


ADVANCED REVIEW **OPEN ACCESS**

Malleable Preferences and the Normative Desirability of Demand-Side Solutions to Climate Change

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Received: 30 September 2024 | **Revised:** 24 April 2026 | **Accepted:** 10 June 2026

Editor-in-Chief: Maria Carmen Lemos | **Domain Editor:** Julie Rozenberg

Keywords: climate change mitigation | decision-making | demand-side solutions | preferences | well-being

ABSTRACT

Demand-side solutions to climate change have been ascribed significant mitigation potential, but their uptake remains limited, often due to normative concerns about individual welfare when conceptualized as preference satisfaction. Here, we address the normative desirability of demand-side mitigation by reviewing work that raises questions about key assumptions underlying standard welfare analysis and their normative implications. Departing from the assumption that observed behavior reliably reflects individuals' underlying fixed preferences and their hedonic well-being, we show how preferences are context-sensitive, constructed, and endogenous to environments. Drawing on novel decision-making frameworks better equipped for sustainable transformation, we argue that conceptualizing preference as malleable is crucial for the broader adoption of demand-side solutions and their embedding into sustainable transformation efforts.

This article is categorized under:

Climate Economics > Economics of Mitigation

Perceptions, Behavior, and Communication of Climate Change > Behavior Change and Responses

Climate and Development > Sustainability and Human Well-Being

1 | Introduction

In Paris, under mayor Anne Hidalgo's leadership, a quiet revolution began. What was once a city of cars gave way to becoming a city of cycling. Her vision, woven into the "Plan Vélo," was a paradigm shift, achieved by fundamental changes to infrastructure. The aim was bold: a metropolis where cycling is no longer the alternative, but the norm. By 2020, she had added over 1000 km of cycling lanes, with many more being added by 2026. These lanes include the now-iconic "coronapistes" that arose from the pandemic and stayed to reshape the streets. While there were other policies such as low emission zones or shared bicycle offers, cycling also surged because of added bicycle lanes, with a 94% increase in use between 2016 and 2022, while car

traffic and concurrent CO₂ emissions were reduced by at least 11% (Natterer et al. 2026). As a result, some 840,000 cyclists are on the roads of Paris every day (Transportnetwork.org 2020). The behavioral changes are self-evident and visible. Indeed, an econometric analysis of 108 European cities demonstrates that an average of 11.5 km additional bicycle lanes increases cycling between 11% and 48% (Kraus and Koch 2021), while another study shows that comprehensive urban cycling networks can reduce urban transport GHG emissions by 4%–19% (Creutzig, Lohrey, and Franza 2022). In the municipal election in 2026, Emmanuel Grégoire was voted into power by a vast majority as the successor of Anne Hidalgo, having run on a strategy to continue the massive changes to infrastructure, making Paris less car-centric and more cycling-friendly.

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Demand-side climate change mitigation—the Paris expansion of the cycling network is a paradigmatic example—is concerned with the decarbonization of service-provisioning levels achieved in various sectors (e.g., transport, food, or housing), while achieving well-being for all (Creutzig, Niamir, et al. 2022). Formally, we define demand-side solutions to climate change as those options that relate to end-users in terms of behavior, infrastructure usage, technology adoption, and those measures which can be shaped by behavioral interventions, infrastructure design, and price policies. Demand-side solutions have been ascribed significant potential (Creutzig et al. 2016, 2018). Research on reduction potential has established that actions like dietary shifts (> 7 Gt CO₂/yr. reduction), reduced food waste (> 1 Gt CO₂/yr), active mobility (3–4 Gt CO₂/yr. reduction), and sustainable housing (> 6 Gt CO₂/yr. reduction) all contribute significantly to GHG emissions reductions between 2020 and 2050, totaling 30%–70% reduction potential compared to counterfactual emissions, while maintaining or improving services for people (Creutzig, Niamir, et al. 2022; Creutzig, Roy, et al. 2022; IPCC 2022). Framed differently, two thirds of final demand can be traced back to consumption decisions by end-users (Ivanova et al. 2020).

While the mitigation potential of demand-side solutions is largely uncontested, the degree to which such measures are normatively desirable is currently part of a larger debate (Creutzig, Roy, et al. 2022; IPCC 2022). Despite their potential, many people view demand-side solutions as personally and politically unpalatable and dismiss them based on paternalism, violations of autonomy, or other threats to individual welfare, leaving demand-side solutions underutilized (OECD 2025). This creates a central tension: On the one hand, demand-side policy is seen as indispensable for meeting climate targets and unavoidable given biophysical constraints (Creutzig, Niamir, et al. 2022). On the other hand, it is argued that many demand-side measures impose individual welfare losses by constraining individual choice or forcing behavioral change that people would not voluntarily be prepared to engage in (Tan-Soo et al. 2024). In the present article, we want to address this tension by calling into question central assumptions underlying current accounts of individual welfare evaluation, particularly those concerning the nature and role of preferences (Berger and Creutzig 2025).

