Enabling sufficiency: towards an actionable concept of fairness in mobility and accessibility

MyFairShare - Individual Mobility Budgets as a Foundation for Social and Ethical Carbon Reduction
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Abstract. This working paper presents the outcome of activities that were conducted as part of the MyFairShare Task 2.1 "Towards an actionable concept of fairness in mobility and accessibility". It introduces a rationale for focusing on and assigning budgets for transport-related carbon emissions, establishes the boundaries of a justice domain for mobility budgets, and touches on some initial aspects of the required information base and data requirements. Its main contribution is a conceptual framework for fairness in the context of mobility and accessibility. Finally, the paper also addresses one aspect of Task 2.5 "Development of context-specific pilots" by introducing a decision approach for defining the general approach for each of the MyFairShare Living Labs.

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1 Introduction

This working paper presents the outcome of activities that were conducted as part of the MyFairShare Task 2.1 “Towards an actionable concept of fairness in mobility and accessibility”. It introduces a rationale for focusing on and assigning budgets for transport-related carbon emissions, establishes the boundaries of a justice domain for mobility budgets, and touches on some initial aspects of the required information base and data requirements. Its main contribution is a conceptual framework for fairness in the context of mobility and accessibility. Finally, the paper also addresses one aspect of Task 2.5 ‘Development of context-specific pilots’ by introducing a decision approach for defining the details for each of the MyFairShare Living Labs.

The broader context of the MyFairShare project is a shift towards sufficiency as part of sustainable mobility. Millonig et al. (2022) argue that the efficiency and consistency principle of sustainability has so far not produced the environmental outcomes that are urgently needed. This elevates the importance of embracing the third sustainability principle of sufficiency. In turn, the sufficiency approach leads to fundamental questions about a fair distribution of finite resources. MyFairShare acknowledges that any resource and ecological constraints go together with new challenges of distribution and identifies the wider transport and mobility sector as a valuable testbed for a fairer allocation of mobility resources.

The three key aspects inform the allocation challenge for MyFairShare (Figure 1): First, the allocation of mobility resources which, at the simplest level, inform the ability to travel at certain speeds and over certain distances. As we will see below, mobility resources play a fundamental role in providing access to opportunities. Second, the allocation of carbon emissions which today have politically defined and scientifically underpinned maximum levels. Assigning carbon emission rights then represent a “positive” benefit to individuals which can be translated to the before mentioned mobility resources: cheap, readily available, comfortable but carbon intense motorised mobility (ie, conventional car use). Third, the allocation of space consumption, which in cities has a clearly defined, physical limit. Space consumption for mobility can be translated to mobility resources such as convenient, comfortable, and spacious individualised transport (again, mainly car use).

As we will see below, while equity concerns linked to mobility resources are centrally considering the definition and guarantee of minimum standards (floors) for accessing opportunities, carbon emissions and space consumption have clearly defined maximums (ceilings). The ceilings for mobility resources (and indirectly for accessibility) are thus derived at indirectly through the constraints of carbon emissions and space consumption.

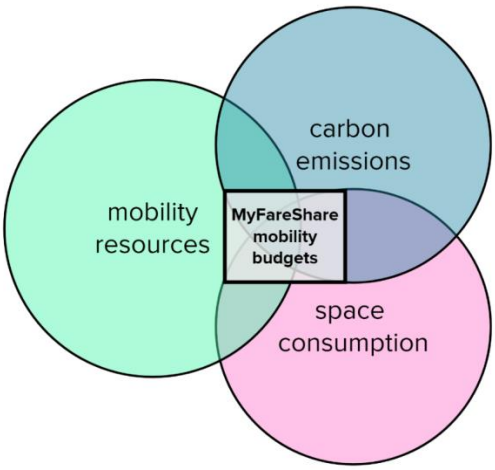

Figure 1: The three aspects of MyFairShare fairness and distribution issues
Source: Author

This paper is structured as follows. As part of this introductory section, it first will present established concerns about fairness in transport, then discuss new frontiers in mobility justice which are of particular relevance to MyFairShare. The section concludes by introducing a rationale for focusing on transport as a dedicated domain and accessibility to the corresponding domain of justice.

The second section will cover exclusively theoretical aspects of fairness in mobility and transport. It revisits the MyFairShare priorities, introduces the key terminology and definitions and then relates four social justice models to the transport domain. These models include libertarianism, Rawls' egalitarianism, the capabilities approach and sustainability justice.

Section three is dedicated to the presentation of a conceptual framework for operationalising the fairness dimension in transport policy and praxis. It applies the approach of Martens et al. (2019) to measuring transport equity based on three key steps: identifying benefits and burdens, considering the social characteristics and defining the allocation principle.

The last section will apply the conceptual framework to the establishment of mobility budgets (and the related exploration) for the MyFairShare Living Labs. Based on the London case, a simple approach is proposed and applied in an illustrative way for the London situation. The section concludes with several key take aways for future discussion.

1.1 Established concerns about fairness in transport

Modernist transport policy and planning, particularly during the post-war period, was predominantly concerned with addressing congestion and lacking capacities in transport systems. It did not explicitly engage with questions of equity and fairness. Instead, its paradigmatic underpinning was to establish the conditions for effective and efficient movement of both people and goods based on existing transport demand (Goodwin, Hallett et al. 1991). Martens (2016) suggests that traditional transport planning operates with a distributive principle of demand rather than one of equality.

At the level of the street, traditional perspectives operate with a mode rather than people-centric approach. As a result, there is an implied assumption of modal egalitarianism (giving equal shares to different modes) or grandfathering (keeping the status quo) as an appropriate and fair allocation. While none of these have any clear ethical justification (Creutzig, Javaid et al. 2020), these were and often remain part of the decision making of transport engineers and modelers (Vasconcellos 2004, Nello-Deakin 2019).

Banister (2018) notes that of a wide range of equity, fairness and justice concerns and definitions which are part of today's transport policy debate and practice, there were only two which featured more frequently in the past. The first relates to questions about how to pay for providing transport infrastructure and services and the degree to which different users and non-users would have to contribute. The second refers to a basic needs perspective which for some time has been and continues to be central for the provision of public transport. It is this second perspective which also has informed the Sustainable Development Goals' Target 11. 2 "… to, by 2030, provide access to safe, affordable, accessible and sustainable transport systems for all …" (UN 2015). Still, most of these issues were not mainstream concerns of transport professionals in the past.

While traditional transport planning may not operate with a clear ethical and distributional principle as a point of departure, it cannot escape an ex-post distributional reality with considerable fairness implications. Martens (2016) identifies two faces of fairness in traditional transport planning: a progressive one and a regressive one. The first relates to an egalitarian tendency which treats transport not unlike the universal access ambition prevalent in engineering for the case of water, sanitation and electricity provision. With resource constraints in the past not as prevalent as today, this ideal could be summarized as "everybody is to receive unhindered travel speed on the transportation network of her choice" (Martens 2016, p.25). The progressive nature of this face of fairness stems from the same

transport access being provided independently from an individual's socio-economic characteristics and residential location.

The regressive face in traditional transport planning is revealed when considering accessibility as the ultimate end of mobility. Because of an equality of speed, accessibility can be highly unequal between urban centres and peripheries. Furthermore, the central role of forecasting in transport planning is based on existing, often highly unequal mobility patterns and then reproduces existing differences. This " … suggests an implicit assumption that demand constitutes the just principle upon which the distribution of new transport facilities is to be based" (Martens 2016, p.29). Finally, the widespread reliance of transport infrastructure decisions based on cost benefit analysis (CBA) tends to reproduce existing inequalities. CBA operates with a monetization of travel time savings which are typically based on income levels of different existing and potential users of a transport system. As a result, transport investments benefitting higher income groups, certain modes and types of travel will perform better in a CBA. In addition, Martens (2016) argues that strong population groups with greater levels of mobility intensities benefit disproportionally from CBA-based decisions and their focus on aggregate travel time savings.

To summarise the traditional perspective, it is worth noting that the politics of transport over the last century always maintained a framing of "travel as freedom" from which a basic right to travel can be extracted, in turn enabling a freer choice of where to live and self-development (Banister 2018). Once again, this connects directly with the universal access perspective and its egalitarian lens.

By contrast, contemporary discourses and policy engagement related to transport equity tend to be most concerned with various forms of discrimination and an unequal distribution of transport resources (SDC 2011, Van Wee and Geurs 2011, Martens 2012, Nordbakke and Schwanen 2014, Banister 2018). It is informed by a new awareness of mobility needs and constraints of groups that were marginalized in modernist transport planning: women, children and young people, older people, lower income groups, ethnic minorities, people with disabilities and other disadvantaged groups. Aligned with a more inclusive transport perspective is the recognition of trip purposes other than commuting and business travel: reaching services and care facilities, educational institutions, retail and recreational travel.

A major focus of contemporary transport fairness deliberations focus on questions of urban accessibility, above all travel times and costs (Martens 2016, Nello-Deakin 2019). For policy making, these usually translate to concerns about the equity implications of large-scale transport infrastructure investments and land use planning. Hananel and Berechman (2016) highlight three elements as part of a new standard approach to inequality in transport: affordability, accessibility and personal/group mobility characteristics.

A major contemporary dimension of transport equity engages with the distribution of negative socio-economic and local environmental externalities from transport. For these, common transport burdens include various health impacts; noise and air pollution; congestion; compromised urban amenities, open and green space; community severance as well as safety and security (Banister 2018). A particularly important perspective on a fair distribution of transport burdens highlights that it is often those groups in society that benefit the least from contemporary transport systems that are at the same time exposed to their greatest negative impacts.

The UK's Sustainable Development Commission's report on Fairness in a Car Dependent Society (2011) refers to the "less-travelled" being the "travelled-upon" (p.5). This may lead to a form of triple injustice as these groups often have fewer opportunities to complain about their situation and to be heard in addition to having limited access to mobility resources and suffering from negative externalities. Gössling (2016) concludes that transport injustices are interrelated and compounding each other with adversarial consequences for those disadvantaged and bearing the costs of contemporary transport.

1.2 New frontiers of mobility justice

Over the last decade and based on the concerns and interests above, transport justice has been a rapidly growing field of academic inquiry. A systematic bibliometric analysis prepared for MyFairShare (Shams 2022) confirmed a considerable increase in related publications compared to general works on transport particularly since 2010 (Figure 2). The analysis of author-assigned keywords revealed that "accessibility" and "public transit" were the most prominent terms overall and gained additional prominence over the last years. From 2006 to 2018, the keywords of "road pricing" and "congestion pricing" were the most relevant (Shams 2022).

