67]. Practice theory has already demonstrated its validity and value in contributing to the transition towards low-carbon lifestyles [68]. In the study of sustainable mobility, practice theory has focused on the elements that constitute these practices and how they are integrated into everyday life, revealing why certain forms of mobility practices become more

prevalent than others [64,68]. An innovative aspect of this approach is the identification of unsustainable practices and their potential reconfiguration or substitution [64,69].

Despite this recognition of the benefits of social sciences, the application of practice theory to research in transport is only recent, and it is more common in academia than in policy development. Further and more in-depth research that considers the integration of practice theory and transport policy is needed [35], a research gap that this study aims to address. Policy interventions can be significantly impacted by a practice perspective. The main novel aspect of this strategy is the identification of unsustainable practices and their reconfiguration. If a shift to sustainable mobility is to be accomplished, the idea of interconnected practices also calls for action, where policy can intervene in other social domains that are linked to mobility. In addition to policy consequences, a practice-based approach to sustainable mobility raises epistemological issues for transportation research addressing climate change mitigation. It is necessary to look for new techniques for data creation and modes of analysis to take into account the practice perspective because the approach is novel and distinct from other methodologies used in transport research. Integration of practice-based approaches with other techniques used in transport, such as backcasting, has the potential of facilitating the application of social practice theory to transport policy.

3. Methods

3.1. Malta as a Case Study

A practice-based participatory backcasting approach was developed and implemented in the case study of Malta, an island state situated in the Mediterranean. With a surface area of 316 km^2 and a population of 519,562 in 2021 [70], Malta is known for having one of the highest rates of motorisation in the EU. Throughout the 20th century, particularly in the last decade, Malta has exhibited a significant increase in motor vehicle ownership and usage. This growth can be attributed to rapid economic development, which led to an improved standard of living and increased expenditure on transportation, thereby fuelling the rise in car ownership.

The shift towards private car use in Malta is evident, as the modal share for this mode of transport rose from approximately 55% in 1989 to around 83% in 2013 and 84.3% in 2021 [34,71,72]. To regulate transportation in Malta, various laws and regulations are in place. The main planning documents, such as the Strategic Plan for Environment and Development and the Local Plans, hold particular relevance in this regard. In 2016, the national government published a transport strategy for 2050 and a master plan for 2025 [73,74]. These documents outline the long-term vision for transportation and propose specific measures to address the major issues faced by the island's transport system [75]. However, despite the existence of these plans, many of the proposed measures have yet to be implemented. Furthermore, local transport policies have primarily focused on road construction projects and the enhancement of road infrastructure to accommodate the growing car traffic.

Small island nations, such as Malta, possess distinct economic, social, geographical, and climatic attributes. These attributes pose greater challenges to sustainability planning and management compared to other regions [76]. Additionally, small islands are highly susceptible to global environmental issues, particularly the rise in sea levels, which motivates them to take measures towards mitigating climate change [77,78]. Despite their minimal contribution to global climate change mitigation, small islands can serve as a model for transitioning to low-carbon transportation [79].

The small size of Malta and its remoteness from the European mainland create unique situations that cannot be compared with those in other larger countries. The specific characteristics of small islands require tailored approaches to transport planning and low-carbon mobility practices and provide the opportunity to test transport planning in a context that has not been extensively explored in transport backcasting studies. Because small islands are remote and isolated, they have the opportunity to switch to sustainable

transportation faster than other large countries, making them ideal for studying sustainable transport transitions.

3.2. Establishing the Context and Baseline

Backcasting studies are generally characterised by a number of different stages, the order and the number of which differ between approaches [51,80–82]. For this study, a backcasting approach consisting of three phases was adopted, namely, the (i) context and baseline; (ii) visioning and scenario development; and (iii) backcasting pathway phases (Figure 1).

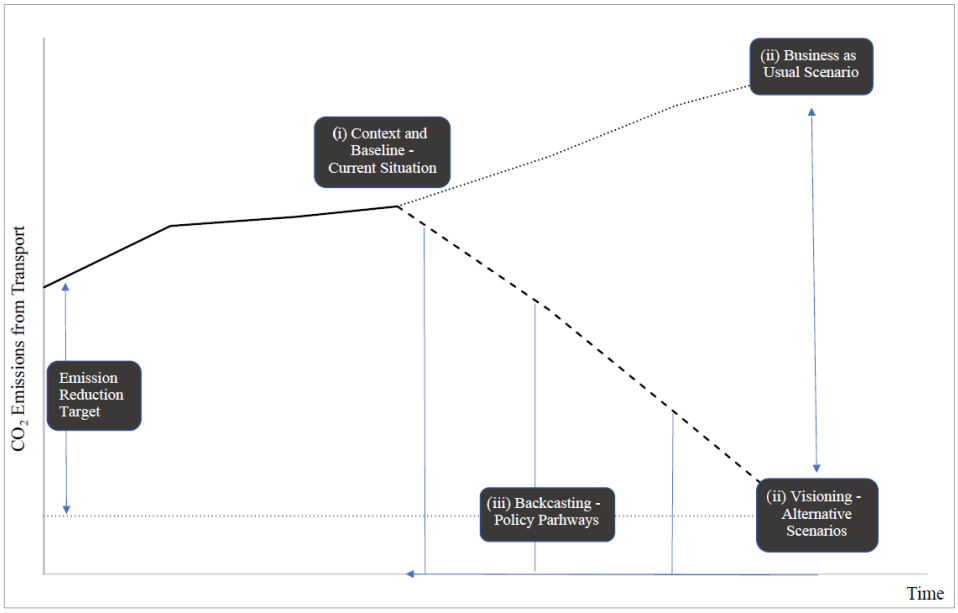

Figure 1. Backcasting framework (drawn by the authors based on [41]).

The first stage of the process consisted of a problem orientation exercise, which was necessary to identify the key challenges in the context of sustainable mobility in Malta. A qualitative approach was adopted to identify the current mobility practices in Malta to understand which wider social practices influence mobility as described in Camilleri et al. (2022) [42]. Semi-structured interviews were used to draw information on the current mobility practices [83,84]. Thematic analysis of the interview transcripts based on an inductive-deductive methodology produced a picture of the constituent elements (materials, competencies, and meanings) of the different mobility practices and how mobility interacts with and complexes with other social practices.

3.3. Visioning Sustainable Transport Scenarios

Alternative and desired transport scenarios for transport in Malta in 2050 were created through an exploration of the perspectives and concerns of key stakeholders in the study context. The methodology for the development of these scenarios and the outcomes can be found in Camilleri et al. (2021) [41]. The participatory process was developed with a two-hour visioning workshop. The visioning exercise commenced by taking into account the existing sustainability challenges and fundamental components of mobility practices, which were identified during the problem orientation phase. Subsequently, the participants were provided with guidance to articulate their visions for achieving sustainable transportation by the year 2050. Following the visioning workshop, the scenario development phase aimed to condense the views of the stakeholders into a set of images of the future of transport in Malta in 2050 using the scenario matrix approach [85]. This process resulted in the generation of four different scenarios, a BAU scenario and three alternative scenarios each encompassing a set of concepts that describe how mobility practices are transformed by the

year 2050. The scenarios were further elaborated into scenario narratives that provide the basis for the formulation of different policy pathways covered in this paper. The narratives of these scenarios are presented in Figure 2.