One of the cornerstones of individual welfare analysis is the assumption of fixed, rational preferences. We show that moving away from this assumption and towards an understanding of preferences as malleable entities is not only empirically more accurate, but can also embed demand-side solutions into broader societal transformation, meeting calls for behavioral science to be more impact-oriented (Nielsen et al. 2024) and transformation focused (Gurtner and Moser 2024). A central goal of this review is to equip an interdisciplinary audience with arguments that de-emphasize fixed preference satisfaction as a unique welfare criterion and thereby tilt the normative debate away from being too centric on neoclassical economics. Past research has started this process by highlighting the relevance of alternative well-being accounts beyond subjective well-being (Deci and Ryan 2008; Lamb and Rao 2015; Lamb and Steinberger 2017; Ryan and Deci 2001). Here, we scrutinize the conceptual and empirical validity of the neoclassical economic approach of using fixed preferences to compute welfare, as this approach

heavily affects normative judgments regarding the desirability of demand-side mitigation.

2 | The Normative Desirability of Demand-Side Mitigation: Dimensions and Central Tensions

In principle, the normative desirability of demand-side mitigation could be assessed based on various moral dimensions and normative criteria, all of which have been the content of the normative debate around climate change mitigation. Need-based accounts posit that all individuals must receive access to the basic conditions required for survival and minimally decent living (Rao and Min 2018). Relatedly, the capabilities approach and other Eudaimonic approaches aim to preserve and expand individuals' substantive freedoms to achieve valuable functionings (Lamb and Steinberger 2017; Nussbaum 2011; Ryan and Deci 2001; Sen 1985). Intergenerational justice (Parfit 1992; Ramsey 1928; Rawls 2003) aims to fairly distribute benefits and burdens across present and future generations, which includes the avoidance of irreversible environmental harm through crossing of planetary boundaries (Rockström et al. 2009). Ecological integrity aims to maintain a stable climate system and a functioning biosphere as relevant preconditions of human flourishing ("ecosystem services"), but also as a potential object of intrinsic value (Piccolo et al. 2022; Vernadsky 1998). Finally, preference satisfaction and individual welfare accounts highlight the promotion of individuals' preferences and their subjective well-being through freedom of choice, putting people into the position of the best judge of their own well-being in a hedonic tradition, while placing a high moral value on people's ability to make sovereign consumer choices (Kahneman et al. 1999; Von Weizsäcker 2024). This latter view is dominant in normative economics, which links the satisfaction of preferences closely to the concept of liberty and welfare (Von Weizsäcker 2024). Freedom is often equated with the freedom to choose among alternatives. A decision is considered legitimate simply by virtue of being chosen by an individual, independent of the reasons. As von Weizsäcker (2024) summarizes, "greater freedom, intuitively speaking, is greater choice." (p. 9).

It is apparent that these different normative criteria are not always easily reconcilable, thereby creating room for a normative debate. For example, human needs satisfaction may conflict with ecological integrity, particularly climate stability (Lamb and Rao 2015). Intergenerational justice concerns may limit present-day freedom of choice (Secretary-General, U. N. 2013), and the lifestyles of people in the Global North can harm capabilities and needs satisfaction in the Global South, as interpreted from current rates of carbon inequality and its related consequences (Chancel 2022). Without trade-offs, an effective demand-side solution is normatively desirable if it secures basic needs for all, if it expands or preserves essential human capabilities, if it respects intergenerational justice, if it maintains an intact biosphere and stable climate, and if it aligns freedom of choice.

In public debates, particularly in rich, developed countries, demand-side solutions are often normatively and practically dismissed as they ostensibly infringe people's freedom of choice. For example, the implementation of a vegetarian-only day in a university canteen, or the closing down of roads for cycling,

can be interpreted as limiting a choice set. As these arguments frequently surface in public and academic debates, it is a worthwhile endeavor to investigate the degree to which and under what circumstances freedom of choice and preference satisfaction are valuable normative criteria.

That said, research has suggested that it is not unproblematic to equate preference satisfaction with welfare (Hausman and McPherson 2009).¹ Three common arguments are that people may hold preferences that are based on false beliefs, that they hold preferences about other aspects than their own well-being, and that their preferences are externally influenced (Hausman 2011; Hausman and McPherson 2009).² Although welfare computation based on preference satisfaction is hardly defensible in a strict philosophical sense, an entry point to legitimizing preference satisfaction lies in a so-called “evidential account” as suggested by Hausman and McPherson (2009) and applied to environmental economics by Beck (2026). Accordingly, welfare economics does not require a full identification of welfare with preference satisfaction, but rather an evidential connection: under certain conditions—when individuals are sufficiently informed and concerned with their own interests—preferences can serve as a reasonable, though imperfect, indicator of welfare.

Although one could have an intensive philosophical debate about the (poor) ontological base of normative economics that equates welfare with preference satisfaction, a practical issue is that people descriptively value their freedom of choice, and that many demand-side solutions are normatively dismissed because they ostensibly violate subjective preference satisfaction through excessively high non-pecuniary (i.e., psychological) costs (Tan-Soo et al. 2024). We argue that one reason underlying this skepticism lies in the—often merely implicitly made—false conceptualization of preference as fixed, rational entities, which, *inter alia*, implies that standard non-market valuations accurately grasp welfare. Against this backdrop, our review of malleable preference opens up a conceptual toolbox with a long-standing research tradition in psychology and the decision sciences that can be used to more accurately assess individual welfare and to embed demand-side mitigation into a broader framework of sustainable transformation. Our approach does not render preference-based approaches entirely obsolete, but develops the argument that current assessments of transition costs may be inflated, which can tilt the overall normative desirability of demand-side mitigation. We argue that demand-side policies are normatively more desirable when they contribute to well-being under conditions in which preferences are dynamically formed in a defensible and informed manner (cf. Tan-Soo et al. 2024), which often implies a crucial role of experiential knowledge to learn one’s own preferences.

