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SHAPING CHANGE

STEERING INDIA TOWARDS A LOW-CARBON LIFESTYLE

MARCH 2024



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EXECUTIVE SUMMARY

Climate change is a problem so massive in scope that individual action alone cannot solve it. We need systemic reform, with strong policy support from national governments and international bodies; we need businesses to revolutionise the way they operate. But individual action does still constitute a key part of the puzzle. In many domains – such as emissions from vehicles, food, electricity consumption, and waste – the sum of the contributions of individual consumers constitutes a huge share of the pie. Individual behaviour thus remains a worthwhile level of analysis.

Our research adopts the RARE framework for examining the barriers to, and facilitators of, behaviour change (Centre for Behaviour and the Environment, 2023). This framework examines the role of emotional appeal, social influence, choice architecture, information, material incentives, and rules and regulations. We apply this framework to four key areas of behaviour, selected based on their climate impact and on their amenability to change: mobility/transport, food, energy use, and waste disposal.

Here is a summary of our study's insights into the structural, social, and individual barriers and facilitators to behaviour change in these four domains:

HOW WE POWER OUR LIFESTYLES:

Our survey respondents show high inertia about upgrading to energy-efficient household appliances. The higher upfront cost of efficient appliances, combined with the hyperbolic discounting of future savings on electricity bills, means that, for most households, spending more money now to save money later would not be a very effective nudge. Encouragingly, however, we find a foot-in-the-door effect, such that households that have recently purchased an EV show more interest in installing rooftop solar panels, or vice versa. This suggests a window of opportunity, whereby a household that

has taken one low-carbon step can be nudged to perform other actions congruent with this new green self-image.

The Indian government is promoting solar energy as the renewable of choice. Our study finds information gaps among consumers regarding the functioning of solar panels. Informational campaigns would fill this knowledge gap and encourage uptake, as would simplifying and streamlining the bureaucratic process for selecting vendors and availing of subsidies. Similar information gaps exist about the performance and efficiency of five-star ACs, and about tactics for optimal AC usage.

HOW WE MOVE:

Private transport signals social status. Taking public transport, and walking or bicycling to commute, are linked in the Indian consciousness with the lower class. Biases and heuristics, such as the availability bias, influence how people choose to commute: given that climate-friendly transport options in India tend not to be salient, people default to choosing less sustainable transport alternatives.

Electric Vehicles (EVs) are being promoted by the Indian government as a low-carbon choice. The present work finds that knowledge gaps about EVs limit their adoption, as do EV vendors' suboptimal sales scripts. We offer insights around making non-motorised transport (NMT) more attractive, making public transport easier to use, and linking NMT and public transport in the public consciousness with better health outcomes as well as higher social status. In particular, we explore in-depth the decision to purchase EVs, and find that access to attractive subsidies, and word-of-mouth from an acquaintance with positive experiences with EVs, facilitate this decision. We also offer suggestions about vendor scripts and automobile store displays.

HOW WE DISPOSE OF WASTE:

Segregation of household waste at the source has become mandated in many states across India. However, many households report a knowledge gap about exactly what item belongs in which kind of rubbish bin. Furthermore, respondents often report perceiving waste segregation as a high-effort endeavour, and as someone else's problem. As a potential solution, which has been successful elsewhere, providing more accessible and detailed sorting guidelines at appropriate locations, as well as disseminating the concrete downstream benefits – including the health benefits – of efficient waste segregation, would help motivate and simplify waste segregation.

Similarly, our survey respondents report lack of knowledge about recycling options: what items can be recycled, where, and how. Due to this information gap, perceived effort remains high, and the likelihood of adoption remains low in the current system. On the bright side, consumers show some interest in composting organic waste at home. Here, again, access to information and resources would help overcome inertia. Many consumers also show high interest in reusing items like glass containers.

All this is good news for the move towards a circular economy. We suggest establishing local, concrete, proximate goals to help create motivation for change by making visible the positive effects of individual choices on valued outcomes such as community health and aesthetics.

WHAT WE EAT:

Diets are deeply rooted in culture, acquired in early childhood, and resistant to change. Thanks to the status-quo bias, most individuals stick with established food habits, and perceive the effort of a

behavioural shift as prohibitively high. Plant-based diets are generally lower-impact; however given longstanding associations in India of meat-eating with the lower castes, any nudge towards plant-based diets must be conceived and deployed with high cultural sensitivity.