Scenario 1: High-Tech Mobility
It is the year 2050 in Malta and individuals have very busy lifestyles and are moving frequently from one point to another. However, technology has evolved in such a way as to allow for an easy transition from private car to mass transit travel. A high-density network of transport capsule lines allows very fast movement of people from one place to another. This system, which is powered by clean energy, is designed is such a way as to allow for easy interchanges with cycling, bus and other modes of transport. A fully electrical bus fleet with segregated lanes provides quality transport for the bulk of mobility needs. Connected and autonomous vehicles (CAVS) which are shared and electrically powered, complements the mass transport and contributes to a small share of the daily mobility needs. CAVS allow easy sharing of trips which also serves as a means of social integration where individuals are no longer isolated within their personal car but can socialise during their day-to-day travel.
Scenario 2: Local Active Mobility
The use of technology is focused on enabling lifestyles with high mobility at the local scale and active travel. This future illustrates a world where the need to travel over long distances to perform the daily activities has been reduced. Individuals are still mobile, however now they are travelling more locally over shorter distances. An efficient IT infrastructure now permits businesses to shift part of their operations to remote working. Universities and educational institutions have integrated e-learning as part of their methods for education. Local centres compliment the e-learning facilities. These centres provide a space where students can utilise facilities and interact with other students. Electric scooters and travel escalators help individuals to travel over short distances. Shopping for goods over the internet is promoted and helps reduce the number of trips to large supermarkets. Travel for other social activities takes place through electric vehicles managed through Mobility as a Service (MaaS). Travel over longer distances is facilitated by a dense network of public transport. Educational programmes have facilitated the use of mobile applications for public transport. Individuals can plan the best route and have information in real-time on the location of the bus, so that they can plan their journey more effectively.
Scenario 3: Green active travel
An improved urban design that prioritises active travel over other forms of transport is utilised. A network of interconnected greenspaces with paths which are wide, safe, and free from obstructions facilitates active travel such as walking. The urban community is aware about the health benefits of active travel over other modes of transport. Tax benefits are in place for those who choose to travel using active modes of travel including walking and the (electric) bicycle. Low-emission zones and parking taxes mean that the use of cars is greatly discouraged. Signs along walking paths which show actual distances between localities provide pedestrians with the knowledge about the actual distances and the best route they need to take. Buses are available and they run on separate lanes than those used for walking or cycling. Buses connect towns together allowing for travel over longer distances. A dense network of public transport provision means that the buses run on time and are frequent and can compete with the efficiency offered by the car. Inside the towns, autonomous electric shuttles are available, and these are connected to the bus system. This system of autonomous shuttles allows for people to carry out other activities such as social activities, carrying of goods from food stores and other work-related activities.

Figure 2. Alternative future narratives Reprinted with permission from ref. [41]. 2021 Camilleri et al.

3.4. Designing Policy Pathways

The present paper develops a set of policy packages and pathways for implementation to reach the desired transport future for Malta in 2050 described in the preceding section. To this end, a novel methodological approach was developed based on the social practices theoretical framework and involving researchers, practitioners, policy-makers, and citizens in the process.

This phase of backcasting was focused on designing interventions that lead towards the alternative transport futures. This phase was based on a participatory approach and was structured in three stages. In the first stage, stakeholders were tasked with identifying a set of policy measures that have the potential of delivering the alternative transport futures.

These policy measures were further elaborated into distinct policy pathways during the second stage. The last stage of the transition phase aimed to incorporate the opinions of the citizens into the process of designing policy pathways for the alternative transport futures.

3.4.1. Stage 1—Identifying Policy Measures

During the initial phase, the focus was on identifying a variety of policy measures that could align with the predetermined visions. To accomplish this, an extensive examination of academic articles, policy papers, and real-world experiences in the field of transportation was conducted as a desk exercise. The purpose of this exercise was to create a comprehensive map of potential policy measures [86–93]. In total, 102 individual policy measures were identified as suitable for achieving the envisioned future outcomes. The selection process took into account two key criteria: (i) the potential of the measures to reduce emissions from the transport sector and achieve the 2050 alternative transport futures and (ii) the synergies that could be achieved by combining different policy measures. The list of policies encompassed a wide range of options, including greener technologies, infrastructure and spatial planning, attractive public transport alternatives, and pricing policies.

3.4.2. Stage 2—Preliminary Policy Pathways

The next phase involved grouping the initial list of policies into bundles and establishing the policy routes to achieve the desired transportation goals. To define these policy routes, a participatory approach was employed to gather input from various stakeholders. In participatory backcasting studies, it is customary for stakeholders to first determine the future endpoints and then assess the disparity between the desired future and the current circumstances. They subsequently formulate objectives and policy routes to attain the envisioned future [46,94]. This stage often entails discussions with stakeholders aimed at identifying the key steps to be taken, the obstacles to be overcome, and the opportunities to be seized to realise the chosen visions [95]. Various methods are available to engage participants during the transition phase of backcasting, including workshops, interviews, and surveys [18,21,24,51].

In this study, the second stage of the backcasting process was carried out through a mixed methodology approach that consisted of a survey coupled with semi-structured interviews. The survey was carried out with a set of stakeholders who had participated in the visioning phase of the backcasting process described earlier (for a description of stakeholder identification refer to [41]). These stakeholders were again invited to participate in the policy-packaging process. Out of the initial 21 stakeholders, a total of fourteen (14) stakeholders agreed to participate in the policy-packaging stage (Table 1). Involving stakeholders who were previously involved in the process and who are already familiar with the topic is advantageous over other methods where participants are new to the process and helps facilitate stakeholder engagement. In this survey, the stakeholders were provided with the initial policies identified in the first stage and guided to cluster the policy measures into packages. The participants were instructed to group policies together based on their similarities when creating policy packages. They were also encouraged to include measures that were likely to work well together and to group measures that could create positive synergies. Additionally, the participants were guided to propose additional policies that contributed to achieving the transport visions through the survey. In this exercise, the stakeholders were directed to focus on the constituent elements of mobility as defined by social practice theory. The survey also reminded the participants to address the materials, competencies, and meanings associated with the current mobility practice. As a result of this clustering exercise, policy packages were created for each of the three alternative transport futures.

In order to complement the survey, a series of semi-structured interviews were carried out with experts in the field of transportation. The purpose of these interviews was to expand on the policy pathways that were formulated by the stakeholders through the online surveys. While workshops and focus group discussions are commonly used for

backcasting analysis [59], semi-structured interviews have been utilised in the policy-pathway development phase of several backcasting studies [7,22,60,62,81]. The selection of stakeholders for the semi-structured interviews aimed to further develop the initial findings of the survey. These stakeholders were chosen to represent groups that were not included among the fourteen (14) stakeholders who participated in the policy-packaging survey. Table 2 provides an overview of the experts involved in the semi-structured interviews.

Table 1. List of stakeholders (compiled by the authors).

Sector	Type of Participant
National/State Agencies	National Energy Regulator (2) National Environmental Authority (2) Climate Change Agency (1) National Transport Regulator (1)
Public/Private	Public Transport Operator (2) Architect and Civil Engineer (1)
NGO/Research	Academics (1) Researchers (2) Environmental NGO (2)

Table 2. List of interviewees in the transition phase (compiled by the authors).