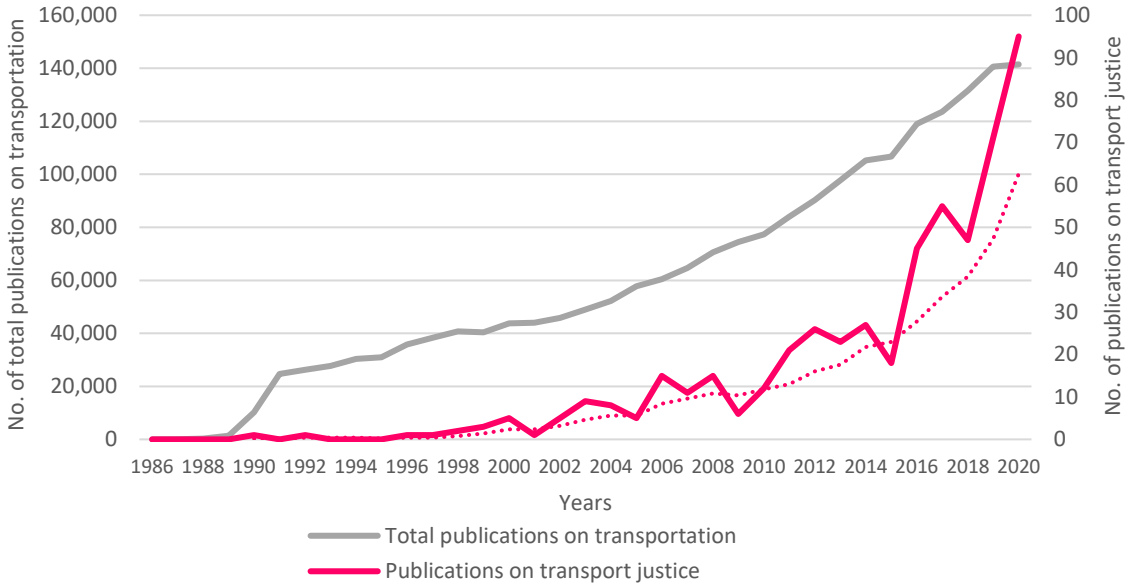

Figure 2: Academic publications on "transport justice" compared to "transport" in general
Source: Shams 2022

Beyond the issues above, there are several new frontiers of mobility justice which MyFairShare may have to recognise: implications of sustainability justice, a needs-based perspective of mobility and access, the speed and distance bias of transport policy, intrinsic values of mobility and the justice of public (street) space use.

To date, transport and mobility justice has been mainly concerned of the justice of the "here and now" and to a lesser extent with broader inter- and intra-generational justice of sustainability. While most transport justice scholars acknowledge planetary limits and environmental sustainability, few incorporate these directly as part of their justice analysis. One exception is Banister (2018) who in his book *Inequality in Transport* refers to obligations to future generations as part of securing their freedoms.

Directly related is a new requirement to better define the consumption of mobility by distinguishing between necessities and luxuries. Such engagement can build on broader theories of human needs and concepts for consumption corridors, identifying floors and ceilings for consumption patterns (Gough 2020). For the transport and mobility sector, this shifts the focus from the supply of transport resources to the need for mobility. Banister (2018) notes that, to date, inequality perspectives in transport have been focusing mostly on accessibility and affordability rather than a concept of needs.

More recent justice considerations also increasingly challenge another deeply embedded bias of transport policy: First, the prioritisation of longer trips – macro-accessibility is frequently considered more important than micro-accessibility. Second, the importance given to higher speeds – the requirements of faster travelling vehicles still dictate urban street design and faster moving vehicles

often are given priority at intersections over non-motorised mobility. Both the environmental sustainability perspective as well as good urbanism inverse that logic.

The increasing recognition of intrinsic values of mobility and transport (Niblett and Beuret 2021a) rather than a "means-to-an-end" understanding linked to accessibility results in particularly complex implications for mobility justice. Considering the joy of travel, status benefits of vehicle ownership or intrinsic preferences for certain means of travel are even harder to qualify and require a high granularity of considering individual cases.

A new framing of transport justice also re-emphasises the local scale and how street space is being distributed (Creutzig, Javaid et al. 2020). This moves the focus away from the distribution of large-scale transport resources linked to major investments, travel time and metropolitan access and instead to the local use of a street. Nello-Deakin (2019) argues that this allocation question once belonged almost exclusively to the technocratic domain of transport engineers and modellers supported by transitional cost benefit analyses. Once again, this so far implied a focus on the movement function of faster moving traffic rather than slow mobility and place functions of streets. A further expansion of the use of public space and a fair distribution thereof requires a fuller account of space consumption over time based on "time-space" (Rode and Gipp 2001).

1.3 The rationale for a dedicated transport domain

The final part of this introductory section is dedicated to the question of why it is helpful to consider the transport sector as a separate domain for both climate action and fairness considerations. Three different viewpoints are considered: governance, climate and justice perspectives.

To begin with, institutional legacies and deeply rooted path dependencies ensure that policy interventions, as well as climate action and social justice, are typically considered within specific domains or spheres. From a policy making and governance perspective, these often relate to establish governmental silos and sectors (Rode 2018). They are the concrete arenas within which policy making operates and for which specific expertise, clear criteria and indicators as well as budgets have been established. It is thus no surprise that when considering government interventions, there is a default retreat to these arenas for change which in most countries and cities separate dealing with education, health, housing and transport alongside other common policy sectors.

The counterargument to this default approach is a recognition that transport, like any other sector, is highly interdependent, dynamic and complex and highly exposed to numerous feedback loops across other sectors and domains (Rode 2018, Randal, Shaw et al. 2020). This is particularly the case if one acknowledges the accessibility goal of transport which depends on land use, the availability of opportunities and various questions of affordability linked to social policy (Rode, Floater et al. 2017). For example, the forces of a complex accessibility nexus establish economies of scale which may reduce the price of food in larger supermarkets while the costs of distribution are transferred from companies to the individual having to access daily groceries further afield.

Regardless of compelling arguments for a nexus or challenge approach to public policy, traditional sectors have prevailed. In the context of multilevel governance, the vertical distribution of political power and responsibilities often reinforces sectoral assignments. Arguments for decentralisation and devolution tend to point to specific sectors with greater associated benefits of local oversight. As a result, decentralisation can result to the strengthening of silos. While the transport domain is considered highly multilevel, it typically features significant levels of local government oversight. This is even more the case for accessibility policy which is centrally informed by the quintessential urban governance domain of spatial planning (Rode, Heeckt et al. 2017).

The climate emergency establishes the second perspective which underpins the case for a dedicated focus on the transport sector. Despite the considerable global commitments and efforts, climate change is advancing at unprecedented pace. It is increasingly becoming clear that the next decade may

well be the last opportunity to avoid tipping points of climate change that could make a ”hothouse earth” unavoidable (Lenton, Rockström et al. 2019). Prior to the pandemic, transport-related emissions were not only stubbornly high, but had started to rise again in several countries where they had been reduced (IEA 2021).

Indeed, transport emissions were growing more rapidly than in any other sector and were projected to increase by 50% by 2035 and almost double by 2050 under a business-as-usual scenario (Sims R. 2014). In most US cities, carbon emissions from road transport have increased since 2015, mainly as a result of the increasing share of sport utility vehicles (SUVs) and other heavier, carbon-intensive vehicles (Popovich and Lu 2019). Similar patterns had been seen around the world, offsetting any GHG reductions from rapid growth in the sales of electric vehicles (IEA 2021).

At the same time, urban transport is a sector for which decarbonisation is relatively easy. Above all, access to opportunities in cities often does not require to travel over long distances and behavioural adjustments towards a lower degree of travel intensity is possible. Most cities also already offer several alternatives to conventional, high-carbon car use such as public transport, walking and cycling. Lastly, the electrification of road transport is supported by a higher density of charging stations and the potential for sharing more expensive electric vehicles.

A further climate emergency rational for an exclusive treatment of the transport sector directly builds on the case for mobility budgets. Millonig et al. (2022) argue that greater transparency of overusing resources has a considerable potential to be both acceptable and effective. However, in the first instance this requires the creation of awareness of resource-intense behaviour and secondly, the provision of viable alternatives. The transport sector is particularly well suited to ensure both with tangible and easy to communicate mobility budgets and, certainly in urban areas, often readily available options for behaviour change. By addressing the personal sphere of action based on a principle of ambitious goal setting in the transport sector, mobility budgets may in turn establish the experimental ground for implementing sustainable consumption corridors across sectors and policy domains.

From a fairness perspective, the rational for treating the transport sector as a separate domain from other distributional questions has recently received increasing attention. But it also had to emancipate itself from the prevailing view, particularly following Rawls, that theories of justice need to be concerned with resource distribution across society as a whole rather than consider sectoral applications (Lewis, MacKenzie et al. 2021). For transport justice, Martens (2016) utilises Walzer’s Spheres of Justice (1983) for a compelling perspective. A fundamental point here is the recognition of specific rather than abstract benefits and burdens for society alongside an acknowledgement that the meaning of goods is socially constructed. This, according to Walzer, prohibits the use of a single criterion for the distribution of a wide variety of goods.

Instead, Walzer makes the case for separate “distributive spheres” for those goods with a distinct social meaning – health and education being typical examples. These are taken out of a general sphere of free exchange and instead need to be guided by specific distributive principles which also secure their independence from distributing other goods (Walzer 1983). For this line of argument, the autonomy of different spheres of distribution avoids injustices which occur when the distribution in one sphere determines that of other spheres.

Martens (2016) advances several tests for transport and whether it deserves its own distributional sphere. He settles on accessibility – the capacity to access places – as the ultimate social meaning of the transport good and thus an appropriate distributive sphere. This implies that injustices within the accessibility domain cannot be simply compensated by intervening in other domains. Financial compensation for insufficient accessibility would therefore not be acceptable, financial transfers that ensure purchasing sufficient accessibility levels would. Applying the same logic, extremely high levels of accessibility cannot compensate for discrimination in other domains.

Following Walzer, Martens also argues that a wide range of transport burdens, or negative externalities, would have to be considered in the respective spheres of, for example, health or the environment (each with enough of their own distinct social meaning). For the establishment of mobility budgets based on carbon emission ceilings this results in the challenge of operating across at least two spheres of distributive justice. However, as will be discussed in Section 3.2 under mobility benefits and burdens, the distribution of "emission rights" can be entirely assigned to the transport sector when being treated as a finite mobility resource.