Our survey finds an uptick in eating out and ordering in, with concomitant increases in food miles and waste generation. The consumption of processed and packaged foods is also rising. Convenience is the most commonly cited motive for this trend. Conspicuous consumption has been made easier by rising incomes, changing social norms, and the availability of food outlets at every price point. We suggest health as a possible reframing to encourage sustainable eating; our sample is already concerned about, for instance, the health impacts of highly-processed foods on their children. Given high uncertainty in our sample about terms like “locally-sourced foods” and “seasonal produce,” as well as the distinction between “processed” vs. “packaged” foods, another fruitful line for intervention would involve educating children and adults about these terms, so as to nudge them towards sustainable choices.

Overall, our analysis across these four domains of behaviour suggests great potential for information campaigns that fill in knowledge gaps, for well-structured incentives that nudge individual choice, and for infrastructure support that make low-carbon choices more achievable. Encouragingly, we find interest in low-carbon lifestyles in a sizeable share of our participant pool. Another promising strategy is reframing low-carbon choices – such as cycling to commute, or opting for seasonal, organic, and/or low-processed food – in terms of their health and financial benefits. In short, there is great potential to promote low-carbon lifestyles in the Indian population via cost-effective informational and behavioural campaigns.

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CHAPTER 1

INTRODUCTION

Climate change is the defining challenge of our times. Given the size of the problem, and the slow pace of necessary change, our current scenario – of fragmented policy action, along with a disproportionate focus on technological solutions – is akin to shifting deckchairs on the sinking *Titanic*. Partly, this slow pace of change is because climate mitigation continues to be seen as primarily a technical issue requiring technological solutions. There has been relatively little focus on understanding the social and human dimensions of climate change, including how climate action intersects with wider societal goals of equity, justice, and development. While technology remains key to fighting climate change, experts agree that technology alone cannot win this fight. To achieve meaningful change, we need significant social and behavioural change.

Both individual and collective actions are critical for addressing climate change. Changes at the individual level produce collective benefits and create momentum that sets the stage for major systemic reform (e.g. Whitmarsh, Poortinga, & Captick, 2021). This makes individual behaviour a worthwhile level of analysis for intervention geared towards sustainable development.

Individual sustainable action does not occur in a vacuum. It is influenced by social structures, social norms – both descriptive and prescriptive – and by a network of contextual facilitators and barriers. Clearly, we cannot expect an individual to recycle in a city lacking recycling facilities. Furthermore, while nudges offered by governments and non-governmental bodies and placed at key decision-points may indeed cue desirable behaviours, social norms are generally far more influential. For instance, given the context of rising car ownership (i.e. descriptive social norms), any given individual becomes likelier to buy a car. Meanwhile, *prescriptive* norms implicitly relegate public transport and private non-motorised transport to the lower class, thus persuading individuals that walking, cycling, and taking the bus are acceptable options as long as one cannot financially afford a car. And the whole discussion becomes moot in areas lacking an adequate bus system or safe footpaths/cycling lanes. It is clear, therefore, that, to really understand why individuals do/do not perform sustainable behaviours, we must understand their socioeconomic, cultural, and geopolitical contexts.

Humans are deeply social creatures, wired to take their cues from fellow group members. We are embedded in a social structure, which shapes our attitudes, worldviews, and behaviours (Douglas and Wildavsky, 1982). To change individual behaviour, therefore, we must change the broader culture; this, in turn, depends on changing the social organisation. How we relate to nature highly correlates with how we relate to one another, which in turn depends on the social organisations we find ourselves in (Douglas, 1970). For a concerted effort at sustainability, therefore, there must occur a collective change in values from individualist-consumerist to community-oriented. An ethics of

care (Gilligan, 1982) must permeate our relationships, both with each other and with nature.

The transition to sustainability in the Indian context presents unique challenges. Due to India's unique and complicated history, cultural and geographical diversity, and massive socioeconomic inequities, India needs to pull millions of citizens out of poverty even as it works towards sustainability. India's cultural diversity and complexity necessitate a nuanced analysis of how various types of contexts affect individual behaviour.

PROBLEM: RISING AND UNEQUAL CONSUMPTION

India is the world's third largest emitter of greenhouse gases (Vashold, Kharas, & Fengler, 2023). Among the world's top economies, India has recently been recording the highest increases in year-on-year emissions (Friedlingstein et al., 2023). As the world's largest democracy, with a booming middle class, India's low-carbon development trajectory will have implications for both global sustainability and national development outcomes.