Stakeholder	Type of Expertise
Transport Expert	Geographer and transport planner
Transport Expert 2	Urban planner
Policy-Maker	Local government
NGO	Bicycle advocacy group

In the course of the interviews, the stakeholders were initially acquainted with the backcasting process and were given an overview of the transport future scenarios that were formulated during the visioning phase of the process. Additionally, the participants were furnished with data derived from the results of the stakeholder survey. Subsequently, each interviewee was asked a series of questions, with the objective of steering them towards formulating a set of policies and implementation strategies for the various alternative transport futures.

The questions included the following:

1. What interventions can help achieve the alternative transport future visions?
2. How can these interventions be combined with other policies to increase their effectiveness, acceptability, and feasibility?
3. What time frames should be used for their implementation? (short-term 2021–2030; medium-term 2030–2040; or long-term 2040–2050).

3.4.3. Stage 3—Citizen Insights and Refinement of the Transition Pathways

The final step of the study involved the enhancement of the policy pathways that were formulated through stakeholder engagement sessions. This was achieved by incorporating the viewpoints and suggestions of citizens in the backcasting process, which allowed for a more detailed elaboration of the policies. One of the benefits of involving citizens in policy development is the attainment of a higher level of agreement and consensus on the policies that aim to promote sustainable mobility. To achieve this, a workshop approach was utilised in this study to encourage citizens to review and refine the policy pathways that were established in the earlier stages.

The citizen workshop was conducted online, utilising interactive online tools. The recruitment process for participants involved an initial online campaign, where members of the public were invited to join the workshop and engage in interactive activities. Additionally, the snowballing technique was employed to attract more participants to the workshop.

A total of ten (10) citizens took part in the workshop, which consisted of a single three-hour session. Following an introductory session, the participants were introduced to the research topic and provided with an overview of their role in the project, emphasizing the significance of their contributions. During the interactive session of the workshop, the policy pathways developed by stakeholders in the previous stages were discussed. The participants were then prompted to deliberate on how these policy pathways would impact their daily practices and activities.

The subsequent phase of the citizen workshop involved a voting exercise, where the participants were asked to select their preferred vision for transportation in Malta by 2050. After the voting exercise, the participants were guided to design policies and establish timeframes for implementation that they believed would be necessary to achieve the preferred vision. Throughout this exercise, the researcher encouraged the participants to consider policies that encompassed all aspects (materials, competencies, and meanings) of sustainable mobility practices. They were also encouraged to think beyond the transport sector and include measures aimed at other areas of social life, such as work, shopping, and parenting, which influence people's travel choices.

This step of the workshop, conducted in the form of a discussion, provided an opportunity for the participants to interact and exchange ideas, both converging and diverging, in order to ultimately reach a consensus on the policy pathways required to achieve the future transport visions. The data collected during the workshop were qualitatively analysed, resulting in a set of refined policy pathways for the alternative more sustainable transport visions.

4. Results

4.1. Initial Policy Packages

The transition phase plays a crucial role in the backcasting exercise, although it is often underdeveloped and primarily handled by experts rather than involving active participation. However, the implementation of policies and interventions in transportation often faces challenges due to public objection and resistance. To address this, a participatory approach to planning policies and interventions can help bridge the gap and facilitate their implementation.

The results from the survey indicated a general consensus among stakeholders regarding the types of policies that would contribute to achieving the desired future of transportation. For instance, when designing policy packages for the first alternative transport vision, which was *High Tech Mobility*, stakeholders expressed a preference for policies that promote the use of cleaner fuels and discourage the use of conventional vehicle technology. Additionally, supporting policies such as the promotion of public transport were identified as important measures to realise this alternative transport future. Policies like the introduction of taxes on fossil fuels, investment in public transport, and regulations facilitating the adoption of cleaner powertrains received high scores during the policy-packaging exercise.

The set of policy packages designed for the second alternative 2050 transport—*Local Active Mobility* vision were notably different from those of the first transport vision. The policy packages for alternative transport future 2 place a strong emphasis on transitioning from car-based travel to active modes of mobility. The stakeholders believed that achieving the second alternative transport vision would require a focus on the adoption of electric vehicles, increased utilisation of public transportation, and a reduction in travel distances. Additionally, the stakeholders identified the need for policy packages that extend beyond the transport sector and target changes in other aspects of social life, including work and education.

The stakeholder survey also yielded a set of policy packages for the *Green Active Travel* future, which represented the third alternative transport scenario. These results encompassed a combination of policy packages that aimed to restrict car-based travel while simultaneously promoting active forms of transportation. One of the policy packages

included land use planning strategies that reduce travel distances and facilitate the use of active travel modes. These policies were integrated with other supporting measures, such as marketing campaigns to encourage active forms of travel and the provision of cycling facilities in workplaces. A summary of these results can be found in Table 3.

Table 3. Policy packages for alternative transport futures (compiled by the authors).

Alternative Transport	1. High Tech Mobility	2. Local Active Mobility	3. Green Active Travel
Policy Package 1	1. Tax increase on fossil fuels 2. Investment in new mass transit system 3. Introduction of new fuels 4. Public transport fare structures such as flat rates, zonal fares, and monthly passes 5. Vehicle ownership restrictions (e.g., one per household) to promote car sharing	1. Subsidies and incentives for purchase of electric cars 2. Incentives to promote hybrid and electric cars for urban delivery	1. Investment in road infrastructure 2. Provision of bus to retail 3. Bicycle racks at bus terminals 4. Information on cycle routes 5. Increased network of bike sharing 6. Emphasis on vulnerable road users in license exams 7. Lower speed limits 8. Trip planning systems that provide information on alternatives
Policy Package 2	1. Measure to improve vehicle emission standards 2. License fee based on fuel efficiency 3. Introduction of smart vehicles 4. Incentives to those using cleaner fuels or using public transport	1. Marketing campaigns to promote active travel based on the experience of users 2. Information on walking routes 3. Wayfinding system to encourage walking 4. Individualised travel planning	1. Wayfinding system to encourage walking 2. Integrated ticket system for different modes 3. Bicycle repair workshop 4. Information on cycle routes 5. Information on walking routes
Policy Package 3	1. Introduction of new fuels 2. Regulations targeted at improving efficiency of conventional vehicles 3. Mandatory regulations for the introduction of electric vehicles 4. Tax increase on fossil fuels 5. Measure to improve vehicle emission standards	1. Route planner for cyclists 2. Information on cycle routes 3. Showering facilities at workplace to encourage people walking to work 4. Incentives to those using bikes	1. Tax increase on fossil fuel 2. Vehicle ownership tax 3. Parking pricing 4. Parking controls including controls on duration, entry times, and designated users 5. Taxation on imported used cars 6. Prioritising public transport, using bus lanes, BRTs
Policy Package 4	1. Increased network of bike sharing 2. Integrated ticket system for bus, mass transit, and shared bicycle facilities 3. New modified bus service 4. Incentives to those using the bus e.g., discounts	1. Integrated ticket system for different modes 2. Safe routes to school 3. Wider and better maintained cleaner pavements 4. Location of bus stops close to employment centres	1. Strategic planning model to integrate land use, housing, and transport 2. Land use development mix in which homes, jobs, and shops are placed close together 3. Marketing campaigns to promote active travel based on the experience of users 4. Integrated ticket system for different modes 5. Obligatory shower and locker facilities at workplace
Policy Package 5	1. National road pricing 2. Parking pricing 3. License fee based on fuel efficiency 4. Investment in new mass transit system	1. Trip planning systems that provide information on alternatives before start of the journey 2. New and modified bus service 3. Provision of real-time information about the bus 4. Investment in demand-responsive transport	
Policy Package 6		1. Incentives to promote teleworking 2. Promotion of flexible working hours 3. Flexible work start times for low-carbon commuters 4. Mandatory green travel plans for new developments	

4.2. Design of Policy Pathways from Initial Policy Packages

The second step involved refining and expanding the initial policy packages through engaging with stakeholders via interviews. These interviews served the purpose of uncovering a range of distinct ideas regarding the policies and policy pathways that can contribute to the realisation of alternative transport futures. The discourse emerging from these interviews revealed a high level of consensus among participants regarding the policy pathways required to achieve the first alternative transport future, namely, *High Tech Mobility*.