The introduction of motorised travel has rendered transport from an almost universal ability to access daily destinations by foot to "shaping people's life opportunities" (Martens 2016, p.54). It is today an asset, commodity or even a form of capital (Kaufmann, Bergman et al. 2004). Furthermore, transport poverty or the absence of this asset then forces the adoption of an accessibility lens. In turn, the distribution of accessibility in most societies today can be considered highly unequal. Martens' perspective (2016) not only offers a rationale for considering transport as a separate sphere of justice but a robust argument that it would have to be defined as accessibility sphere which would have to include other policy sectors, above all land use planning. He also offers one additional argument why accessibility could be considered a good with distinct social meaning: It is a good which is jointly produced by all members of society through their spatial concentration. This form of social cooperation establishes the basis for claiming fair shares of the advantages which accessibility produces for individuals.

Finally, what makes the transport sector particularly interesting as a unit of analysis for the sufficiency approach taken by the MyFairShare project is the fact that unlike education, health and housing it is a sector which has not engaged much with the definition of minimum standards or floors of consumption. Banister (2018) concludes that there is considerable agreement that by enhancing accessibility, transport has a considerable potential to reduce inequality. However, he does not see much evidence in his country, the UK, regarding judgements about appropriate levels of transport and suggests that related moral questions are mostly absent from policy debates.

2 Fairness in mobility and accessibility

Having established the rational for operating within a separate justice domain for accessibility, this section initially gets back to the project priorities of MyFairShare to then clarify important terminology and the most relevant social justice models. This section also underscores that distributional questions in any sector or domain are among the most fundamental ones of public policy and that a mobility and accessibility lens is only a small representation of this universal subject. Intriguingly, from a transport policy perspective, Banister (2018) observes that mainstream economics has only recently rediscovered questions of distribution as a core concern.

2.1 MyFairShare priorities

The point of departure of the MyFairShare project is a recognition that the required behaviour change in the transport sector to reduce carbon emissions in line with a safe climate has so far not materialised. It also recognises that overall emission reduction targets at the national level are too abstract for appreciating a sense of personal responsibility and agency. Employing the concept of carbon allowances translated to the transport sector as mobility budgets, the project targets the development of policy tool kits and guidelines to support the introduction of socially acceptable mobility budgets.

By focusing on social acceptance, the central concern of introducing mobility budgets shifts from technocratic considerations of implementing allowances to the consideration of a fair distribution of these budgets. Building on the mobility budgeting approach of the Mobalance project (Millonig, Rudloff et al. 2022) illustrated in Figure 3, MyFairShare takes particular interest in its second point on

how particular socio-spatial situations of certain groups will have to be considered when applying a fairness lens.

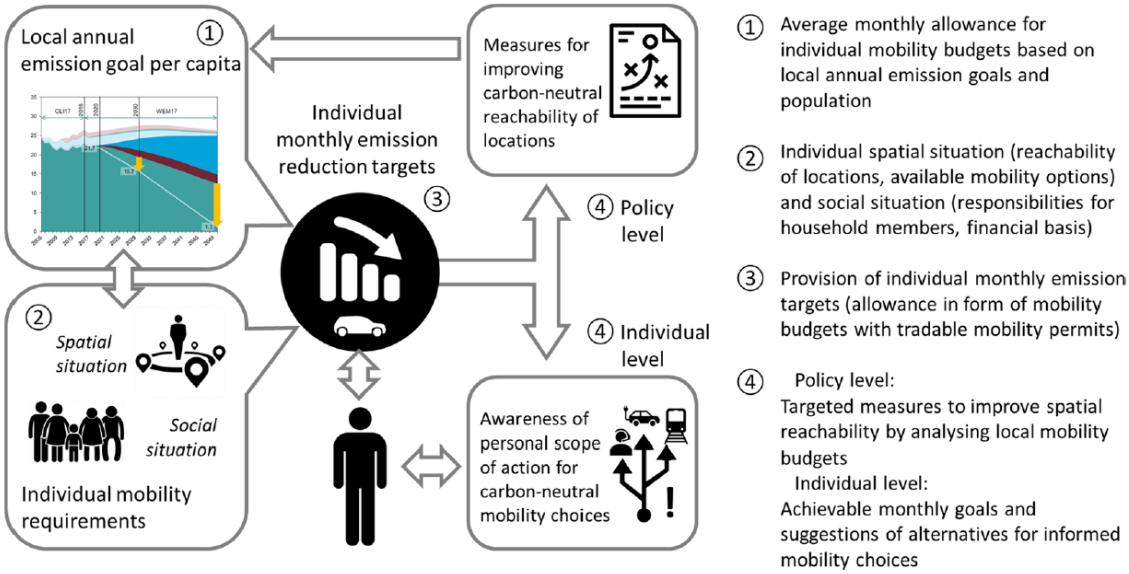

Figure 3: The Mobility Budget of the Mobalance Project
Source: Millonig et al. 2022

An initial prioritisation exercise by all MyFairShare consortium partners revealed the relevance of different fairness concepts and notions for the project (Table 1 documents the 10 most relevant). The points listed are not mutually exclusive and allow for a first clear emphasis of the following aspects: basic mobility needs, fair burden sharing of emission reduction, class and income considerations, and occupational travel requirements.

Table 1: Concepts and notions of fairness to be considered as part of the MyFairShare.
Source: Results from CoDigital Survey, July 2021.

1. Needs-based fairness: can people still do all the things they need to do?
2. Constraints to fair access: income, education, physical ability, place of residence, gender (eg, safety), class (eg, flexibility of commuting times), race (eg, feeling welcome/safe), family/care commitments, individuals' overall carbon footprints.
3. Fair burden sharing across income groups of reducing carbon emissions in the transport sector
4. Total individual consumption (or pollution, carbon footprint ...) mediated by choice (ie, how much of that consumption was by the individual's own choice?).
5. Fair exposure to traffic risks and pollutants; fair distribution of space; and fair valuation of transport time
6. Social fairness: the extent to which allocation is proportionate to need (needs-based equity)
7. Horizontal fairness: the extent to which individuals across classes (eg, income, gender, ability, race) are treated similarly
8. Equal opportunity to access amenities, services, experiences. This requires making sure that access of individuals isn't being hindered by any physical, psychological or socioeconomic conditions (ie, may require privileging certain groups of people)
9. A fair distribution of car mobility budgets considering a need to travel with luggage/equipment as part of the job
10. Equality in accessibility outcomes which may require positive discrimination

2.2 Terminology and definitions

This subsection first presents a simple differentiation between transport, mobility and accessibility which demarcate the domain of justice on which MyFairShare is focusing. It then provides a basic

definition of justice and related terms such as fairness, equity and equality. The last part introduces prominent concepts of justice and relates these to the transport and accessibility domain.

Figure 4 provides a helpful overview of a transport policy progression from traffic to mobility and accessibility which acknowledges the difference between transport-related terminologies which are often used interchangeably: traffic (focus on level of service of roads and vehicle speeds), mobility (focus on multi-modal, door-to-door movement), connectivity (focus on ease of exchange between fixed locations) and accessibility (focus on travel costs and time to reach destinations) (Venter 2016). Transport cuts across the first two views of traffic and mobility and is defines as "the movement of people or goods from one place to another". Accessibility is commonly defined as the "potential to interact with destinations (incorporating proximity and mobility)" or "the ability to reach destinations as an interaction of mobility and proximity" (Levine 2020).

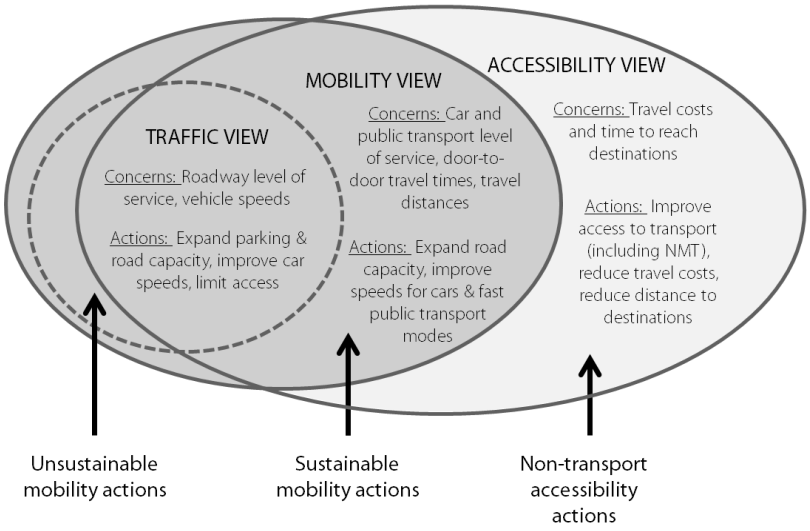

Figure 4: The transport policy progression towards accessibility
Source: Venter based on Litman 2017

Moving to a general definition of justice and related terminologies, it is helpful to first consider the concept of **equality**. Unlike all other terms covered in Table 2, equality can be a numerical and positivist concept which requires that all members of society to have access to the same share of benefits and to be exposed to the same level of burdens. Beyond formal equality, the concept of equality can also be considered to cover more normative aspects such as equal rights and opportunities. Political philosophy stresses that formal equality may not be inherently fair (Rawls 2005) and differential treatment of people can be a requirement of fairness (Dworkin 1981).

By contrast, **equity** implies a moral judgement. Pereira et al. (2017) identify four different aspects of equity: a demand for impartiality (Sen 2009), proportionality between reward and effort (Schweitzer and Valenzuela 2004), treating people according to their differences (Rawls 2005) and considering particular circumstances in ethical judgements (Barry 2010). For the application of equity within the field of transport, Lewis et al. (2021) conclude that it "has essentially created a normative space that many positively trained researchers and practitioners rushed to fill, often implicitly" (p.2).

Fairness and **justice** are directly related to equity and many scholars use the three concepts interchangeably while acknowledging that references to justice do not operate with a single definition (Pereira, Schwanen et al. 2017). It is broadly acknowledged that justice may be the broadest of these concepts which also entails a legal and rights dimension. In political philosophy, the term justice tends to also be used more commonly than fairness (Kymlicka 2002). As part of a taxonomy of fairness and justice introduced in Section 3, four different components are differentiated: procedural, absolute, distributive and substantive fairness. Pereira et al. (2017) note that fairness may not only require

treating people differently but also limiting of individual liberties. When considering justice in the realm of transport, fundamental questions of freedom are translated to the specific right to freedom of movement (Banister 2018). For the latter, the UK's Sustainable Development Commission (SDC 2011) suggests that this "must be exercised without unduly compromising the rights of others to live free from the negative impacts that travel imposes" (p.7).