3 | Malleable Preferences

Among the various normative criteria discussed above, preference satisfaction plays a central role in cost–benefit assessments of individual welfare and in economic evaluation of climate policy. Objections to such policies frequently rest on the concern that they constrain individual choice and thereby reduce welfare by limiting the satisfaction of given preferences. This line

of reasoning rests on the assumption that preferences are stable, well-defined, and observable through behavior (Beck 2026; Grüne-Yanoff 2016; Hausman and McPherson 2009; Mattauch et al. 2022). However, a large body of research across economics, psychology, and related fields calls this assumption into question. Preferences are shaped by the contexts in which decisions are made; they are often constructed during the act of choice rather than merely elicited, and influenced by social and institutional environments. Hence, preferences are malleable rather than fixed. If preferences are indeed malleable in these ways, the link between observed choice and individual welfare becomes considerably weaker. But this also allows us to re-interpret preferences: rather than treating preferences as fixed constraints for climate policy, they can be understood as evolving through lived experience, social interaction, and policy environments, thereby enabling sustainable behavioral and societal transformation.

3.1 | Context-Dependent Preference

By context-dependent preferences, we refer to the empirical observation of violations of a central principle of rational choice theory, namely independence of irrelevant alternatives (Tversky and Simonson 1993). Context-dependence in perception has already been a central tenet in Gestalt theory (Fechner 1860, cited in Palminteri and Lebreton 2021) and has been discussed in early utility theory (Bernoulli 1738, cited in Palminteri and Lebreton 2021). Modern behavioral science and its related fields (e.g., behavioral economics, psychology, decision-making research, consumer research, neuroscience) have provided a large body of cumulative evidence that preferences are, in fact, context-dependent. Hence, a central source of malleability arises from the fact that context is seldom neutral and can be actively designed, for example, by marketing action and pioneering advantage (Carpenter and Nakamoto 1989), through nudging (Thaler and Sunstein 2009) and related behavioral interventions such as default-setting (Ebeling and Lotz 2015; Jachimowicz et al. 2019; Johnson and Goldstein 2003; Schubert 2017), or through behavioral economic engineering (Bolton et al. 2013; Bolton and Ockenfels 2012).

In research on the context-dependence of preferences, several lines of literature are routinely discussed. Research on the endowment effect shows that a significant source of context lies in the question whether an object is already in possession of the decision-maker or not (Kahneman et al. 1991). It has identified that valuation differs whether or not people are asked to state their Willingness-to-Pay for the acquisition of an object, or prompted to state their Willingness-to-Accept to give up an already possessed object. Relatedly, status-quo bias (Samuelson and Zeckhauser 1988) refers to a behavioral phenomenon that people prefer a status-quo option that is irrelevant from the perspective of rational choice theory. A prominent application of status-quo bias lies in the field of nudging through defaults. Designing what happens if no active choice is made (i.e., default-setting) has been applied to issues in health care (Johnson and Goldstein 2003), food decision-making (Radnitz et al. 2023), saving for retirement (Beshears et al. 2007), or to the selection of green energy tariffs (Ebeling and Lotz 2015). Finally, reference-dependence and framing suggests that people evaluate objects or make effort decisions relatively to a comparison standard

(i.e., a reference point; Kahneman and Tversky 1979). Reference frames may stem from whether or not a choice is framed as gain or loss relative to the status-quo (Kahneman et al. 1991; Ockenfels et al. 2015), or from social comparisons (Abeler et al. 2011; Schwerter 2024; Stouffer 1949). People are shown to be more averse to losses than they are securing gains and that their social or non-social comparisons can serve as suitable reference points for judgment and decision-making.

Marketing and consumer research has accumulated a large body of evidence that market prices can serve as anchors that serve as a reference point. For example, the reference price literature has shown that previous or present market prices, the price of a close substitute or an unrelated good, and even an arbitrarily generated price can influence people's willingness to pay for a product by serving as an anchor (Krishna et al. 2006; Mazar et al. 2014; Simonson 2008; Tversky and Kahneman 1974). Research outside of the field of marketing shows that irrelevant anchors affect judicial decision-making (Englich et al. 2006) and that first offers in negotiations can serve as anchors (Galinsky and Mussweiler 2001). Research at the intersection of neuroscience and marketing has shown that context manipulations affect neural encoding of value (Tymula and Plassmann 2016) and can even modulate the neural representation of experienced pleasantness (Plassmann et al. 2008).

To sum up, context dependence has emerged as a robust, empirically validated phenomenon guiding human judgment and decision-making (Kahneman 2012), raising not only doubt about individual welfare computations based on fixed, rational preferences, but also offering an entry point for interventions based upon such behavioral insights (Composto and Weber 2022; Jachimowicz et al. 2019; Mertens et al. 2022; Nisa et al. 2019; Szaszi et al. 2025).

3.2 | Constructed Preferences

Another central tenet of rational choice theory is that preferences exist prior to choice and that they are revealed through behavior. Decision makers are assumed to possess stable and well-defined preferences, and choices are understood as expressions of such (Von Neumann and Morgenstern 2007). This enables welfare inferences.