To bring about this alternative future, policy pathways would necessitate a substantial investment in infrastructure and a stepwise planning approach that begins with short-term changes and progresses towards longer-term investments. Stakeholders discussed how, in the short term, efforts should be focused on improving the existing public transport system, which can be further upgraded in the future. One potential option in the short term is the implementation of a bus rapid transit system.

Furthermore, short-to-medium-term planning should also prioritise the adoption of electric vehicles and educational campaigns promoting bicycle use. Stakeholders also emphasised that medium-term measures should explore the introduction of autonomous vehicles. On the other hand, long-term plans should consider the development of a larger mass transit system, described in the alternative future narrative as an underground system. To enhance the effectiveness of these measures, supplementary actions that encourage the use of public transport, such as awareness campaigns, parking pricing, and traffic management systems, can be implemented.

During the course of the interviews, it became apparent that the stakeholders held the belief that the realisation of alternative future 2—*Local Active Mobility* is more attainable compared to the first alternative future. The stakeholders emphasised the necessity for policies that prioritise the establishment of a robust IT infrastructure and comprehensive planning for essential services like electricity and telecommunication. These measures would ensure that all areas are adequately equipped to facilitate teleworking and e-learning. Additionally, it was recommended that policy initiatives concentrate on enhancing urban planning by situating supermarkets within town centres rather than on the outskirts of towns, thereby promoting convenient pedestrian access. Furthermore, the implementation of mixed land use planning strategies presents significant potential in reducing the need for long-distance travel and contributing to the realisation of the second alternative transport future.

The stakeholders' perspectives on policy pathways for alternative transport future 3—*Green and Active Travel* suggested that, in the short term, there should be a specific focus on enhancing the walking infrastructure and implementing signage that improves the legibility of local towns. Additionally, measures aimed at enhancing the current public transport system should be included in the short-term plans. Other short-term initiatives should prioritise the improvement of cycling infrastructure, stricter road enforcement, and restrictions on vehicle access within town centres. Moving into the medium term, urban planning should prioritise the development of small-scale projects that are easily accessible by foot. Furthermore, there should be continued improvement in walking and cycling infrastructure, implementation of wayfinding systems, and the promotion of active forms of travel. The experts also suggested that medium-term policies should include measures that limit vehicle access in town centres while prioritising walking. As for the long term, measures should focus on further developing walking and cycling infrastructure and enhancing the public transport network to achieve the goals of alternative future transport 3.

4.3. Citizens' Views and Refinement of Policy Pathways

In the final stage of the backcasting exercise, the objective was to incorporate the perspectives of citizens into the formulation of policy pathways. Through an interactive workshop, participants were given the opportunity to share their viewpoints and ideas

regarding the proposed policy pathways. They were also encouraged to provide feedback on how these policies would impact their daily lives if implemented. The researchers aimed to identify the potential effects on citizens' day-to-day routines under the three different transport future scenarios. This exploration allowed the identification of crucial elements in mobility practices that are essential for transitioning to alternative transport futures but that were not initially considered in the stakeholder-designed policy pathways. The absence of these elements in the new or reconfigured practices may lead to opposition from citizens and create barriers to the successful implementation of the policy pathways. For instance, the provision of cycling infrastructure alone may not effectively encourage more individuals to adopt cycling if the underlying meanings associated with cycling are not addressed.

The information obtained from the interactive workshop provided insights into the aspects of mobility that were overlooked in the policy pathways. Additionally, these data were utilised to identify additional areas in society where policy interventions could facilitate the realisation of the alternative transport futures. These ideas are presented in Table 4, which illustrates how policy measures can effectively address various components (materials, competencies, and meanings) of sustainable mobility futures.

Table 4. Results of citizen workshop—additional policy measures (compiled by the authors).

Materials	Competencies	Meanings
Alternative Future 1—High Tech Mobility		
- Bus stops are within walking distance - Alternative transport that enables carrying of goods- Bus lanes must be segregated to allow for fast bus journeys - Parking from towns must be removed	- Bikeability courses - Information on how to plan a multimodal journey	- Public transport is comfortable and provides adequate personal space - Reliable public transport system - Cost of public transport is kept low - Safe cycling lanes - Cost of purchase of e-cars is not high - More awareness on the health benefits of cycling and walking
AlternativeFuture2—Local Active Mobility		
- Improvement in IT and electricity services - Better enforcement on the roads - Facilities and services are available in town centres - Extended hours for public services and availability during the weekends	- Information on travel using alternative modes of transport - Aid for employers to help them shift to teleworking - Information on the best available routes - More awareness on how to integrate different activities within walking distance	- Awareness on benefits of active travel - Address the lack of social interaction created due to teleworking - Incentives to promote on-line shopping - Social life inside town centres should be promoted - Feeling of community in towns is prioritised
Alternative Future 3—Green Active Travel		
- Installation of bike racks - Increase the accessibility of different destinations by bike - Provision of alternatives to those who cannot cycle but still need to move around - Bus routes are designed to allow for more accessibility	- Provision of information on cycle and walking routes - Provision of information on how to shift to walking for short trips	- Cycling rendered safer - Socialising in town centres in prioritised

In relation to an alternative future scenario 1, the participants highlighted the significance of enhancing the infrastructure for public transportation and active modes. They recognised that providing information on planning multimodal journeys and offering bikeability courses would be crucial policy measures to address the existing gaps in skills and knowledge. Moreover, it was acknowledged that implementing policies to make public transportation affordable, dependable, and convenient would play a vital role in fostering

favourable attitudes towards its usage. Furthermore, the workshop participants engaged in discussions regarding the necessity for additional policies that prioritise the safety of pedestrians and cyclists.

The workshop discussions and subsequent data analysis have revealed that policies for alternative future 2 should prioritise the improvement of IT infrastructure, internet platforms, and urban planning in towns. Participants emphasised the need for competencies that enable individuals to use alternative modes of transportation instead of cars, making it crucial for future policies to focus on this aspect. Additionally, participants suggested conducting awareness campaigns to promote the benefits of active travel and implementing policies that enhance social life within town centres.

When discussing the policy pathways for alternative future 3, participants proposed additional measures to enhance public transport infrastructure and cycling facilities. They also emphasised the importance of providing information on cycle routes and walking paths to equip individuals with the necessary skills and facilitate the transition to active modes of transportation. Furthermore, participants highlighted the significance of ensuring cycling safety and transforming town centres into spaces that foster socialisation.