Table 2: Basic definitions of justice and related dimensions
Source: Author based on multiple sources

Equality	Equity	Fairness	Justice
• the same share of benefits and burdens • the state of being equal, especially in status, rights, or opportunities • the right of different groups of people to have a similar social position and receive the same treatment • everyone is treated in the same way	• the quality of being fair and impartial. the situation in which everyone is treated fairly and equally	• the quality of treating people equally or in a way that is right or reasonable • impartial and just treatment or behaviour without favouritism or discrimination • a special kind of being proportionate	• just behaviour or treatment • fairness in the way people are dealt with • a moral concept and an ethical/normative obligation • morally proper state of affairs • legal (proper administration of law) vs social justice (moral acceptability)

Given the considerable degree to which the MyFairShare project focuses on urban transport, three specific justice lenses need to be highlighted. First, the notion of **urban justice** as presented by Fainstein (2014) and which evolved through the field of urban studies. She identifies three main approaches to urban justice: First, communicative rationality, which links to deliberative democracy by emphasizing the importance of interaction between people as part of non-hierarchical decision making about preferences and resource distribution. Second, the recognition of diversity, which needs to consider group identification beyond material inequality and implies social mixing and porous borders in cities. Third, the just city/spatial justice approach directly considers geography as "a significant causal force in explaining social relations and societal development" (Soja 2010, p.63).

Second, while urban justice also has made direct links to equity in transport policy by suggesting that reduced public transport fares in cities is a fundamental part of spatial justice, Gössling (2016) argues that just city frameworks need to better incorporate effects of transport systems. The more specific and emerging lens of **transport justice** considers the mitigation of local disparities in transport accessibility (Lucas 2006); the inequality in accessibility that cuts across transport service availability, affordability and a range of individual constraints (Banister 2018); or specific social groups that are being excluded from transport (Martens 2012). Third, once again getting closer to urban justice, Lewis et al. (2021) note that proponents of **mobility justice** aim to broaden the focus beyond transport. According to Sheller (2018) mobility justice is concerned with "how power and inequality inform the governance and control of movement, shaping the patterns of unequal mobility and immobility in the circulation of people, resources, and information" (p.30f).

2.3 Social Justice: key political models

As shown above, the interest in fairness considerations as part of transport policy and research has increased considerably over recent years. At the same time, there have been concerns that the application of a justice lens in transport has been incoherent. Lewis et al. (2021) stress that too often

transport research has been operating with imprecise definitions of justice. They are particularly critical of positive distributional analysis operating under the umbrella of "equity" or "justice". Following their critique, an important point of departure for any equity analysis is an explicit value judgement based on a normative perspective. They further stress that concepts of equity are based on normative spaces for discussion rather than able to rely on a single equity perspective.

The political, social justice models below are particular helpful for the positioning of a normative fairness perspective that may underpin the MyFairShare project. Of the broader spectrum of social justice approaches presented, the social-liberal justice ideals of Mill, Rawls, Dworkin and Sen are most relevant. This section briefly presents the case of Rawls' egalitarianism and the capabilities approach (Sen and Nussbaum) and how these social justice models relate to the domain of transport. In addition, the overview presents environmental and sustainability justice as an expansion of the justice models of a "here and now". This perspective is relevant for incorporating a climate change lens and establishes the justice baseline for carbon as well as mobility budgeting.

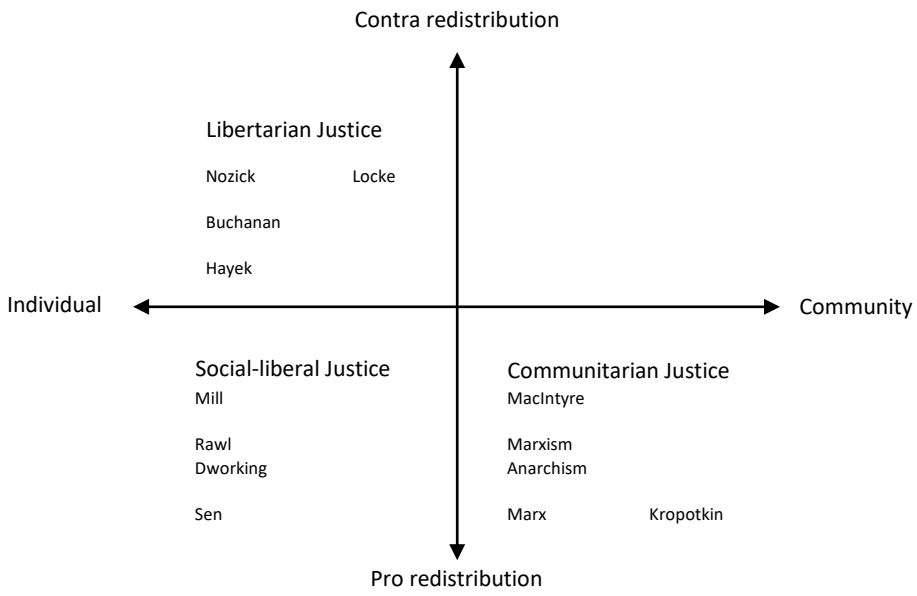

Figure 5: Axes of Social Justice
Source: Merkel 2009

To begin with it is also helpful to succinctly highlight the main tenets of liberalism to illustrate a much broader social justice spectrum that could be considered (but will not be employed) and to enable a better contrasting with social-liberal ideals more directly relevant for MyFairShare.

Libertarianism

The libertarian tradition of justice acknowledges equally shared fundamental rights and individual freedoms to choose whatever a person wants as long as it does not violate the rights of others (van der Vossen 2019). Libertarianism is particularly critical of any interference by the state or other actors while considering free markets as inherently just and the prime mechanism for advancing justice (Kymlicka 2002). The fundamental criticism of libertarianism is that an individual's achievements and preferences are not only a result of their individual choices but a range of contextual factors including natural and social pre-condition (Kymlicka 2002). Furthermore, power imbalances between different social actors do not allow markets to address potentially conflicting freedoms in a fair manner.

A particularly important limitation of adopting a libertarian approach to justice for the transport sector is the risk of market failures in the context of second-order effects and externalities of an individual's action (Pereira, Schwanen et al. 2017). The transport sector is a prime example of where the freedom of individuals to independently choose mobility has resulted in externalities, above all social and

environmental costs, which severely limit the freedoms of others (disadvantaged groups and future generations). Banister (2018) notes that this cannot be considered either as fair (and also not sustainable).

Rawls' Egalitarianism

A particularly prominent social justice perspective adopted by transport scholars is Rawls' egalitarianism (Martens 2016, Lewis, MacKenzie et al. 2021). This is hardly surprising as John Rawls' *A Theory of Justice* (2005) is widely considered a cornerstone of contemporary political philosophy. His theory evolves around defining a fair distribution of primary social goods for which two sequential principles are proposed: First, the principle of greatest equal liberty which holds that basic rights need to apply equally to everyone and should be maximised as long as they do not compromise the freedom of others. Second, social and economic inequalities can only be acceptable if they are at the same time (a) a result of a fair equality of opportunity and (b) they benefit the most disadvantaged members of society which is referred to as the difference principle (Rawls 2005).

Rawls' original list of five primary social goods has been repeatedly tested regarding the possibility of accommodating transport or accessibility related goods (Martens 2016). The five initial social goods are (1) basic rights and liberties, (2) freedom of movement and free choice of occupation, (3) powers and prerogatives of office and positions of responsibility, (4) income and wealth and (5) the social bases of self-respect (Rawls 2005). One perspective of considering transport as part of these social goods is to consider transport as part of freedom of movement and to understand when this freedom violates the freedom of others (Banister 2018). Alternatively, it has been proposed to treat accessibility as an additional primary good for which the difference principle would have to be applied (Van Wee and Geurs 2011, Martens 2016, Pereira, Schwanen et al. 2017). However, Martens (2016) warns that this approach is confronted with the problem of interpersonal comparison and (paternalistic) value judgements as different primary goods would have to be weighed against each other.

In an applied research and policy context, Rawls' egalitarianism is commonly interpreted as a fairness rationale for interventions benefiting the most vulnerable and disadvantages. In transport policy, most commonly, children, the elderly and disabled people are singled out. When introducing accessibility as primary social good, unequal impacts of policy interventions such as transport infrastructure, land use regulation and transport service provision can then only be justified if they improve access for the most disadvantaged. The Rawlsian justice perspective also has highlighted the importance of minimum levels of primary goods to cater for basic needs for which governments would be responsible – above these minimum levels allocation may be the role of regulated markets (Pereira, Schwanen et al. 2017). Based on their assessment of how fairness principles can be accommodated in the transport sector, Lewis et al. (2021) warn that a common, simple adoption of egalitarianism leads to many imprecisions and should be avoided.

Capability Approach

Developed by Amarta Sen and Martha Nussbaum, the capability approach builds on Rawls' difference principle and argues for a shift in focus from primary goods to human capabilities (Robeyns 2021). These capabilities are defined as the "activities we are able to undertake ('doings') and the kinds of persons we are able to be ('beings')" (Robeyns 2021, s2.1). A shift towards capabilities implies moving away from a focus on means such as resources and goods to the ends of what people can do or become. In other words, it is not so much a primary good that matters but a person's capacity to convert resources into a meaningful outcome. This shift acknowledges individual choices and agency as protection against paternalism and cultural imposition as well as broader abilities that may determine ends. Sen's capabilities also go beyond differentiating just and unjust by adding a comparative perspective between different societal states and their relative level of justice (Sen 1999, Robeyns 2021).

A particular advantage of the capabilities approach for the context of the transport and mobility policy is that, unlike broader approaches such as egalitarianism, it can be more easily applied to specific sectors (Lewis, MacKenzie et al. 2021). Pereira et al. (2017) argue that accessibility rather than mobility should be positioned as a capability. Furthermore, critical for adopting a capability approach for the transport sector is Sen's prioritisation of securing basic capability equality through committing to context and culture specific minimum levels. Based on this, Banister (2018) suggests that minimum levels of access to essential destinations would need to be set but warns that this may be problematic. Pereira et al. (2017) note that the identification of minimum accessibility thresholds remains unresolved. They also identify a second challenges linked to accessibility being a capability combining personal abilities with complex transport system-land use interactions. This would require bringing together a transport studies' understanding and measurement of accessibility linked to location and the capability approach's concern about freedoms of individuals.

Environmental and Sustainability Justice

This overview would be incomplete without a reference to environmentalism and sustainability which expands the notion of justice beyond current members of a society and their main political space. Environmental justice is a well-established concept with a strong social movement connotation and a particular concern for environmental harms affecting disadvantaged and marginalised communities (Sze and London 2008). From a political science view, the justice in environmental justice has been referred to as the "equity in the distribution of environmental risk, recognition of the diversity of the participants and experiences in affected communities, and participation in the political processes which create and manage environmental policy" (Schlosberg 2004, p.517).