Contrasted against this rational choice benchmark, a second source of preference malleability lies in preference construction (Bettman et al. 1998; Griffin et al. 2005; Slovic 1995; Warren et al. 2011). Preference construction refers to the phenomenon that preferences are often built during the choice process, rather than merely elicited. This may change the causal relationship between preference and choice: choices no longer reflect pre-existing preferences but depend on how construction happens in any given choice situation.

Today, a substantial body of empirical evidence supports the existence of preference construction as a behavioral phenomenon (Lichtenstein and Slovic 2006). One branch of research investigated preference reversals (Kusev et al. 2020; Lichtenstein and Slovic 1971, 1973; Slovic and Lichtenstein 1983), in which decision makers showed incompatible preferences depending

on the elicitation instrument. After initial methodological and dogmatic criticism from economics (Grether and Plott 1979), the phenomenon is now widely accepted, even in the economic mainstream (Lichtenstein and Slovic 2006; Tversky and Thaler 1990). Next to preference reversals, preference construction—broadly referring to the interaction of properties of the human information-processing system and the properties of task environments (Simon 1956) – is also well-established. Lichtenstein and Slovic (2006) write that “there are probably hundreds of articles that could be cited as illuminating the nature of preference construction” (p. 24). Most commonly, the phenomenon of “coherent arbitrariness” serves as an illustration of constructed preferences (Ariely et al. 2003). Coherent arbitrariness suggests that people display stable demand curves based on initial randomness, ostensibly because they do not possess well-defined preferences in the first place or that they remain inaccessible through introspection. For example, people construct their preferences based on irrelevant anchors or on the experimental instruction whether an experience requires payment (i.e., being a “good”) or justifies compensation (i.e., being a “bad”). After such initial randomness, subsequent behavior is quite consistent with typical economic comparative static, showing cost and benefit sensitivity. In recent experiments, the notion of coherent arbitrariness was also applied to environmental economics, suggesting that people do not have well-defined intrinsic valuations about which monetary amounts to accept for certain levels of carbon emission reduction (Berger and Bregulla 2023). In a similar vein, this phenomenon has also been observed in studies on non-market valuation of environmental public goods and coined “scope-insensitivity” (Kahneman and Knetsch 1992; Smith and Osborne 1996).

Outside of the field of behavioral economics, further evidence that calls into question the choice-preceding nature of preferences stems from cognitive dissonance and choice-induced preference change (Brehm 1956; Festinger 1957; Vaidis et al. 2024). Further supporting evidence is inferred from choice-blindness experiments (Johansson et al. 2005, 2014), in which individuals readily justify and defend preferences for options they did not in fact choose, but were led to believe they had chosen. Together, these findings raise doubt about the fact that preferences always precede behavior.

As a summary, these findings have relevant implications for policy evaluation and welfare. If preferences are constructed rather than revealed, such measures may fail to capture true welfare effects but rather reflect inherent construction rather than true elicitation.

3.3 | Endogenous Preferences and Dynamic Preference Formation

Endogenous preferences refer to the idea that preferences are shaped by the economic and social conditions under which they are expressed. As put by Bowles (1998, 75), endogenous preferences imply that “markets and other economic institutions do more than allocate goods and services: they also influence the evolution of values, tastes, and personalities.” In contrast, rational choice and neoclassical economics generally assume preferences to be exogenous, as this enables straightforward

prediction (i.e., “positive economics”) and evaluation of policies (i.e., “normative economics”; Bowles 1998). Historically, the formation and evolution of preferences has been largely dissociated from economics and left to other disciplines (Stigler and Becker 1977). However, the accumulation of knowledge about how preferences are formed calls into question central results from welfare economics and has led (behavioral) economists to revive their research interest in the topic (Bernheim et al. 2021; Bernheim and Rangel 2007; Bernheim and Taubinsky 2018).

Even before the advent of behavioral economics, conceptual research in economics (e.g., Galbraith 1958) has already hypothesized that endogeneity problems may underlie excessive consumption patterns of affluent societies. Galbraith argued in his “Dependence Effect” that the production sector creates the preferences it then seeks to satisfy, which undermines the moral authority of preferences and questions preference satisfaction as an indicator of welfare. Galbraith writes that “consumer wants can have bizarre, frivolous, or even immoral origins, and an admirable case can still be made for a society that seeks to satisfy them. But the case cannot stand if it is the process of satisfying that creates the wants” (Galbraith, 1999/1958, 125). Although early critiques did not find it plausible that demand could be deliberately engineered in such a fashion (e.g., Hayek 1961), modern advertising and behavioral design have rendered this critique largely obsolete. For example, Google has—in an effort to keep competitors out of the market—spent billions to serve as the default search engine (Berger et al. 2024), thereby exploiting context-sensitivity to gain market shares. Behavioral design by a carbon compensation platform shapes people’s seemingly voluntary payments for carbon offsets (Berger et al. 2022), and decoy pricing can steer consumer demand in ways inconsistent with standard choice models (Huber et al. 1982).

In basic preference research, the fields of behavioral and cultural economics have accumulated an increasing body of evidence suggesting endogeneity of preference in terms of social and economic context. Based on the observation that preferences largely vary across cultures (Falk et al. 2018; Henrich et al. 2005, 2010), or within cultures depending on socio-economic status or other variables (Kosse et al. 2020), or even within persons across the life-span (Cobo-Reyes et al. 2020), the nature of changing preferences has resurfaced, and research has attempted to establish a causal link between social environments and preferences. Although some correlational evidence on preferences does not allow the conclusion that preferences are causally shaped by social or economic institutions (Fehr and Hoff 2011), research has increasingly demonstrated causality, often owed to innovative methodological developments in terms of causal identification (e.g., natural experiments; Dunning 2008).