5. Discussion

Alternative and more radical transport policies are required if significant reductions in CO_2 emissions from transport are to be achieved. Backcasting offers the tools for devising possible alternative transport policy pathways that are better suited to reach the desired emission reduction targets. This paper has considered the outcomes of a practice theory-based participatory approach to the policy design phase of the transport backcasting process. This study has focused on the integration of different stakeholders and integration of new theoretical frameworks in the design of policy packages for a more sustainable transport sector. For this research, the transport system in Malta was used as a case study and to test the outcomes of participatory backcasting related to transport policy-making. What follows is a reflection on the methods used, the results of the collaborative process, and the lessons learnt about this new approach in transport backcasting.

The research presented in this paper was based on an innovative approach to developing transport policies and climate policies, which is based on the integration of engagement of a wide range of stakeholders. This approach allows for a more participatory process in transport planning. In comparison to other approaches in policy-making, this innovative means of designing policy pathways has the advantage of reducing the gap between academic research and policy-making [27,51]. The results presented from this research are crucial to demonstrate the creation of spaces where a range of participants could interact and to emphasise that dialogue was essential to link research to transport practice. Integrating a wide range of participants in the process meant that different views and perspectives could be explored and more radical policies uncovered, or at least that the policies adopted would be more acceptable to the public.

Selection of participants was considered a crucial aspect of the process [50]. For the policy-packaging phase of the backcasting process, participants included transport planners and policy-makers who were knowledgeable about different policy alternatives and what policies or combinations of policies might work. Citizens also played a role in the iterative backcasting process by being involved in the last phase of the process where they provided feedback on the acceptability and impact of the designed policy pathways. The combination of various participants throughout the process was important for the final policy pathways to be effective and easy to implement.

The process followed during this research was systematic and iterative, wherein policies for the alternative transport futures were identified and refined to produce a set of policy packages that would be feasible to implement and to have the potential of bringing the required reductions in emissions from transport. This process contrasts with other processes used in transport policy-making, which are often top-down, expert-led, and engage only a narrow set of experts. In contrast, the approach adopted in this study has

focused of integrating a wider set of stakeholders, and this approach has the advantage of inducing deliberation between different actors and initiating high-level learning between the participants involved in the policy-packaging phase.

The significance of the transition phase findings in this backcasting study also highlights the potential of innovative approaches in transportation research and the valuable insights gained from disciplines like social sciences. These approaches offer new opportunities for advancements in transportation policy. It is important to note that this does not diminish the importance of policies informed by other approaches, such as technological innovation and behavioural change [35]. However, the results of this study underscore the necessity of shifting the focus from policies that solely target infrastructure or individual choices. Instead, there is a need for more transformative policies that address socio-structural factors influencing travel behaviour, particularly in relation to achieving carbon reduction targets [96].

The policy pathways that emerged from the study take into account the restructuring of all aspects (materials, skills, and interpretations) of mobility practices. For example, policies aimed to shift travel from car-based practices to active forms of mobility go beyond the provision of material elements, such as walking infrastructure. They include measures that ensure that the required information to help individuals navigate to their destination is available. The final policy pathways also include policies that target the meanings around mobility for example by raising awareness about the health benefits of walking. The approach utilised in this transport backcasting study has also allowed the exploration of a broader range of policy options that are not only related to transport but also target other spheres of social life that have implications on mobility. For example, shifts in the practices of shopping or working might decrease mobility needs or allow individuals to transition away from car-based travel. The transport futures and policy pathways outlined in this paper diverge from other transport policy scenarios due to their acknowledgement of the significance of incorporating and considering the impact of various social practices on mobility.

This paper has focused on one of the phases of transport backcasting—the policy-packaging phase. The results of this study demonstrate the usefulness of the participatory approach. The present research can serve as a starting point for an innovative approach that can be further refined. Further research could be focused on improving and elaborating this participatory framework to overcome current implementation barriers in transport and climate policy. While the policy pathways are useful for a transition to more sustainable mobility, additional investigations are needed to assist policy-makers in deciding which policy pathway should be followed. The assessment of policy pathways using quantitative tools such as life-cycle assessments or multi-criteria decision analysis can provide help in appraising the policy measures and determining their suitability for reaching the desired transport futures [7].

This study could also serve as a starting point for other research that investigates the transferability of this backcasting framework to real-life transport policy-making. Additional research could also focus on the applicability of this innovative approach to other similar geographical contexts where the transition to sustainable mobility is proving to be a major challenge. In particular, research should focus on the applicability and transferability of the framework to other small island states where sustainability planning and management might be more challenging than in other contexts. The methods of this study can also provide valuable lessons to contexts that have unique characteristics and require tailored approaches to transport planning.

Shifting to low-carbon forms of mobility requires a set of interventions that target all the elements of mobility practices while taking into account the influence of other interlocking practices on mobility. Introduction of practice theory-inspired interventions would mean a different approach to policy-making. However, it must also be acknowledged that policies aimed at behavioural change and measures that deter automobility may still be beneficial and work alongside practice-based approaches.

6. Conclusions

This paper has demonstrated the applicability of a participatory practice-based approach to the policy-packaging phase of a transport backcasting exercise. The case of Malta, where motorisation and dependence on private cars are so heavily embedded in everyday life, has been used as a laboratory for testing this innovative approach. The exercise was based on a participatory approach where different actors were engaged in the various stages of the process, which was aimed at the design of policy pathways for low-carbon transport futures. The method, including a systematic approach, was fundamental to bring together different actors in the design of policy pathways. The research showcased the manner in which involving diverse participants in the discourse facilitates the convergence of various viewpoints. This aspect of participatory backcasting offers an advantage over the more conventional expert-led processes, which reflect the common views and ideas of one group of experts.

This study has emphasised the great challenges involved in achieving sustainable mobility. These findings highlight how decarbonisation of transport is not a 'one-size-fits-all' solution but requires tailor-made solutions that are specific to the geographical context. However, there are also many opportunities for interventions that can produce the required shift towards more sustainable mobility. The transition to a more sustainable transport future can be facilitated by an understanding of the complexity of mobility practices. The appreciation of the interdependencies between a set of mobility practices and the interaction of travel with everyday life can illuminate areas of interventions that were otherwise not evident with conventional approaches to policy-making. Public participation is an important part of transport planning, where the inclusion of members of the public in policy design can further enhance the process and yield policies that are easier to implement and are more acceptable. This study suggests that transport policy should adopt a more integrated approach to sustainable transport and incorporate a mix of policy options to help progress towards more significant reductions in CO_2 emissions.

To conclude, innovative approaches in transport research, such as the application of social science perspectives, can uncover new potential issues of influence that are not evident with more conventional approaches. These approaches will become meaningful with additional and more in-depth research in this area.

Author Contributions: The authors confirm contribution to the paper as follows: study conception and design: R.C., M.A. and R.H.; data collection: R.C.; analysis and interpretation of results: R.C.; and draft manuscript preparation: R.C. and M.A. and R.H. All authors reviewed the results. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the Government of Malta Endeavour Scholarship Scheme. The scholarship was funded out of National Funds.

Institutional Review Board Statement: This study was conducted according to the guidelines of the University of Malta Research Code of Practice and was approved by the Faculty of Arts Research Ethics Committee of the University of Malta (Unique form ID: 210:26.11.18-Rosalie Camilleri; 7 March 2019).

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors on request.

Conflicts of Interest: The authors declare no conflicts of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

References

1. Chapman, L. Transport and climate change: A review. *J. Transp. Geogr.* **2007**, *15*, 354–367. [CrossRef]
2. Gilbert, R.; Perl, A. *Transport Revolutions: Moving People and Freight without Oil*; Routledge: London, UK, 2012.
3. Sperling, D.; Gordon, D. *Two Billion Cars: Driving toward Sustainability*; Oxford University Press: Oxford, UK, 2010.