By contrast, sustainability justice is an evolving justice lens and requires further explanation. First, sustainability is itself already a more integrative concept combining concerns of environmental degradation and the depletion of natural capital with those of human poverty and prosperity. It therefore includes both mutually reinforcing concerns as well as trade-offs (Waas, Hugé et al. 2011). Second, sustainability expands the unit of analysis and intervention from the common political space of a society (e.g. nation state) to that of a global society. The resulting intra-generational justice claims can build on international and environmental justice approaches (Schlosberg 2004, p.517, Blake and Smith 2021). Third, and most importantly, sustainability justice combines claims across three different relations, the relations between contemporary members of global society, with future generations and with nature (Stumpf, Baumgärtner et al. 2015).

Stumpf et al. (2015) directly attach the definition of sustainability justice to the claims in the three sustainability relations. They emphasise that these relations are highly asymmetrical as different members of current global society have different means and powers, contemporary generations can impact on futures but not vice versa, and humans impact nature in distinctively different ways compared to nature impacting humans. The three sustainability relations also create the most distinct difference with traditional political philosophy which have been described as the ethics of the "here and now" (Jonas 1985, p.5).

In turn, it is only when falling back to the "here and now" ethics that sustainability can be considered as blind to social injustices or that negative consequences of green policy on social equity are being referred to. However, traditional ethics frameworks remain a more prominent reference point. As result, in the context of transport, Gössling emphasizes "that the sustainable mobility paradigm would benefit from justice theory perspectives." (Gössling 2016, p.7). Randal et al. (2020) note that "policies and actions to decarbonise the transport system are urgently needed, but their equity effects are also important." (p.1). Unsurprisingly, most work of integrating ethical perspectives in the transport context is not operating with environmental or sustainability justice. In a study of more than a dozen transport study publications, only one incorporated some environmental aspects (Lewis, MacKenzie et al. 2021). Less common also are an exploration of environmental justice implications for the transport from a legal (Bullard 2003) or carbon emission perspective (SDC 2011, Karner and Marcantonio 2018).

A tangible implication for any justice claims following the sustainability perspective is the recognition of finitude and relatively clearly defined limits of the natural world (Hayward 2001). Stumpf et al. (2015) suggest that considering a finite world justifies a prioritisation of justice claims and refer to the Brundtland report "overriding priority" (p.37) of the needs of the world's poor (Brundtland and Khalid 1987). Alongside, the principle of sufficiency with a definition of "what is enough" has been associated with sustainability justice (Stumpf, Baumgärtner et al. 2015). In the context of transport and a fair allocation of finite street space, Creutzig et al. (2020) refer to global environmental efficacy which considers the two global problems of climate and land use change. Low GHG emissions and efficient space use (avoiding urban sprawl) become the specific ethical interpretation of sustainability in the transport and land use space. Here the link to wider public goods (via environmental and natural capital) from the local to planetary scale is introduced. But sustainability also dictates that environmental damage needs to be balanced against other social allocation approaches and ethical concerns – some of these have recently been considered under the broader well-being framework.

3 Towards a conceptual framework

This section introduces the propositional part of this paper and with it a general framework for considering a fair distribution of transport benefits and burdens in the context of the MyFairShare project. To begin, four key warnings by Lewis et al. (2021) for employing equity norms to transport research and practice serve as a helpful reminder:

- Researchers should employ scepticism when employing ethical theories based on ahistorical assumptions to the transport sector (such as Rawls)
- Researchers should recognise that equity involves both positive analysis and normative value judgements
- Equity criteria and associated assumptions should be explicitly stated
- Theories and categories should be defined with precision.

Above all, it is of critical importance to clarify in which domain of justice MyFairShare is operating. Based on the project proposal, Figure 6 is an illustration of the boundaries and connections which the project aims to establish. While making strong reference to the transport sector, the project is centrally attached to mobility: "MyFairShare builds on studies exploring the applicability of sufficiency principles to change mobility habits, eg, through individual mobility budgets" (p.2). This implies a focus on passenger transport and a just treatment and behaviour as part of it. However, as argued in Section 1.4 based on Martens (2016), it is really the accessibility domain that can be positioned as a coherent justice domain. Settling on an accessibility domain for MyFairShare also aligns the project with its broader research umbrella of the JPI Urban Europe "Urban Accessibility and Connectivity" programme.

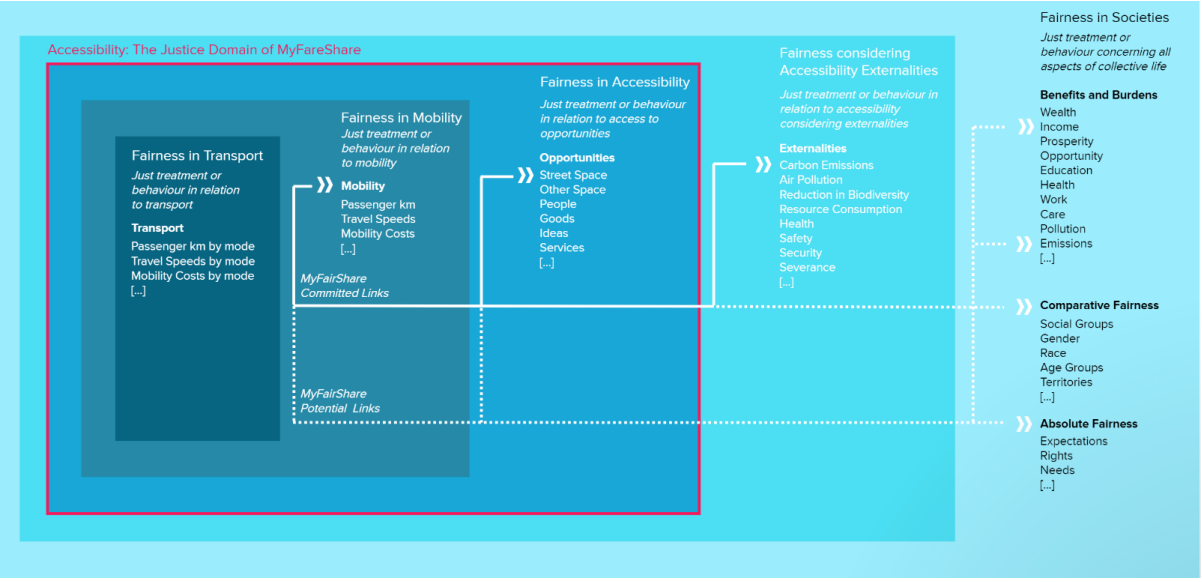

Figure 6: MyFairShare Justice Domain, Boundaries and Connections
Source: Author

MyFairShare connects fairness in mobility with opportunities and externalities of mobility-induced accessibility. In other words, the main accessibility inputs under consideration are transport resources rather than land use changes. Negative externalities which occur in other justice domains, particularly related to the environment and planetary health are not directly considered as part of fair burden sharing (ie, a fair distribution of climate change risks) but instead are translated to the limited availability of transport resources expressed as mobility budgets. Indirectly, as discussed below, MyFairShare also considers high level effects on fairness in societies as indicated on the very right of Figure 6.

The broader ethical principles introduced above already establish implications for fairness in any given domain of justice. Here, we take these implications one step further and introduce more specific and applied components of fairness based on the below taxonomy of fairness in mobility (Figure 7). This taxonomy differentiates four main aspects of fairness: (1) procedural, (2) absolute, (3) distributional and (4) substantive fairness. These aspects were established based on a review of relevant literature (Hay 1995, Gössling 2016, Banister 2018, Lewis, MacKenzie et al. 2021) and then tested for MyFairShare suitability as part of a workshop in July 2021.

Procedural fairness involves the "proper adherence to the rules" of a decision-making situation. This requires consistency over time and space (Hay 1995). It may be linked to democratic practices such as deliberation and wide participation as implied by the capabilities approach (Sen 2009) or citizenship theory (Kymlicka 2002). Other subcomponents include subjective fairness and normative benchmarks.

Absolute fairness is established independently from a comparative perspective and can be judged at the level of individual experiences. Besides minimum standards and basic needs, this also includes the idea of the fulfilment of legitimate expectations. This form of fairness recognises how people make decisions and that these are based on reasonable expectations of what may happen in the future. Sudden and arbitrary changes of the conditions impacting on expectations by individuals can thus be seen as unjust (Campbell 1973). At the same time, fair consequences of decisions such as trade-offs between personal living space and accessibility are equally part of fair expectations.

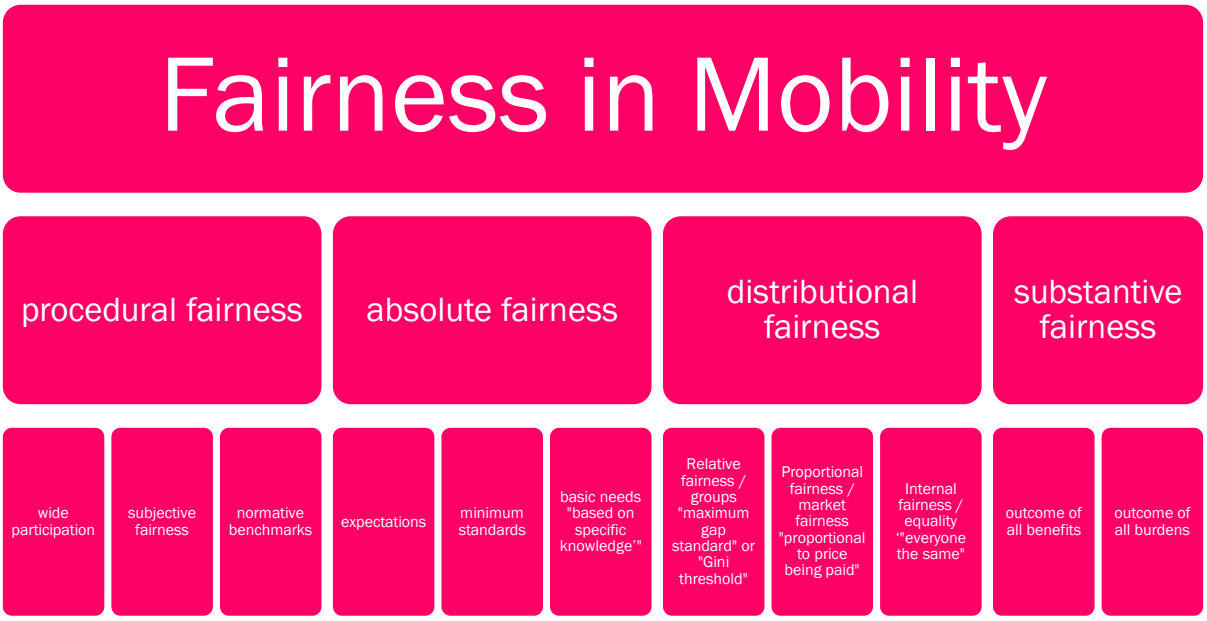

Figure 7: Basic Taxonomy of Fairness in Mobility
Source: Author

Distributional fairness embraces a comparative lens and can range from full equality "everyone the same" to proportional fairness considering efforts or "price being paid". The middle ground between these two is relative fairness which considers a maximum gap between the most advantaged and disadvantaged group or alternatively a threshold level of a Gini distribution.