Equity is a major concern in this context. While average GDP is rising in India, so are indicators of socioeconomic disparity (Chancel & Piketty, 2019). The rich are getting richer, consuming more, and emitting more, while the poor are disproportionately exposed to global warming, increased frequency and intensity of natural disasters, and other negative externalities of this conspicuous consumption (e.g. Kulkarni, Kulkarni, & Gaiha, 2020). Now, however, with a government interested in both development and sustainability, we stand at a pivotal point, where legislation can correct market flaws and shift individual and collective behaviour in the right direction.

There has been relatively little focus on understanding the social and human dimensions of climate change, including how climate action intersects with wider societal goals of equity, justice, and development.

High and growing financial inequity in India is reflected in the uneven distribution of greenhouse gas (GHG) emissions. The average high-income household in India contributes 3446 kg CO₂e (carbon dioxide equivalent) per capita per year more than does the average low-income household (Sri & Banerjee, 2023). A household in the top-10% income bracket in urban India emits 15 times more carbon dioxide than a household in the bottom-10% bracket (ibid). Wealthier Indian households emit 300% more GHGs than poorer households (Kaechele et al., 2011). India thus typifies the global scenario of wide and growing socioeconomic inequities, where climate action must take account for, and attempt to correct, social inequalities.

Now, however, with a government committed to both development and sustainability, we stand at a pivotal point, where legislation can correct market flaws and shift individual and collective behaviour in the right direction. Supporting the transition to low-carbon choices in individual households would directly help offset emissions, and also has the potential to trigger systemic change, contributing to India's Nationally Determined Contributions and green growth pathway (Ministry of Environment, Forests, and Climate Change, 2022). The present study's paradigm of focussing on individual behaviour change also echoes national policies and programmes like Lifestyle for the Environment (LiFE). Launched in 2021, LiFE encourages citizens to make simple changes in their daily habits to reduce their carbon footprint, and promotes the philosophy that combating climate change is everybody's responsibility (LiFE website, 2024).

The present study showcases exploratory research on individual sustainable actions, focussing on the critical question of rising disparities in incomes and emissions. Given that climate impacts are caused disproportionately by the wealthy, and are borne disproportionately by the poor, our study constitutes a significant step in addressing sustainable and equitable development, and is a critical contribution to global climate justice.

Social change will be critical in achieving an equitable, low-carbon future: recent research suggests that social change and lifestyle choices have the potential to reduce global emissions by up to 70% by 2050 (Reynolds, 2010). To achieve equitable socioeconomic development as well as

Across the behavioural domains of food, household energy, material use and waste management, and mobility, the project explored a total of nine behavioural solutions, identified fifty interventions, and, finally, piloted three interventions for promoting climate mitigation behaviours.

climate goals, we must simultaneously address two hard problems: (1) the widening gap between the emissions of the rich and the poor, and (2) how to promote low-carbon lifestyles that also have corollary developmental benefits for the poor, e.g. by encouraging uptake of products and services that are both eco-friendly and affordable.

INTRODUCTION TO THE VOLUME

The Low-Carbon Lifestyles project (2022-2023) took a 'landscape approach' to understand sustainable choices in India: what the available options are, as well as individual-level and structural-level barriers and facilitators to their uptake. Across the behavioural domains of food, household energy, material use and waste management, and mobility, the project explored a total of nine behavioural solutions, identified fifty interventions, and, finally, piloted three interventions for promoting climate-mitigation behaviours among high-emitting middle-income and high-income households.

To organise our ideas for behaviour-change interventions, we use the framework suggested by RARE's six-pronged conception of levers and strategies for behaviour change (Centre for Behaviour and the Environment, 2023):

(1) Emotional appeal: Contrary to popular belief, humans are far from rational creatures. Our actions are deeply influenced by emotions like

pride, hope, fear, and shame, whether actual or anticipated. Our emotions, which often involve a social context, can be harnessed to motivate a transition to more sustainable lifestyles.