4. Hickman, R.; Banister, D. Looking over the horizon: Transport and reduced CO_2 emissions in the UK by 2030. *Transp. Policy* **2007**, *14*, 377–387. [CrossRef]
5. Hickman, R.; Banister, D. Towards a 60% Reduction in UK Transport Carbon Dioxide Emissions: A Scenario Building and Backcasting Approach. ECEEE 2005 Summer Study—What Works & Who Delivers? 2005. Available online: https://d1wqtxts1xzle7.cloudfront.net/30958971/HickmanBanister-with-cover-page-v2.pdf?Expires=1663164762&Signature=BhjTeM50kfX97Qm2Y3jFetlQxRaGH3ZbXivtM1SDlIuc4Ih1wnV~4kJx~Y4j2KkcpJNLaqLeT77~-FdboUN2dkIn8DOdg2hu5ltpbCSVh4PGC3Mips2vAu5wkyjWAQr3TCmAAin7QbdmdQHO2k9C4fzIGtkB92DGTKqrgoEFPNKeFZwqisAxWu9rjL54zsLS6tjtGzjafoSXQKDPvTvv06wUbrQVvYeGlTCTJw8-x5V2lM2-c67HJCycZNEDe-6Q05nsMowHvZbzePqsB34Xrijks6Tzyc1TQMGQmBXN3VUgHysOr5VFyH2SS9emjALzKEYBVQpWYywInRjs1AOk8g__&Key-Pair-Id=APKAJLOHF5GGSLRBV4ZA (accessed on 20 May 2023).
6. Yang, C.; McCollum, D.; McCarthy, R.; Leighty, W. Meeting an 80% reduction in greenhouse gas emissions from transportation by 2050: A case study in California. *Transp. Res. Part D Transp. Environ.* **2009**, *14*, 147–156. [CrossRef]
7. Soria-Lara, J.A.; Banister, D. Collaborative backcasting for transport policy scenario building. *Futures* **2018**, *95*, 11–21. [CrossRef]
8. Wiederkehr, P.; Gilbert, R.; Crist, P.; Caïd, N. Environmentally sustainable transport (EST): Concept, goal, and strategy–the OECD's EST project. *Eur. J. Transp. Infrastruct. Res.* **2004**, *4*, 11–25.
9. Banister, D. POSSUM, Policy Scenarios for Sustainable Mobility. Final Report. 1998. Available online: https://sustainablestrategies.eu/wp-content/uploads/2018/05/Policy-Scenarios-for-Sustainable-Mobility-The-POSSUM-Project.pdf (accessed on 20 May 2023).
10. Lyons, G.; Davidson, C. Guidance for transport planning and policymaking in the face of an uncertain future. *Transp. Res. Part A Policy Pract.* **2016**, *88*, 104–116. [CrossRef]
11. Bueno, G. Analysis of scenarios for the reduction of energy consumption and GHG emissions in transport in the Basque Country. *Renew. Sustain. Energy Rev.* **2012**, *16*, 1988–1998. [CrossRef]
12. Daly, H.E.; Gallachóir, B.P. Future energy and emissions policy scenarios in Ireland for private car transport. *Energy Policy* **2012**, *51*, 172–183. [CrossRef]
13. Vergragt, P.J.; Quist, J. Backcasting for sustainability: Introduction to the special issue. *Technol. Forecast. Soc. Chang.* **2011**, *78*, 747–755. [CrossRef]
14. Quist, J.; Vergragt, P. Past and future of backcasting: The shift to stakeholder participation and a proposal for a methodological framework. *Futures* **2006**, *38*, 1027–1045. [CrossRef]
15. Dreborg, K.H. Essence of backcasting. *Futures* **1996**, *28*, 813–828. [CrossRef]
16. Åkerman, J.; Höjer, M. How much transport can the climate stand?—Sweden on a sustainable path in 2050. *Energy Policy* **2006**, *34*, 1944–1957. [CrossRef]
17. Soria-Lara, J.A.; Banister, D. Dynamic participation processes for policy packaging in transport backcasting studies. *Transp. Policy* **2017**, *58*, 19–30. [CrossRef]
18. Soria-Lara, J.A.; Banister, D. Participatory visioning in transport backcasting studies: Methodological lessons from Andalusia (Spain). *J. Transp. Geogr.* **2017**, *58*, 113–126. [CrossRef]
19. Woodcock, J.; Edwards, P.; Tonne, C.; Armstrong, B.G.; Ashiru, O.; Banister, D.; Roberts, I. Public health benefits of strategies to reduce greenhouse-gas emissions: Urban land transport. *Lancet* **2009**, *374*, 1930–1943. [CrossRef] [PubMed]
20. Holmberg, J.; Robèrt, K.-H. Backcasting—A framework for strategic planning. *Int. J. Sustain. Dev. World Ecol.* **2000**, *7*, 291–308. [CrossRef]
21. Tuominen, A.; Tapio, P.; Varho, V.; Järvi, T.; Banister, D. Pluralistic backcasting: Integrating multiple visions with policy packages for transport climate policy. *Futures* **2014**, *60*, 41–58. [CrossRef]
22. Zimmermann, M.; Darkow, I.-L.; von der Gracht, H.A. Integrating Delphi and participatory backcasting in pursuit of trustworthiness—The case of electric mobility in Germany. *Technol. Forecast. Soc. Chang.* **2012**, *79*, 1605–1621. [CrossRef]
23. Ashina, S.; Fujino, J.; Masui, T.; Ehara, T.; Hibino, G. A roadmap towards a low-carbon society in Japan using backcasting methodology: Feasible pathways for achieving an 80% reduction in CO_2 emissions by 2050. *Energy Policy* **2012**, *41*, 584–598. [CrossRef]
24. Marchau, V.A.W.J.; van der Heijden, R.E.C.M. Innovative methodologies for exploring the future of automated vehicle guidance. *J. Forecast.* **2003**, *22*, 257–276. [CrossRef]
25. Nogués, S.; González-González, E.; Cordera, R. New urban planning challenges under emerging autonomous mobility: Evaluating backcasting scenarios and policies through an expert survey. *Land Use Policy* **2020**, *95*, 104652. [CrossRef]
26. Olsson, L. Bridging the implementation gap: Combining backcasting and policy analysis to study renewable energy in urban road transport. *Transp. Policy* **2015**, *37*, 72–82. [CrossRef]
27. Mattila, T.; Antikainen, R. Backcasting sustainable freight transport systems for Europe in 2050. *Energy Policy* **2011**, *39*, 1241–1248. [CrossRef]
28. Robèrt, M.; Jonsson, R.D. Assessment of transport policies toward future emission targets: A backcasting approach for Stockholm 2030. *J. Environ. Assess. Policy Manag.* **2006**, *8*, 451–478. [CrossRef]
29. Bristow, A.L.; Tight, M.; Pridmore, A.; May, A.D. Developing pathways to low carbon land-based passenger transport in Great Britain by 2050. *Energy Policy* **2008**, *36*, 3427–3435. [CrossRef]