Substantive fairness considers the aggregate of all benefits and burdens and may accept shortcomings in procedural fairness and distributional fairness in specific domains of justice (Hay 1995). Thus, substantive fairness is no longer concerned specifically with justice within the transport, mobility and even accessibility context but rather with the combination of all possible domains and their outcomes.

Assuming an absolute or distributive fairness perspective, what follows below is the documentation of the MyFairShare conceptual framework for fairness in the accessibility domain based on the specific application of mobility budgeting. The overall approach follows Martens et al. (2019) and operates with three key components: (1) the definition of benefits and burdens, (2) the social characteristics to be differentiated and (3) the allocation principle (Figure 8).

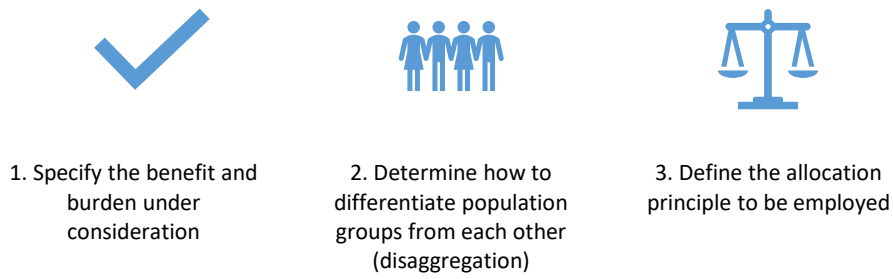

Figure 8: The key components of accessing fairness
Source: based on Martens et al. (2019)

3.1 Benefits and burdens

Following Martens et al. (2019), a first fundamental component for measuring and actioning fairness in transport and mobility is the detailing of benefits and burdens. Alongside these, an early

understanding of the key metrics and indicators is helpful. The overview below separates mobility benefits and burdens.

Mobility benefits

Transport and mobility are usually characterized as means to an end. Following this framing, accessibility, ie, the opportunity to research destinations in space, is the primary end and thus the purpose of mobility. At the same time, increasing attention is paid to other non-accessibility benefits of mobility which are more linked to the intrinsic nature of travel. Pleasure and status are common components of the latter (Niblett and Beuret 2021b). The broader mobility benefits are illustrated in Figure 9 below which are all generated via the provision of mobility resources such as transport infrastructure and services. It is important to note that the three mobility benefits of accessibility, pleasure and status are co-produced with non-mobility resources. In the case of accessibility this includes location/land use, digital connectivity and freight transport for accessibility.

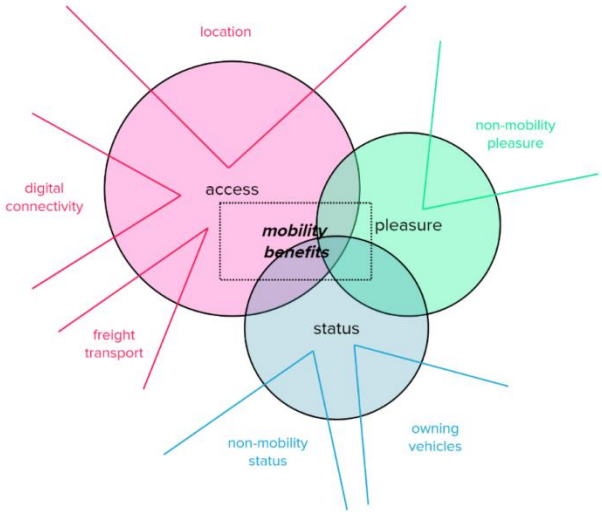

Figure 9: Mobility benefits: co-producing accessibility, pleasure and status
Source: Author

In his conceptualization of "urban transport justice" Gössling (2016) refers to two out of three dimensions of injustices which are directly connected to mobility benefits: the distribution of space and the valuation of transport time. For the purpose of MyFairShare, an exclusive focus on accessibility related mobility benefits is utilised.

Table 3 provides an exemplary overview based on a simple logic model how more specific mobility resources (provided by the state, market or individuals) translate to movement outputs and in turn to accessibility outcomes. Extremely simplified, these then generate desired overall welfare benefits. The table also includes suggested metrics for each of the key components.

It is important to note that hydrocarbon fuels are part of mobility resources that enable movement. While these produce considerable negative externalities which underpin the logic of mobility budgets investigated by MyFairShare, in the first instance, these fuels are mobility benefits (which have to be reduced and eventually phased out). The same is the case with the provision of road space which is initially another mobility resource and only due to secondary effects a mobility burden.

Table 3: Basic Logic Model for selected mobility benefits focusing on accessibility
Source: Author

Input: Mobility Resources	Outputs: Movement	Outcome: Accessibility	Impact: Welfare
• Public transport (level of service within walking distance) • Vehicle ownership (number of cars/bikes per household) • Hydrocarbon fuels (litres) • Road space	• Travel distances and modes (distances per day/week and transport mode) • Costs of travel (travel costs per km)	• Access to jobs (number of jobs within 30 min and travel cost x) • Number of services within 30 min and travel cost x	• Life satisfaction (self-reported satisfaction) • Happiness (self-reported happiness)

Mobility burdens

From an urban transport justice lens, Gössling (2016) identified the exposure to traffic risks and pollutants as the central burdens. Going beyond these, MyFairShare considers carbon emissions and space consumption as the central mobility burdens (Table 4). These are particularly complex burdens as they are not only deeply engrained as part of the mobility benefits above but also because the fair allocation of these burdens has considerable limitations. This becomes clearer when contrasting carbon emissions and space consumption with other mobility externalities such as air pollution or noise.

Air pollution and noise are tangible burdens with local impacts that can be detected and differentiated easily. This then allows for considering whether those generating mobility burdens are also those suffering from the same (eg, drivers living on main roads). This is not the case with carbon emissions which only impact in aggregate terms through their complex global effects on a changing climate. In the case of space consumption, the mobility benefit of having a certain amount of private space for travelling through the city is also directly connected to the burden and opportunity costs of taking this space away from others. In the latter case, if burdens would be eliminated, they would also eliminate the mobility benefits, which is not the case for carbon emissions, air and noise pollution.

Table 4: Basic Logic Model for selected mobility burdens
Source: Author

Input: Mobility Behaviour	Outputs: Direct Burdens	Outcome: Indirect Burdens	Impact: Risk to Sustainability
• Carbon intense travel • Space intense travel	• Global warming • Opportunity costs for alternative space use • Risk of accidents	• Global warming effects • Reduction in quality of urban environments • Reduction in road safety	• Impact on future generations • Impact on global society • Reduction in broader welfare

Furthermore, carbon emissions as burdens, following Martens (2016), also may have to be assigned to a different distributive sphere than that of accessibility (see Section 1.4). As a helpful simplification for MyFairShare, carbon emissions and the justice linked to their generation and impact distribution are considered only indirectly. The globally agreed caps, nationally determined contributions to

emission reduction and city-level climate reduction plans are translated to mobility budgets expressed in kilometers per transport mode and introduced as ceilings into the sphere of accessibility. There they become part of mobility resources that then must be fairly distributed within that sphere (see mobility benefit section above).

3.2 Social characteristics

To continue following Martens et al. (2019), a second fundamental component of operationalising equity analysis of policy in the transport sector involves the disaggregation of population groups. This in turn then enables a differentiated understanding or treatment of these groups in accordance with the allocation principles which will be discussed further below.

A helpful approach to identifying different groups is to initially consider subgroups of society that are more likely to experience transport and mobility disadvantages (Table 5). In addition, the table summarises the relevance of these differentiation criteria for MyFairShare and its Living Labs. This analysis was conducted during a workshop in July 2021. A helpful and more focused overview on individuals with mobility impairment has been presented by Sammer et al. (2012).

Table 5: From disadvantaged groups to differentiation criteria (transport equity)
Source: based on MyFairShare Workshop, July 2021

Disadvantaged groups	Differentiation criteria	MyFairShare Relevance
Remote residential locations with little public transport access	Home location and public transport access	5
Young and old	Age	5
Poor populations	Income and wealth	4
No access to car, no drivers' licence	Level of car access or dependency	3
Disabled people	Physical and mental impairment	2
Women	Gender	2
Occupation groups, families, groups afraid of cycling	Other	2
Ethnic minorities	Ethnicity	1

3.3 Allocation principle

The final component following Martens et al. (2019) approach to operationalising equity analysis and policy in the transport sector revisits the earlier discussion on ethical principles and establishes more specific allocation principles which will have to be considered. Most build directly on Rawls' egalitarianism and the capabilities approach rather than sustainability justice.

The overview below differentiates allocation principles that target an end state of how mobility benefits and burdens are distributed and principles that are intervention oriented (Figure 10). The latter helps to get closer to a desirable end state of a desirable contribution but primarily considers the extent to which an intervention achieves changing the status quo (Martens, Bastiaanssen et al. 2019).

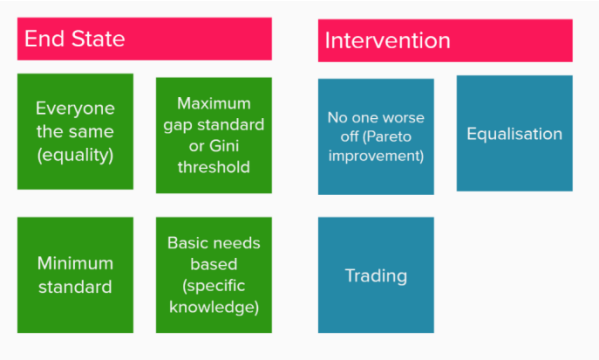

Figure 10: Allocation principle by end-state and intervention focus
Source: based on Martens et al. 2019

End-state-oriented allocation

Formal equality

Formal or numerical equality implies that every group or individual has access to the same share of mobility benefits and is exposed to the same level of mobility burdens (Lewis, MacKenzie et al. 2021). It is important to note that the approach of "everyone the same" may well contradict adjusting for fairness in cases where populations are distributed across territories with different spatial characteristics (Martens, Bastiaanssen et al. 2019). Formal equality have been discussed in the context of transport equity by Fol et al. (Fol and Gallez 2014) and Litman (2017). It has limited utility for the MyFairShare context.