- (2) Social influences:** Individual behaviour can be radically shaped by the desire to imitate celebrities, authority figures, and other role models, as well as by information we pick up from our social contexts about descriptive and prescriptive norms (respectively, what other people are actually doing, and what other people think we should all be doing).
- (3) Choice architecture:** Our choices depend not just on the actual content and prospects of each alternative, but also on how these alternatives are presented or 'framed.' By modifying the context in which lifestyle decisions are made, we can direct attention to desirable behaviours, simplify decision-making, reduce the cognitive burden of choosing the more sustainable option (e.g. deploy green defaults), and use wisely-placed prompts to cue a sustainable choice.
- (4) Information:** While information gaps tend not to be the main reason for lack of sustainable behaviour, in many cases, providing instructions and guidance, and building awareness and understanding, can move individuals towards sustainable behaviour.
- (5) Material (dis-)incentives:** Rewards and penalties, financial or otherwise, can make unsustainable behaviours less likely, and sustainable behaviours more likely.
- (6) Rules and regulations:** Prohibitions and mandates can also shape behaviour, as long as adequate mechanisms exist for oversight and enforcement.

OVERVIEW OF CHAPTERS

The present study selected a handful of high-impact individual sustainable behaviours, and examined the social, psychological, and cultural factors that influence their uptake. With swelling urban populations, emissions are rising, particularly from food consumption, transport, material use and waste management, and energy consumption.

Urban mobility and transportation, both public and private, contribute 40% of all transport emissions (Li et al., 2023). Despite advancements in low-carbon transport technologies, this figure is expected to double by 2050 (ibid). In India, rising incomes and urbanisation are likely to keep driving up sales of private vehicles, and thus of transport-related emissions.

Waste generation contributes approximately 4% of India's total GHG emissions (Kumar & Sharma, 2014). Waste-related emissions will likely continue to grow, especially given the flawed and patchy system for the collection and treatment of municipal solid waste in India. We conceptualise waste management within the larger context of material use – since behaviours around consumption, reuse, and recycling, and waste segregation are all correlated at the individual level (e.g. Ayalon & Schechter, 2013).

Power generation and transport together accounted for over 66% of all CO₂ emissions from fuel combustion in 2019 (International Energy Agency, 2023). India's CO₂ emissions from household electricity consumption accounts for approximately 10% of CO₂ emissions attributed to household energy consumption globally (ibid).

Global food consumption contributes anywhere between 22% and 37% of global GHG emissions (Li et al., 2023). Of this figure, India contributes 6.3% of global emissions from food systems. With growing wealth, and growing reliance on the global industrial food system, food-sector emissions in India are likely to continue to rise (Vetter et al., 2017).

The size of emissions from these four sectors, and the potential for individual change in these areas of everyday behaviour, drove their selection as our four focus areas. The following four chapters set out our study design, findings, and recommendations in each area.