30. Schmid, E.; Knopf, B. Ambitious mitigation scenarios for Germany: A participatory approach. *Energy Policy* **2012**, *51*, 662–672. [CrossRef]
31. MRA, 2019, Fourth Biennial Report of Malta, 2020. Available online: https://www4.unfccc.int/sites/SubmissionsStaging/NationalReports/Documents/35164807_Malta-BR4-1-BR4_Malta_V4_final.pdf (accessed on 8 August 2020).
32. European Commission. Commission Staff Working Document. Assessment of the Final Energy and Climate Plan of Malta. 2020. Available online: https://ec.europa.eu/energy/sites/ener/files/documents/staff_working_document_assessment_necp_malta.pdf (accessed on 15 June 2023).
33. National Statistics Office. Transport Statistics 2021 (Reference Year 2020). 2022. Available online: https://nso.gov.mt/en/nso/Media/Salient-Points-of-Publications/ (accessed on 15 June 2023).
34. National Statistics Office. National Household Travel Survey 2021. 2021. Available online: https://nso.gov.mt/en/nso/Media/Salient-Points-of-Publications/Documents/2022/NHTS/National%20Household%20Travel%20Survey%20Publication.pdf (accessed on 22 June 2023).
35. Schwanen, T.; Banister, D.; Anable, J. Scientific research about climate change mitigation in transport: A critical review. *Transp. Res. Part A Policy Pract.* **2011**, *45*, 993–1006. [CrossRef]
36. Sanne, C. Willing consumers—Or locked-in? Policies for a sustainable consumption. *Ecol. Econ.* **2002**, *42*, 273–287. [CrossRef]
37. Reckwitz, A. Toward a theory of social practices: A development in culturalist theorizing. *Eur. J. Soc. Theory* **2002**, *5*, 243–263. [CrossRef]
38. Shove, E.; Walker, G. Governing transitions in the sustainability of everyday life. *Res. Policy* **2010**, *39*, 471–476. [CrossRef]
39. Warde, A. Consumption and theories of practice. *J. Consum. Cult.* **2005**, *5*, 131–153. [CrossRef]
40. Spaargaren, G. Sustainable Consumption: A Theoretical and Environmental Policy Perspective. *Soc. Nat. Resour.* **2003**, *16*, 687–701. [CrossRef]
41. Camilleri, R.; Attard, M.; Hickman, R. Future Low-Carbon Transport Scenarios: Practice Theory-Based Visioning for Backcasting Studies. *Sustainability* **2021**, *14*, 74. [CrossRef]
42. Camilleri, R.; Attard, M.; Hickman, R. Understanding barriers to modal shift in Malta: A practice-theoretical perspective of everyday mobility. *J. Transp. Geogr.* **2022**, *104*, 103446. [CrossRef]
43. Holmberg, J. Backcasting: A natural step in operationalising sustainable development. In *Greener Management International*; Greenleaf Publishing: Austin, TX, USA, 1998; p. 30.
44. Van Wee, B.; Geurs, K. Backcasting as a tool for sustainable transport policy making: The Environmental Sustainable Transport study in the Netherlands. *Eur. J. Transp. Infrastruct. Res.* **2004**, *4*, 47–69.
45. Ashina, S.; Fujino, J. Methodology for Designing Quantitative Roadmaps towards Low-Carbon Societies using a Backcasting Approach. *Glob. Environ. Res.* **2013**, *17*, 99–107.
46. Guo, X.; Fu, L.; Ji, M.; Lang, J.; Chen, D.; Cheng, S. Scenario analysis to vehicular emission reduction in Beijing-Tianjin-Hebei (BTH) region, China. *Environ. Pollut.* **2016**, *216*, 470–479. [CrossRef]
47. Doyle, R.; Davies, A.R. Towards sustainable household consumption: Exploring a practice oriented, participatory backcasting approach for sustainable home heating practices in Ireland. *J. Clean. Prod.* **2013**, *48*, 260–271. [CrossRef]
48. European Commission Joint Research Centre. Backcasting Approach for Sustainable Mobility. 2008. Available online: http://publications.jrc.ec.europa.eu/repository/bitstream/111111111/7659/1/backcasting%20final%20report.pdf (accessed on 20 May 2022).
49. Geurs, K.; Van Wee, B. Backcasting as a Tool to Develop a Sustainable Transport Scenario Assuming Emission Reductions of 80–90%. *Innov. Eur. J. Soc. Sci. Res.* **2010**, *13*, 47–62. [CrossRef]
50. Wangel, J. Change by whom? Four ways of adding actors and governance in backcasting studies. *Futures* **2011**, *43*, 880–889. [CrossRef]
51. Banister, D.; Hickman, R. Transport futures: Thinking the unthinkable. *Transp. Policy* **2013**, *29*, 283–293. [CrossRef]
52. Bertolini, L.; Brömmelstroet, M.T.; Pelzer, P. If a mobility transition is what we want, transport research should. *Transp. Res. Procedia* **2019**, *41*, 824–829. [CrossRef]
53. Curtis, C. Planning for sustainable accessibility: The implementation challenge. *Transp. Policy* **2008**, *15*, 104–112. [CrossRef]
54. Gordon, A.V. Limits and longevity: A model for scenarios that influence the future. *Technol. Forecast. Soc. Chang.* **2020**, *151*, 119851. [CrossRef]
55. Innes, J.E.; Booher, D.E. *Planning with Complexity: An Introduction to Collaborative Rationality for Public Policy*; Routledge: London, UK, 2010. [CrossRef]
56. Willson, R. Assessing communicative rationality as a transportation planning paradigm. *Transportation* **2001**, *28*, 1–31. [CrossRef]
57. Guy, S.; Shove, E. *The Sociology of Energy, Buildings and the Environment: Constructing Knowledge, Designing Practice*; Routledge: London, UK, 2000; Volume 5. [CrossRef]
58. Shove, E.; Chappells, H.; Van Vliet, B. *Infrastructures of Consumption: Environmental Innovation in the Utility Industries*; Routledge: London, UK, 2012.
59. Carlsson-Kanyama, A.; Dreborg, K.H.; Moll, H.; Padovan, D. Participative backcasting: A tool for involving stakeholders in local sustainability planning. *Futures* **2008**, *40*, 34–46. [CrossRef]
60. Quist, J.; Thissen, W.; Vergragt, P.J. The impact and spin-off of participatory backcasting: From vision to niche. *Technol. Forecast. Soc. Chang.* **2011**, *78*, 883–897. [CrossRef]