Proportional equality

By contrast, proportional equality takes into consideration whether or not certain individuals or groups deserve a different share of mobility benefits or burdens (Lewis, MacKenzie et al. 2021). A slightly different interpretation of proportional equality is offered by Martens et al. (2019). They consider proportionality more in relation to taking account of statistical effects that may prevent formal equality.

Maximum gap standard

This standard accepts considerable inequality in the distribution of benefits and burdens if the range between the most and least benefitting group does not exceed a certain maximum gap. The maximum gap can build on a comparison between the top 10 percent of profiteers and the bottom 10 percent and then define a maximum ratio between the benefits for each group. Alternatively, maximum gap standards can operate with a maximum for the Gini Coefficient which takes into account the distribution curve (Banister 2018). A more specific application of the maximum gap standard is Martens' (2012) definition of a MaxiMax criterion for allocating accessibility levels. This composite approach combines a limit between the worst-off and best-off with a goal of maximising the average accessibility level.

Minimum standard

Beyond distributional questions, minimum standards are concerned only with mobility benefit thresholds at the bottom of a distribution as in the case of identifying a minimum level of accessibility. For mobility burdens these standards translate to maximum exposure levels that are acceptable for any group or individual. Martens (2012) specifically considers the establishment of a minimum floor for accessibility while aiming to maximise average accessibility levels as a direct implication for transport policy. Explorations of minimum transport access utilise basic destination access including daily shopping, educational and medical services (Delbosc and Currie 2011, Van Wee and Geurs 2011). However, Pereira et al. (2017) emphasise that defining minimum accessibility thresholds remain a considerable challenge and that they imply using paternalistic assumptions risking to overlook diverse needs and preferences. An extension of minimum standards as allocation principle of particular relevance to MyFairShare is sufficientarianism. It adds to the minimum threshold that

additional benefits of groups already above this threshold are irrelevant (Casal 2007). This perspective builds a potential bridge to sustainability justice as detailed above potentially allowing to identify excessive mobility compromising the three additional justice angles of global society, future generations and nature.

MiniMax approach

The MiniMax approach is a combined method of minimum standards and capping accessibility if negatively impacting on the least well-off group. In Pereira et al.'s (2017) words: (1) "setting minimum standards of accessibility to key destinations, which should be guaranteed by the government through social or transport policies if necessary", and (2) "limiting highest levels of accessibility of social groups and transport modes only in those circumstances when a marginal improvement of accessibility at the upper levels would harm those groups at the bottom" (p.184). Banister suggests that this composite approach can be embedded within an "accessibility plus framework".

Principle of Need

A context specific approach to a minimum standard which considers group specific characteristics is based on needs. Banister (2018) refers to thresholds levels of accessibility which can be determined by experts based on group and location specific needs. This in turn requires specific knowledge on the situations of groups and individuals. At the same time, Martens (2012) questions the degree to which needs can be differentiated from wants and how basic needs (e.g. food and health related) can be translated to transport policy. Needs based approaches also may have unclear implications in a situation where minimum accessibility levels are not achieved.

Intervention-oriented allocation

Intervention-oriented allocation principles consider the effect of policy on justice outcomes rather than only considering end-states. In his book *Transport Justice*, Martens (2016) concludes that three domains of the accessibility spectrum will have to be considered as part of a fair allocation of mobility resources: First the domain of clearly insufficient accessibility; second, the domain of clearly sufficient accessibility; and third, the domain of disagreement. Following Sen (2002) he stresses that the latter domain may have to be subjected to democratic deliberation on sufficiency.

Martens also concludes that the domain of insufficient accessibility is the actual domain of justice for which corrective measures of the collective (ie, the state) can be justified. By contrast, the domain of sufficient accessibility may be subject to free exchange (ie, market-based distribution).

Pareto improvement (no one worse off)

The criteria for a beneficial intervention under a Pareto improvement perspective is that it improves the condition of at least one person without reducing conditions for anyone else. While Pareto improvements can indeed advance a situation to any of the end states discussed above, there is also a possibility that it further increases disparities when the benefit is assigned to already well-off individuals even though the situation is not getting worse for anyone.

Equalisation

According to Martens et al. (2019), two interpretations of equalisation are possible. The first requires the situation to move towards the ideal of equality as defined above, the second suggests that interventions simply reduce existing disparities. This second interpretation acknowledges that formal equality may not be a fair distribution to begin with and also that full agreement on a fairness ideal is difficult. Martens et al. (2019) stress that this form of equalisation works well for a broad range of transport-related benefits and burdens. It also allows judgement of policy interventions in a comparative way with regards to justice improvements. At the same time, there is a risk that equalisation remains unambitious and has only marginal impact on status quo distribution.

Market-based allocation

The focus of MyFairShare on mobility budgets informed by pre-established ceilings for carbon emissions creates a direct link to the allocation approach via tradeable emission allowances and the broader notion of cap-and-trade. This has already been considered in the context of mobility budgets by Millonig et al. (2022) suggesting that "a limited contingent of tradable certificates" (p.8) may be desirable based on a consensus conference conducted for the case of Austria. Following Martens (2016), the trading of mobility budgets may be entirely appropriate for the domain of sufficient accessibility.

Without getting into too much detail here, this allocation approach and its fairness implications can be informed by related debates on international carbon trading policies. For example, Caney and Hepburn (2011) acknowledge that market-based allocation more generally is unlikely to increase distributive justice. They note that market systems either sustain or further exacerbate wealth differences and tend to lead to highly unequal outcomes while generating aggregate wealth and promoting liberty. But they also stress that equity outcomes will be a function of the design of emission trading and highlight two critical factors: "first, the impact of increasing the cost of emitting pollution on different segments of the population and second, the transfers of wealth involved in the sale or free allocation of emissions allowances" (p.223f).

Policy Instruments

To conclude this section, it is important to consider how the above allocation principles can be facilitated by different transport policy instruments while employing the principle logic of mobility budgets. Figure 11 below introduces a basic taxonomy of sustainable transport policy interventions by Rode, Heeckt and da Cruz (2019). This overview presents both policy instruments and governance reforms and as part of this overview also indicates which specific instruments and reforms are most suitable for the implementation of mobility budgets. This is also discussed in greater detail in a separate MyFairShare working document.

It is important to note that mobility budgets are broadly associated with the two domains of regulatory and economic based instruments. Mobility budgets are purely regulatory instruments if they imply an upper limit of individual mobility (and/or those which generate carbon emissions). If these personal allowances are non-tradable, they are a form of rationing and thus a pure regulatory instrument. In case allowances can be traded, this makes mobility budgets also an economic policy instruments attaching either monetary or non-monetary values to carbon-producing mobility.

A particularly interesting form of mobility budgeting is a form of trading that involves public transport credits whereby residents who do not use their allocated mobility budget receive credits to use public transport. This has recently been trialled in Coventry, UK where residents are offered credits to use public transport when selling their private vehicle (Coventry 2022).

Linked to communication and nudging tools, mobility budgets can also be accommodated as part of information-based instruments. This is for example the case for voluntary budgets for individual organisations.

For the development of specific policy instruments based on mobility budgets, a briefing note on "Mobility Budgets: A behavioural science perspective" was prepared as part of MyFairShare Task 2.1 (Hicks 2022). This briefing covers fairness perceptions in government-citizen interactions, effectiveness and acceptability of policies to reduce car use, transport behavioural models and behavioural science concepts of relevance for developing mobility budgets.

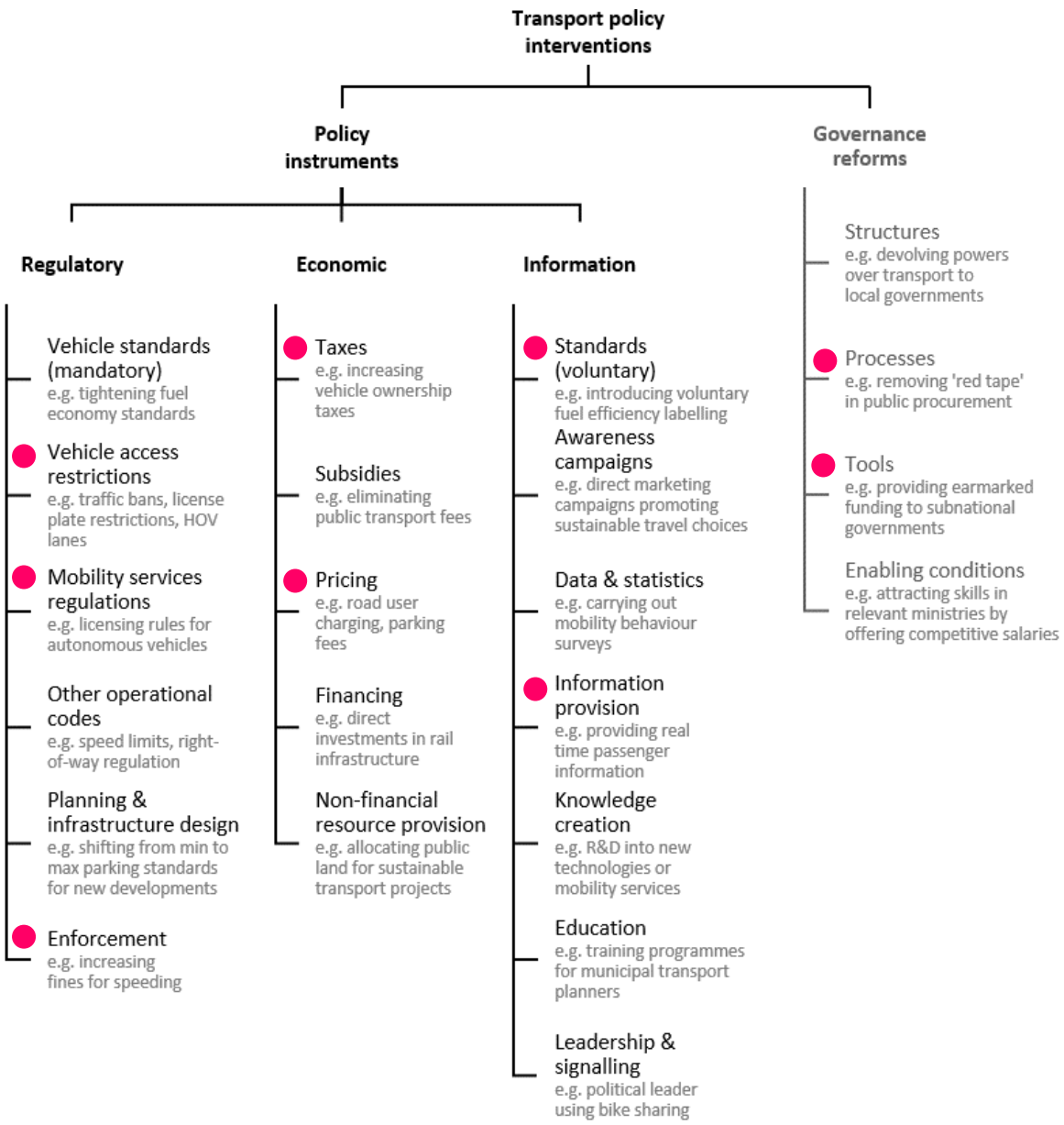

Figure 11: Transport policy instruments and governance reforms, potential mobility budget integration in pink
Source: Rode, Heeckt and da Cruz 2019

4 Fair mobility budgets for Living Labs

This final section introduces a decision approach for developing pilot interventions for fair mobility budgets. This approach can be tested for each specific context of each of the six MyFairShare Living Labs. It is the outcome of the first part of Task 2.5 which has been generated through the engagement with various options for the London Living Lab.