For example, Abeler et al. (2025) show that random assignment to a mentoring program shapes preferences for honesty. Kosse et al. (2020) show that access to mentorship causally affects prosocial preferences. Similarly, Falk et al. (2026) show that mentoring causally determines educational choices. Mentoring is seen as a source of social environment in all these studies and has been randomly assigned to provide causal evidence. In other domains, quasi-randomized access to television content promoting smaller family sizes has been shown to influence women’s fertility decisions in Brazil, particularly among those

from lower socio-economic backgrounds (Ferrara et al. 2012). Within Switzerland, preference differences in terms of social security have emerged within the same economic system, but across a language barrier, suggesting cultural effects on preference formation (Eugster et al. 2011). In India, caste assignment leads to observable differences in terms of norm-enforcement through altruistic punishment (Hoff et al. 2011). This causal evidence fits into observational evidence on preference differences between cultures or political groups (Falk et al. 2018; Henrich et al. 2005, 2010).

More broadly, research also suggests that preferences may evolve dynamically over time through processes such as learning and habit formation (Kiley 2010; Palminteri and Lebreton 2021), suggesting that feedback and context influence valuation processes (Palminteri and Lebreton 2021), making habits path-dependent. Empirical evidence supports the persistence of such habits, showing that preferences are influenced by past consumption patterns (Kiley 2010), which themselves have been influenced by the social environment.

Regarding demand-side mitigation, research on preference endogeneity weakens the normative authority of preference satisfaction as a unique welfare criterion, but it enables a broader assessment of well-being. Framed positively, endogeneity of preferences highlights that policy interventions may steer not only behavior but affect preference formation at a deeper level.

3.4 | Cognitive Constraints and the Limits of Preference Formation

While fixed, complete, and rational preferences may serve their goal in positive and normative economics, research in cognitive science and neuroscience points to practical limitations, for example under the framework of bounded rationality (Simon 1957). Decision-making in many relevant domains is routinely characterized by substantial computational costs. Individuals are often faced with complex environments in which forming complete and well-defined preference orderings may exceed their cognitive capacities. As a consequence, rather than evaluating all possible alternatives, individuals rely on heuristics, defaults, and status-quo options (Gigerenzer and Gaissmaier 2011; Kahneman and Tversky 1979; Simon 1955). In this sense, observed choices may reflect cognitive constraints rather than stable underlying preferences. Insights from computational neuroscience suggest that information processing itself is costly and subject to energetic constraints, implying that the brain economizes on cognitive effort (Creutzig and Sprekeler 2008; Zénon et al. 2019). This provides a mechanistic explanation for why individuals tend to rely on familiar options and established routines, even when alternatives may be objectively preferable. Such tendencies reinforce status-quo behavior and contribute to the persistence of existing patterns of choice. Importantly, these computational constraints extend beyond standard notions of imperfect information. While imperfect information assumes that a well-defined information set exists but is not fully accessible, many real-world decision problems are characterized by an effectively unbounded space of possible alternatives. Consider food choices: there are myriad ingredients and an exponentially larger number of ways to combine and prepare them. It is impossible to evaluate all relevant

options *ex ante*. Rather than deriving preferences from a complete evaluation of alternatives, individuals acquire information through lived experience, which constitutes a contextually rich but necessarily limited exploration of what can be known and experienced. In this sense, preferences emerge from constrained exploration rather than from fully specified preference orderings, which gives a central role to lived experience as a source of preference formation.

4 | Malleable Preferences, Demand-Side Solutions, and Experience-Based Sustainable Societal Transformations

Many demand-side solutions involve unfamiliar or not yet widely experienced practices. Hence, our reasoning on preference malleability and computational costs become particularly relevant in the context of climate change mitigation and demand-side solutions (Beck 2026; Creutzig, Niamir, et al. 2022; Mattauch et al. 2022; Stern et al. 2022). Crucially, these experiences often cannot readily be acquired by isolated individuals, unless societies at large commit to broader transformations. For example, cycling in a city that does not support cycling through infrastructure can hardly deliver the same experience as cycling in a fully transformed city (Friel and Wachholz 2025; Panter et al. 2019; Prado et al. 2026). This affects endogenous preference formation or stated preference about transition intentions—it hardly seems surprising that people are reluctant unless they experience an infrastructure change at first hand. Likewise, being a committed vegetarian is likely incomparable to trying a few vegetarian meals here and there, because “being” a vegetarian often encompasses deep identity shifts that affect preferences and habits (Rosenfeld and Burrow 2017). More broadly, decisions to pursue a low-carbon lifestyle based on identity (Whitmarsh and O’Neill 2010) creates similar epistemic gap that may undermine decision-making based on fully defined, fixed preferences.

4.1 | Epistemic Gaps and Transformative Experiences

Psychological research has investigated how strongly people underestimate the extent to which their preferences are not fixed, once and for all. For example, the end-of-history illusion shows that people regard the present as a defining moment for their preferences and identity, thereby underestimating future changes (Quoidbach et al. 2013). Projection bias leads people to overestimate the degree to which future preferences resemble current preferences (Loewenstein et al. 2003). More generally, differences in expected, experienced, and remembered utility can distort decision-making (Redelmeier 1993; Simonson 1990), while limited “growth mindsets” let people underestimate the malleability of their traits (Yeager and Dweck 2020).