61. Höjer, M.; Gullberg, A.; Pettersson, R. Backcasting images of the future city—Time and space for sustainable development in Stockholm. *Technol. Forecast. Soc. Chang.* **2011**, *78*, 819–834. [CrossRef]
62. Eames, M.; Egmose, J. Community foresight for urban sustainability: Insights from the Citizens Science for Sustainability (SuScit) project. *Technol. Forecast. Soc. Chang.* **2011**, *78*, 769–784. [CrossRef]
63. Schatzki, T.R. *Introduction: Practice Theory*; Cetina, K.K., Schatzki, T.R., Von Savigny, E., Eds.; Routledge: London, UK, 2001.
64. Watson, M.; Pantzar, M.; Shove, E. *The Dynamics of Social Practice: Everyday Life and How it Changes*; Sage: Thousand Oaks, CA, USA, 2012. [CrossRef]
65. Pangbourne, K.; Anable, J. Alternative travel futures. *J. Transp. Geogr.* **2011**, *19*, 1535–1537. [CrossRef]
66. Dennis, K.; Urry, J. *After the Car*; Polity: Cambridge, UK, 2009.
67. Yearley, S. Sociology and climate change after Kyoto: What roles for social science in understanding climate change? *Curr. Sociol.* **2009**, *57*, 389–405. [CrossRef]
68. Watson, M. How theories of practice can inform transition to a decarbonised transport system. *J. Transp. Geogr.* **2012**, *24*, 488–496. [CrossRef]
69. Kent, J.; Dowling, R.; Maalsen, S. Catalysts for transport transitions: Bridging the gap between disruptions and change. *J. Transp. Geogr.* **2017**, *60*, 200–207. [CrossRef]
70. NSO. Regional Statistics Malta 2019 edition. 2019; p. 311. Available online: https://nso.gov.mt/en/publicatons/Publications_by_Unit/Documents/02_Regional_Statistics_(Gozo_Office)/Regional%20Statistics%20MALTA%202019%20Edition.pdf (accessed on 10 June 2021).
71. European Union. Special Eurobarometer 422a "Quality of Transport". 2014. Available online: http://ec.europa.eu/public_opinion/archives/ebs/ebs_422a_en.pdf (accessed on 30 November 2022).
72. Transport Malta. National Household Travel Survey 2010. 2010. Available online: https://www.transport.gov.mt/NHTS2010-Report-pdf_20120502091559.pdf-f1687 (accessed on 30 November 2022).
73. Transport Malta. National Transport Strategy 2050. 2016; pp. 1–182. Available online: https://www.transport.gov.mt/strategies/strategies-policies-actions/national-transport-strategy-and-transport-master-plan-1343 (accessed on 30 November 2021).
74. Transport Malta. Transport Master Plan, 2025. 2016. Available online: http://www.transport.gov.mt/transport-strategies/strategies-policies-actions/national-transport-strategy-and-master-plan (accessed on 10 June 2021).
75. Attard, M.; Von Brockdorff, P.; Bezzina, F. *The External Costs of Passenger and Commercial Vehicle Use in Malta*; University of Malta—European Commission Representation in Malta: Valletta, Malta, 2015.
76. Calado, H.; Quintela, A.; Porteiro, J. Integrated coastal zone management strategies on small islands. *J. Coast. Res.* **2007**, 125–129.
77. De Águeda Corneloup, I.; Mol, A.P. Small island developing states and international climate change negotiations: The power of moral "leadership". *Int. Environ. Agreem. Politics Law Econ.* **2014**, *14*, 281–297. [CrossRef]
78. Ourbak, T.; Magnan, A.K. The Paris Agreement and climate change negotiations: Small Islands, big players. *Reg. Environ. Chang.* **2018**, *18*, 2201–2207. [CrossRef]
79. Soomauroo, Z.; Blechinger, P.; Creutzig, F. Unique opportunities of island states to transition to a low-carbon mobility system. *Sustainability* **2020**, *12*, 1435. [CrossRef]
80. Robinson, J.B. Futures under glass: A recipe for people who hate to predict. *Futures* **1990**, *22*, 820–842. [CrossRef]
81. Höjer, M.; Mattsson, L.G. Determinism and backcasting in future studies. *Futures* **2000**, *32*, 613–634. [CrossRef]
82. Quist, J.; Knot, M.; Young, W.; Green, K.; Vergragt, P. Strategies towards sustainable households using stakeholder workshops and scenarios. *Int. J. Sustain. Dev.* **2001**, *4*, 75–89. [CrossRef]
83. Spotswood, F.; Chatterton, T.; Tapp, A.; Williams, D. Analysing cycling as a social practice: An empirical grounding for behaviour change. *Transp. Res. Part F Traffic Psychol. Behav.* **2015**, *29*, 22–33. [CrossRef]
84. Gosselain, V.; Bartiaux, F. Methodology for in-Depth Interviews Investigating EU Dwelling Owners' Practiceson (Energy-Related) Renovation Works)—D.4.1. 2011. Available online: https://www.bre.co.uk/filelibrary/pdf/projects/in_depth_interviews.pdf#page=186 (accessed on 30 November 2021).
85. Ramirez, R.; Wilkinson, A. Rethinking the 2 × 2 scenario method: Grid or frames? *Technol. Forecast. Soc. Chang.* **2014**, *86*, 254–264. [CrossRef]
86. Berkhout, F.; Bouwer, L.M.; Bayer, J.; Bouzid, M.; Cabeza, M.; Hanger, S.; Hof, A.; Hunter, P.; Meller, L.; Patt, A.; et al. European policy responses to climate change: Progress on mainstreaming emissions reduction and adaptation. *Reg. Environ. Chang.* **2015**, *15*, 949–959. [CrossRef]
87. Deetman, S.; Hof, A.F.; Pfluger, B.; van Vuuren, D.P.; Girod, B.; van Ruijven, B.J. Deep greenhouse gas emission reductions in Europe: Exploring different options. *Energy Policy* **2013**, *55*, 152–164. [CrossRef]
88. Dugan, A.; Mayer, J.; Thaller, A.; Bachner, G.; Steininger, K.W. Developing policy packages for low-carbon passenger transport: A mixed methods analysis of trade-offs and synergies. *Ecol. Econ.* **2022**, *193*, 107304. [CrossRef]
89. Gross, R.; Heptonstall, P.; Jillian Anable, J.; Philip Greenacre, P. What Policies are Effective at Reducing Carbon Emissions from Surface Passenger Transport?—A Review of Interventions to Encourage Behavioural Andtechnological Change. A Report Produced by the Technology and Policy Assessment Function of the UK Energy Research Centre. 2009. Available online: https://d2e1qxpsswcpgz.cloudfront.net/uploads/2020/03/what-policies-are-effective-at-reducing-carbon-emissions-from-surface-passenger-transport.pdf (accessed on 20 May 2023).

90. Huber, R.A.; Wicki, M. What explains citizen support for transport policy? the roles of policy design, trust in government and proximity among Swiss citizens. *Energy Res. Soc. Sci.* **2021**, *75*, 101973. [CrossRef]
91. Santos, G.; Behrendt, H.; Teytelboym, A. Part II: Policy instruments for sustainable road transport. *Res. Transp. Econ.* **2010**, *28*, 46–91. [CrossRef]
92. Hrelja, R.; Rye, T. Decreasing the share of travel by car. Strategies for implementing 'push'or 'pull'measures in a traditionally car-centric transport and land use planning. *Int. J. Sustain. Transp.* **2022**, *17*, 446–458. [CrossRef]
93. Thaller, A.; Posch, A.; Dugan, A.; Steininger, K. How to design policy packages for sustainable transport: Balancing disruptiveness and implementability. *Transp. Res. Part D Transp. Environ.* **2021**, *91*, 102714. [CrossRef]
94. Iacovidou, E.; Wehrmeyer, W. Making sense of the future: Visions and transition pathways of laypeople and professionals from six EU countries. *Glob. Bioeth.* **2014**, *25*, 211–225. [CrossRef]
95. Kerkhof, M.V.d.; Wieczorek, A. Learning and stakeholder participation in transition processes towards sustainability: Methodological considerations. *Technol. Forecast. Soc. Chang.* **2005**, *72*, 733–747. [CrossRef]
96. Cass, N.; Faulconbridge, J. Commuting practices: New insights into modal shift from theories of social practice. *Transp. Policy* **2016**, *45*, 1–14. [CrossRef]