Figure 12 introduces a general framework for establishing mobility budgets which allows for a context-specific and tailored approach of defining and designing relevant interventions. The framework centrally considers questions of fairness based on the broad approach introduced in Section 3 of this document. A workshop by all members of the MyFairShare team, held in July 2021, allowed for initial testing of this framework as well as identifying preliminary priorities and direction for each of the living labs. All components and terminologies of this framework were described above. What follows below is a presentation of how this can be employed for the case of the London Living Lab and how in turn this then leads to broader questions on how MyFairShare Living Labs can employ a standardised perspective of fairness and where they will diverge.

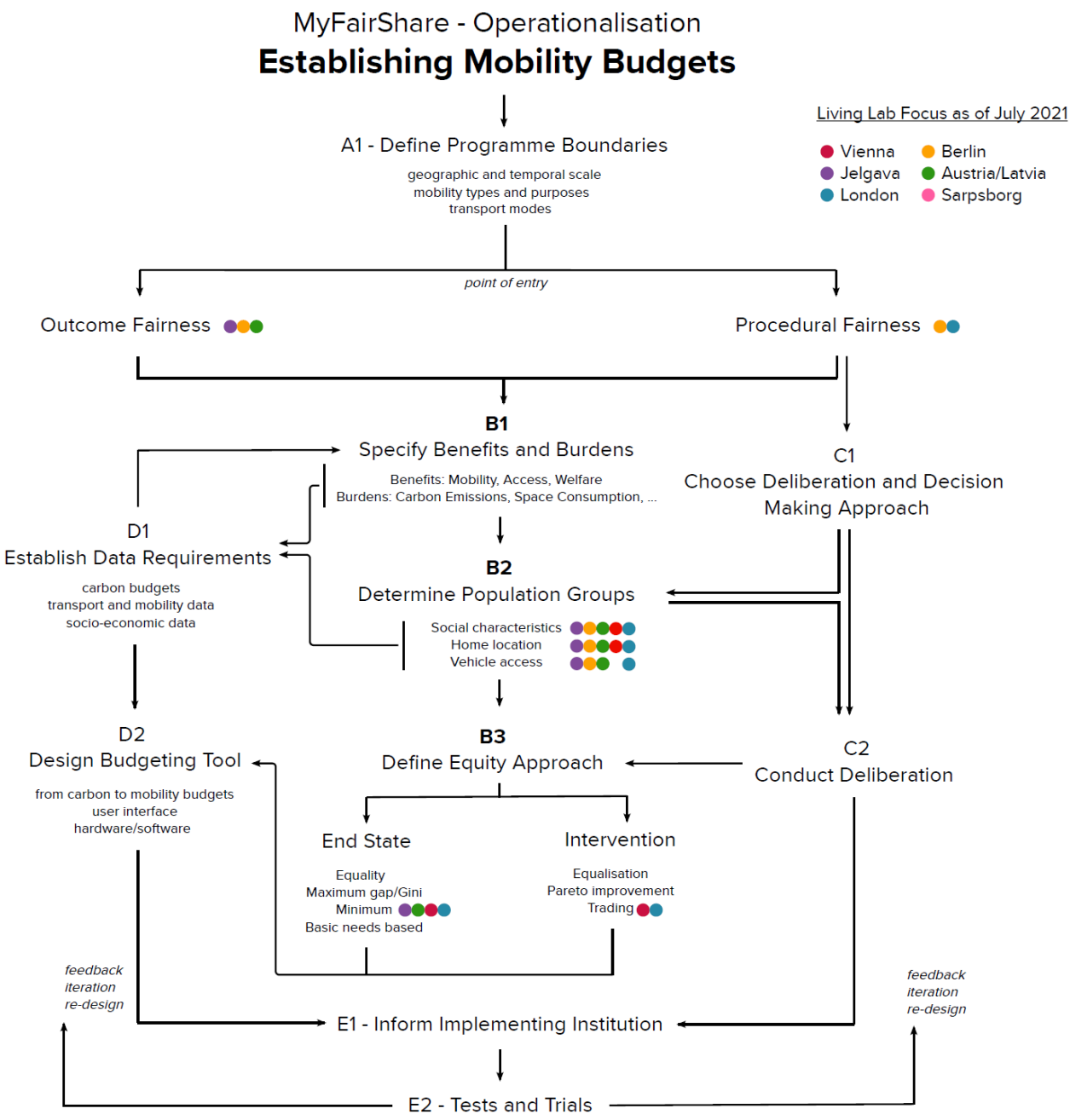

Figure 12: A general framework for establishing fair mobility budgets
Source: Author

4.1 Applying the above framework for the London Living Lab

At this point, the following overview is illustrative as discussions with the London Living Lab partner, Transport for London, are ongoing. Additional commentary following the '>' sign document what other Living Labs had discussed during the July 2021 workshop and how this may deviate from the London case.

A1 – Define Programme Boundaries

The geographic boundary for the London LL is Greater London (about 1,600 sqkm of what is considered the political territory of London with about 8.8m inhabitants). The timescale is up to 2030

which aligns with current net zero targets by the Greater London Authority. The mobility types cut across all personal mobility for all trip purposes. Freight transport and digital connectivity are excluded. All urban transport modes are considered excluding air and river transport.

A1 – Point of Entry

The London Living Lab will initially begin with a focus on Procedural Fairness which requires the choice of a deliberation and decision making approach. One options currently being explored is that of a citizen assembly which then goes through the key elements of defining outcome fairness.

> unlike the London case, most Living Labs are likely to immediately focus on Outcome Fairness and establish the approach to mobility budgets with a smaller group of experts and MyFairShare partners.

B1 – Benefits and Burdens

The London LL will employ a simple descriptor for mobility benefits expressed in annual kilometres travelled by motorised modes. While these kilometres stand for a complex combination of intrinsic-, access- and welfare-related benefits, it would be beyond the scope of this lab to define these in greater detail.

> several other LL have expressed an interest in defining some of the access-related benefits in greater detail and may employ other descriptors than kilometres travelled.

On the burden side, the London LL will consider only the total remaining CO_2 budget for the passenger transport sector up to 2030 alongside a daily space consumption ceiling for its major A-route road network. Both are converted to mobility resources and considered as part of the above analysis. Other burdens such as road accidents, air pollution and inactivity are not considered.

> most LL may not consider space consumption and may instead include questions of air pollution or accidents.

B2 – Population Groups

The London LL will consider a differentiated treatment of different population groups based on the deliberation process.

> Most LL were interested in considering a mix of social characteristics, home location and vehicle access.

D1 – Establish Data Requirement

Carbon budgets for the London LL are based on the city's commitment to net zero by 2030 with a tailored analysis to establish the remaining carbon budget for the transport sector up to 2030. This will establish the carbon ceiling. Other key datasets include:

- Annual kilometres travelled by modes, ward level and socio-economic status
- Trip purpose data
- Average carbon emissions by different transport modes
- Average space consumption by different transport modes and speeds
- Basic socio-economic data

> Several LL may employ a more fine-grain and detailed transport data collection and analysis exercise.

B3 – Define Equity Approach

While the London LL may once again employ a deliberative process to decide on an appropriate equity approach for establishing carbon budgets, initial ideas are based on a minimum standard and/or mobility budget trading approach.

> Most other LL identified minimum standards as the easiest way forward. It is expected that in many cases, minimum standards may be the same as the ceilings defined by carbon budgets. There is an

important discussion about advancing even more radical reductions in cases where minimum standards (based on socio-economic conditions) are well below the carbon ceilings.

D2 – Design Budgeting Tool

The budgeting tool for the London case will initially translate the remaining carbon budget in the transport sector to kilometre allowances for private motorised modes (differentiating ICE and electric vehicles) and public transport. Given a potential interest in a trading function, one idea is to generate mobility credits for public transport rather than being able to "make money" by selling mobility budgets.

E2 – Test and Trials

The LL Living Lab may employ a theoretical game to test initial concepts or simply discuss potential budgeting design ideas with the participants of the deliberation process.

4.2 Key take aways for further discussion

Mobility Benefits

The simplest approach and proxy to mobility benefits would be to establish "person kilometres per year'"as the baseline benefit. While not accounting for actual accessibility, it is a simple second-best proxy which also entirely incorporates any intrinsic mobility benefits.

Mobility Burdens

By definition for this project, all LLs will have to consider CO_2 emissions from transport. Some LL will also work with space consumption (a proxy for opportunity costs – not allowing for other public space functions –and community severance).

Differentiating Population Groups

This may be among the more challenging components for MyFairShare as any form of differentiation has shortcomings and the process could be endless. LLs with deliberative elements will work with perspectives from the general public. Some consideration of social disadvantage and home location is likely to be considered.

Equity Approach

Teams were most interested in a minimum standard approach and mobility budget trading. Both will have to be refined and tested for more specific application.

5 Conclusion

This working paper summarised the preliminary exploration of fairness in the context of the MyFairShare project. It is based on the work conducted between May and December 2021 and serves as a point of departure for subsequent research, particularly related to the individual Living Labs.

As seen in the previous section, the most fundamental step for the equitable design of mobility budgets is the choice of procedural fairness (how the decision on choosing any distribution approach is made) or directly considering outcome fairness. For the first case, the focus is establishing a decision making process which reflects a legitimate and democratic approach to reaching any conclusions about how the implementation of mobility budgets can and should be approached. In the second case, the issues below need to be considered in an iterative process building on the expertise of involved knowledge partners preparing a decision by an executive body (public, private or otherwise) with the capabilities to implement a mobility budget programme.

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