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CHAPTER 2

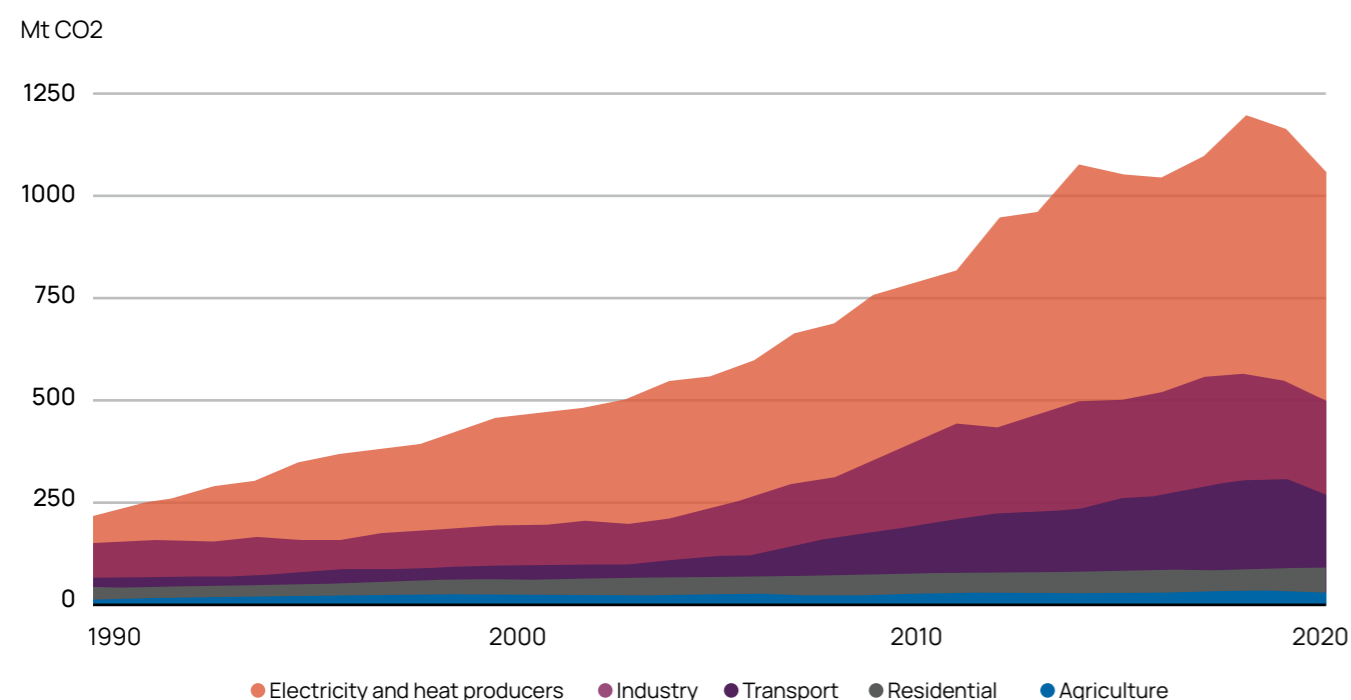
INSPIRING BEHAVIOUR CHANGE FOR LOW-CARBON HOUSEHOLD ENERGY

ENERGY EMISSIONS: THE INDIAN CONTEXT

Electricity and heat production are the largest sources of CO₂ emissions in India (IEA, 2022). A significant proportion of these emissions are from the residential sector, which contributes to 25% of India's electricity consumption. These emissions are rapidly growing, suggesting the high potential of optimising electricity use to combat rising electricity-driven emissions (*ibid*).

India is standing at a pivotal moment for shaping the future of its energy emissions, particularly within households. With a growing population and increasing urbanisation, there is a pressing need to address electricity consumption patterns. Currently, household energy consumption in India heavily relies on thermal-powered electricity. However, given the current government's focus on renewable energy, we have a unique opportunity to leverage emerging low-carbon innovations and technologies, as well as encourage low-carbon energy choices at the level of individual households.

FIGURE 1: CO2 emissions by sector, India 1990-2020



Source: International Energy Agency, 2022

The adoption of low-carbon and sustainable energy practices is dependent on individual choice. Various factors such as the availability and accessibility of electricity infrastructure (Mulugetta et al., 2019), the cost of energy (Khandker et al., 2013), awareness of energy-saving practices and their benefits (Abdullah et al., 2022), and perceptions of comfort, reliability, and ease of use (Steg et al., 2015), all influence energy consumption choices. It is evident that promoting low-carbon energy consumption involves not only improving the availability of and infrastructure for renewable energy sources, but also requires behavioural interventions to encourage energy-efficient practices within households.

OVERVIEW OF LOW CARBON ENERGY CONSUMPTION PRACTICES IN INDIAN CITIES

As part of the project, we conducted a comprehensive survey of sustainable energy consumption practices worldwide. Based on the literature, 10 distinct solutions were identified and then evaluated within the context of energy consumption in Indian cities. The solutions were

examined based on their current adoption rates in India, mitigation potential, and alignment with existing policies (see Table 1). The 10 solutions were prioritised according to their potential for substantial GHG emissions reduction, equity considerations, and scalability. This prioritisation process also factored in the feasibility of implementation, encompassing supply-side facilitators such as robust policy support.

At the end of this project we selected three solutions for behavioural research: energy-efficient cooling appliances, rooftop solar installations, and electricity-saving behaviours. We then identified five low-carbon behaviours to examine:

1. Encouraging people to purchase and install rooftop solar panels
2. Encouraging people to purchase 5-star air conditioners (ACs)
3. Encouraging people to operate ACs at an optimal temperature
4. Encouraging people to regularly maintain ACs
5. Encouraging people to reduce electricity consumption

TABLE 1: Prioritised low-carbon energy consumption solutions

Energy Solutions	Potential Impact		Feasibility		Total
	Mitigation	Scalability	Uptake	Supply-Side Facilitators	
Rooftop Solar Panels	3	2	2	3	10
Energy-Efficient Cooling Appliances	3	2	2	3	10
Encouraging Electricity-Saving Behaviours through Behavioural Communication	3	3	2	2	10
Smart Meters	3	2	1	3	9
Energy-Efficient LED Lamps	3	1	2	3	9
Energy-Efficient Tubular Fluorescent Lamps (TFLs)	2	2	2	2	8
Energy-Efficient Refrigerators	2	3	1	1	7
Energy-Efficient Fans	1	3	1	1	6
Energy-Efficient Televisions	1	3	1	1	6
Energy-Efficient Electric Water Heaters	2	1	1	2	6