These empirical results, alongside context-sensitive and constructed preferences, show the limits of preference-based evaluation in the context of sustainable behavioral transformations and demand-side solutions when preferences are modeled as or perceived to be fixed. People do not only miss the necessary experiential knowledge to form complete preferences; their psychology also unreasonably supports sticking with many unsustainable

status quos. As discussed, this may lock in carbon-intensive lifestyles by habit and biased cost–benefit analysis based on fixed preferences (Tan-Soo et al. 2024).

This suggests the need for an alternative decision-making framework that can accommodate malleable preferences and transformative choice. One of such frameworks has been established in philosophy, coined “transformative experience” (Paul 2014). Paul argues that when people live their lives, they routinely make decisions that shape their future selves and circumstances. For transformative choices—these are big choices that cannot readily be reversed—people cannot access relevant subjective utilities before committing to their choice. Although Paul primarily discusses personal choices such as motherhood or emigrating, a similar reasoning can apply to societal transformations, which equally require a certain degree of commitment (e.g., investments into cycling infrastructure without knowing *a priori* how this is received). Choosing, or “opting” (Sunstein 2023), might reveal novel subjective utilities, but also potentially change deeper preferences and, thereby, identity. Applied to the context of the Paris cycling network cited above, Parisians could not reasonably have estimated how a transformed city will be experienced and evaluated on a day-to-day basis. Hence, decisions which are made under epistemic uncertainty, both regarding novel discovered subjective utilities and the possibility of changes to one’s identity, are impoverished compared to the fully informed, rational choice benchmark.

This epistemic uncertainty poses an imminent threat for normative decision-making and cannot easily be circumvented using choice under risk and uncertainty.³ Hence, a novel normative model is required. According to Paul (2014), choosing rationally, then, may require people to regard transformation as conscious choices to make novel discoveries and to recognize that living authentically involves experiencing a life and preferences as they evolve from the choices people and societies make. This may anchor preference satisfaction into broader normative criteria, for example enabling preferences to commit to a life of psychological richness (Sunstein 2023) or to one within planetary boundaries and decent living for all (Rao and Min 2018; Rockström et al. 2009). Welfare based on preference satisfaction can then be reconsidered by other well-being accounts grounded, for example, in Eudaimonia.

4.2 | Empirical Evidence of Experience-Driven Preference Change

Empirical support for this “transformative experience” perspective can be found in examples frequently discussed in the literature on endogenous preferences (Beck 2026). In many cases, individuals initially oppose policies such as smoking bans, seat belt legislation, road congestion pricing, or car-free city centers that they later come to endorse after their implementation. While such evidence often lacks causality in a strict experimental sense, it is consistent with the idea that experience shapes subjective evaluations and preferences over time. That said, the evidence about post-trial or post-implementation preference shifts owed to novel experiential knowledge seems strong enough for researchers to label it a “stylized fact” (Baranzini et al. 2021).

Research on congestion pricing acceptance in Stockholm shows how preferences shifted before versus after implementation, with the effect being attributed to the unanticipated experience of the positive consequences (Schuitema et al. 2010). Similarly, the attempt to make the center of Ljubljana car-free caused protests before implementation, but was met with high levels of approval after implementation (EU Urban Mobility Observatory 2020, cited in Beck 2026). In Gothenburg, research showed higher public support after a trial run. Although a majority ended up voting against the congestion tax in a referendum, attitudes towards the tax became more positive following the trial, supporting the hypothesis that experience shapes preferences (Hansla et al. 2017). Noteworthy, the researchers attribute the negative result of the referendum to the seemingly “not-as-bad” initial situation compared to Stockholm, alongside perceptions of politicians as insufficiently trustworthy or benevolent. Trust and benevolence are major prerequisites of trust in scientists and policy acceptance (Cologna et al. 2025; Todorova et al. 2025). Further research suggests preference shifts in Bergen, Oslo, and Trondheim, suggesting negative attitudes decreased after introducing urban tolls (Odeck and Bråthen 2002).

All of these findings are consistent with the experience-based hypothesis suggesting that relying on fixed, ex-ante preferences affects the normative desirability of many demand-side options in an overly negative way. Experience is often labeled a key ingredient for preference changes, both theoretically and in the practical context of transport regulation (Gu et al. 2018; Paul 2014; Winslott-Hiselius et al. 2009). Similar results of preference shifts have been obtained in the regulation of smoking in Ireland (Fong et al. 2006), during the implementation of seat-belt laws in various European countries (Stephens et al. 2002), or when implementing garbage pricing in Switzerland (Carattini et al. 2018). While real-world observational studies often increase external validity, they can often be limited in terms of causality (cf. Carattini et al. 2018). Hence, laboratory work complements these field studies to arrive at causal insights. In this light, laboratory research (Janusch et al. 2021) has delivered causal insights into the role of experiential learning in the domain of congestion pricing consistent with the decision framework of transformative experience (Paul 2014) and consistent with the observational evidence.

In sum, one could argue that much of the debate about the normative desirability of demand-side solutions critically hinges on false perceptions of fixed preferences—both as a theoretical conception as well as a judgment phenomenon in humans. This may allow a re-interpretation of demand-side solutions away from being perceived as coercive practices limiting free choice towards tools to actively shape environments and allow preference formation in line with other normative goods such as climate stability or intergenerational justice. Under this interpretation, infrastructure provision, pricing policies, or behavioral design do not merely impose novel constraints and thereby shift rational behavior without affecting preferences. Instead, these policies enable the experience of alternative lifestyles under more realistic conditions. In this sense, demand-side policies may function as transformation mechanisms that reduce epistemic gaps (Paul 2014), facilitate experiential learning (Janusch et al. 2021), and allow preferences to evolve in response to new contexts (Beck 2026; Mattauch et al. 2022). Their normative assessment,

therefore, cannot be limited to the satisfaction of fixed preferences, but must take into account the possibility that preferences themselves are contingent on the policies being evaluated.

4.3 | Application to Demand-Side Mitigation

Applying this idea to various sectors of demand-side mitigation, we can show that many high-impact behavioral changes—such as dietary shifts, reduced food waste, active mobility, and low-carbon housing—are not solely the result of individual preferences, but are strongly shaped by external conditions, including infrastructures, norms, and policy environments. Table 1 summarizes these domains, highlighting their climate relevance, their contribution to Eudaimonic human well-being, and the role of preference malleability.

5 | Policy Implications

Based on the review of literature that suggests that preferences are malleable rather than fixed, we can arrive at several policy implications. First, theoretical research (Paul 2014) as well as empirical results (Gu et al. 2018; Janusch et al. 2021), mostly from the transport sector, suggest that first-hand experience is a crucial element for preference formation and uncertainty reduction. For many demand-side solutions, it is hard to acquire the necessary subjective utilities without committing to them (Paul 2014). This suggests that initial resistance often does not necessarily reflect long-term welfare losses (Tan-Soo et al. 2024), but rather predictable short-term costs resulting from the perception of fixed preferences (Berger and Creutzig 2025; Quoidbach et al. 2013; Slovic 1995). From a policy perspective, this highlights the value of piloting, experimentation, and temporary implementation of demand-side solutions. These approaches may allow people to acquire adequate subjective utilities and arrive at better, informed decision-making.

Second, the current approach of applying cost-benefit analysis to assess the welfare effects of demand-side solutions (Tan-Soo et al. 2024) faces severe challenges, both conceptually and empirically. The assessment of non-pecuniary (i.e., psychological) cost using established elicitation methods leads to transition costs that are miscalculated. If demand-side solutions change preferences, or lead to the discovery of novel subjective utilities, people will likely and unintentionally overreport their true transition costs. As an illustration, Tan-Soo et al. (2024) arrive at positive welfare effects precisely in such domains where experience has already been enabled or when infrastructure has already been established (Berger and Creutzig 2025).

A third implication is that preference satisfaction as a key element of hedonic well-being should be embedded within a broader normative framework that also includes eudaimonic well-being (Creutzig, Roy, et al. 2022; Lamb and Steinberger 2017), as this would allow to select development paths for individuals and societies in an informed manner and based on moral criteria. After all, it requires other moral goods beyond preference satisfaction to normatively decide which preference formation processes to commit to (Paul 2014; Sunstein 2023). Within demand-side mitigation, such alternative frameworks encompass capabilities,

TABLE 1 | Key individual options to reduce GHG emissions, their climate and Eudaimonic relevance, and an explanation how these options are largely dependent on external settings rather than (only) on individual choices.

Sector & option	Climate relevance (from 2020 till 2050)	Eudaimonic relevance	Preference malleability
Dietary shift	The most important individual choice to reduce GHG emissions in aggregate, > 7 Gt CO ₂ /yr. (Springmann et al. 2016)	Reduced red meat consumption aligns GHG emissions reductions with better health, avoided death > 7 million/yr. (Springmann et al. 2016)	Food choice depends on social and cultural context and (soft) infrastructure, that is, the availability of food choices and their priming in restaurants and cafeterias (Bauer and Reisch 2019)
Reduced food waste	Can reduce GHG emissions by > 1 Gt CO ₂ /yr. in aggregate (Creutzig, Niamir, et al. 2022)	Reducing food waste reinforces ethical behaviors, promotes personal growth, and enhances one's sense of purpose and connection to both the environment and society (Graham-Rowe et al. 2014)	Design choices that help reduce food waste include several behavioral interventions such as portion-controlled packaging, clear expiration labels, vacuum-sealed storage, modular containers, meal planning apps, smaller plates in restaurants, and promoting the sale of imperfect produce (Aschemann-Witzel et al. 2018; Chan 2022; Hebrok and Boks 2017; Hong et al. 2024; Reynolds et al. 2019)
Active mobility	15-min cities, compact urban form, ban of greenfield development, and safe bike lanes can reduce GHG emissions by 3–4 Gt CO ₂ /yr. (Creutzig, Niamir, et al. 2022)	Monetized health benefits range from €0.06/km for cycling to €0.32/km for walking (Mela and Girardi 2022)	Urban planning can provides spaces suitable for active mobility (Creutzig and Reisch 2024). Infrastructure strongly affects preference formation (Friel and Wachholz 2025; Panter et al. 2019)
Housing	Residents can invest into low-carbon or passive housing via insulation, low carbon building materials, efficient floor space utilization, and solar home systems, chose fewer and energy efficient appliances, > 6Gt CO ₂ /yr. (Creutzig, Roy, et al. 2022)	Provides autonomy and self-efficacy, aligns with environmental values; improves sleep quality (less noise), reduces indoor air pollution, improves air quality, thermal well-being (Creutzig, Roy, et al. 2022; Ryan and Deci 2023; Whitmarsh and O'Neill 2010)	Building materials are strongly influenced by formal standards and ISO-norms. Roof-top solar is strongly influenced by neighbors (Barton-Henry et al. 2021). Real-time feedback can increase salience of energy consumption within households (Exadaktylos and van den Bergh 2021).

Note: The suggested examples (i) infrastructures, norms, defaults, nudges, feedback) all have in common that they shift salient experience and thus affect malleable preferences.

needs-based approaches, or other eudaimonic conceptions of well-being, which focus on individuals' ability to lead meaningful and flourishing lives. In such a broader framework, well-informed preferences that reflect deeper morality can receive a higher moral value. In addition, demand-side interventions can be evaluated not only in terms of their alignment with existing preferences, but also in terms of their contribution to long-term well-being, health, and social and environmental sustainability (Creutzig, Roy, et al. 2022; Lamb and Rao 2015; Lamb and Steinberger 2017).

A final implication addresses the role of policy as a regulatory tool. Preferences are routinely shaped by market structures, advertising, and other behavioral-economic design, as conceptually anticipated by Galbraith (1958) and as repeatedly demonstrated empirically in contemporary research (Berger et al. 2022; Ebeling and Lotz 2015; Mazar et al. 2014; Plassmann et al. 2008). This raises the question not of whether preferences should be shaped, but how and to what ends, and to which limits. From this perspective, demand-side policies can be understood as deliberate efforts to steer preference formation in socially desirable directions, for example by promoting low-carbon lifestyles or healthier consumption patterns. Treating preference satisfaction as a normative benchmark basically results in the fact that non-moral actors capitalize on an empirically more valid scheme. In this sense, Shafir (2016) calls to embrace manipulation as a way of life and suggests not to leave manipulation of preferences to those with unadmirable goals. This highlights the need to critically assess and potentially regulate forms of preference shaping that are misaligned with societal goals. As an illustration, antitrust regulation has already used context-sensitivity and preference construction as key evidence in antitrust trials, thereby committing to a framework of malleable preferences (Berger et al. 2024).

6 | Summary and Conclusions

In the current review, we have examined the normative desirability of demand-side climate mitigation in light of a richer, and empirically more accurate description of human decision-making compared to standard rational choice assumptions. While demand-side mitigation has been shown to have significant emission reduction potential, it has been underutilized (OECD 2025), often based on overly restrictive assumptions that imply that they are infringing on individual welfare (Tan-Soo et al. 2024). We show that this criticism is largely dependent on false assumptions regarding human behavior. Drawing on evidence from behavioral economics and psychology, we can support a view that preferences are often context-sensitive, constructed during choice, and affected by the social and institutional environment (Bowles 1998; Slovic 1995; Tversky and Simonson 1993). As a consequence, behavior cannot readily be used to interpret welfare-relevant preferences (Beck 2026; Hausman 2011). This weakens the normative case made against demand-side solutions.

Opening up the concept of preference and allowing preference to be malleable aligns not only better with human psychology, but also helps to anchor preference in richer, experience-based models of decision-making that can promote broader societal

transformation and anchor behavioral science in such efforts (Gurtner and Moser 2024; Nielsen et al. 2024). Specifically, drawing on the framework of “transformative experiences” (Paul 2014) as well as the limitations imposed by computational limits of the brain explains why people mis-predict future preferences. This approach provides a feasible alternative to embed decision-making into broader moral considerations that highlight human flourishing (Lamb and Steinberger 2017; Ryan and Deci 2001). In addition, these insights inform current policy debates by raising caution about cost-benefit analysis, by showing the epistemic value of experience, and by suggesting that regulation should take into account behavioral realities.

Taken together, our review suggests that the perceived tension between demand-side mitigation and individual welfare results to a considerable degree from empirically contested assumptions regarding human behavior (Hausman and McPherson 2009) as well as human psychology (Simon 1955; Zénon et al. 2019) itself. Recognizing preferences as malleable and accepting human behavior as fundamentally restricted in terms of information-processing can serve as a guideline to motivate and normatively legitimize demand-side solutions, especially given the urgency of crossing critical planetary boundaries (Rockström et al. 2009) and the relationship of demand-side solutions to broader conceptualizations of well-being (Creutzig, Niamir, et al. 2022).

Author Contributions

Sebastian Berger: conceptualization (equal), methodology (equal), writing – original draft (equal), writing – review and editing (lead). **Felix Creutzig:** conceptualization (lead), methodology (equal), writing – original draft (equal).

Funding

FC acknowledges intellectual supports by the EDITS network.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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Endnotes

¹ Note that the statement *preference satisfaction is not uncomplicated* does not imply that other normative criteria such as intergenerational justice are.

² We refer to the cited literature (Hausman 2011; Hausman and McPherson 2009) for an extensive treatment of why these issue matter strongly for welfare computation based on preference satisfaction.

³See Paul (2014) for a detailed explanation how rational choice under risk and uncertainty does not solve the epistemic problem—choice under risk and uncertainty refers to probabilities, not subjective utilities.

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