- (1) The project conducted diagnostic fieldwork over two distinct studies. The first study was conducted in Surat and Ahmedabad to understand the barriers and facilitators related to the purchase of rooftop solar panels amongst high-income households. Semi-structured interviews were conducted with 35 households and solar-panel suppliers across the two cities.
- (2) The second study was conducted in Delhi NCR to understand the barriers and facilitators related to behaviours around energy-efficient air conditioners, specifically the purchase of 5-star ACs, the usage of ACs at optimal temperatures, and the regular maintenance of ACs. Semi-structured interviews were conducted with 38 households.

- (3) The project also conducted an analysis through a literature review of electricity-saving behaviours. This review explored different energy-saving nudges that have been empirically tested using electricity bills, including strategies like public commitments, goal-setting, information, feedback, and monetary rewards. This study was used to design a pilot intervention, which was selected as part of *Government of India's Mission Life Compendium: Thinking for Our Planet – 75 ideas to promote Life* (NITI Aayog, 2023).

The project identified a series of demand-side and supply-side barriers that facilitate or limit the uptake of these behaviours:

BARRIERS TO AND FACILITATORS OF THE UPTAKE OF LOW-CARBON ENERGY CONSUMPTION BEHAVIOURS

LOW-CARBON ENERGY-CONSUMPTION BEHAVIOUR	DEMAND-SIDE OR INDIVIDUAL BARRIERS	SUPPLY-SIDE OR EXTERNAL BARRIERS	FACILITATORS
<p>Purchase and Installation of Rooftop Solar: How can households who have roof rights be motivated to purchase rooftop solar panels?</p>	<p>Present bias: The high upfront cost of solar panel installation deters many households, especially those without sufficient funds or access to loans. Additionally, the discrepancy between government benchmarks and actual costs, influenced by taxes and household dynamics, often exceeds consumers' expected budgets, causing hesitation about the purchase.</p> <p>Sludge around buying and installation: The process of purchase and installation can be tedious and lengthy: the professional expertise required to assess one's home for solar panels is often unavailable or inaccessible; local electricity boards' cooperation for meter installation is not always easy.</p> <p>Complicated subsidy process: Customers and suppliers are often confused about the subsidy process due to confusion at several levels: the multiple types of subsidies available, who can avail the subsidy (supplier or customer) and the process of availing it.</p> <p>Information gaps: There are significant gaps in understanding essential facts about solar panels, their benefits, functioning, and long-term costs, which cause reluctance to purchase. First, consumers have doubts regarding functionality during different seasons, concerns about experiencing blackouts at home, and a lack of awareness about the environmental and economic advantages of solar energy. Second, consumers exhibit hesitancy in investing in solar panels due to uncertainties about repair costs, doubts about the long-term investment value, and apprehensions regarding maintenance tasks such as cleaning. Finally, inadequate knowledge about warranties on solar panel components, and the claims process, adds to the reluctance in adopting solar panels.</p> <p>Status quo bias: There are perceptions that solar panels are only for the rich or for intellectuals who have enough money to do good for the environment.</p> <p>Anchoring bias: While both the price and process of installing solar panels has changed in recent years, acquaintances who bought solar panels in the past, and who experienced a complicated installation process and/or unexpectedly high costs, serve as negative word-of-mouth, dissuading potential consumers.</p>	<p>Vendor ineptitude: Vendors are often underprepared to answer questions about solar panels. Many vendors have knowledge gaps about government incentives and fail to offer consumers accurate estimates of the total long-term costs and benefits of ownership.</p> <p>Unorganised market structures: The solar panel market is both unorganised and unregulated, which poses challenges, with unregistered vendors offering lower prices but often compromising on service quality, post-installation support, and crucial safety measures like proper earthing. Additionally, vendors lack effective marketing strategies, depending solely on word-of-mouth referrals for new customers.</p> <p>Lack of transparency in costs, subsidies, and processes: The lack of transparency in solar panel pricing, with discrepancies between government quotes and vendor prices (given that government rates exclude taxes and quality considerations), causes confusion and distrust among consumers. Additionally, delays and complications in subsidy crediting, exacerbated by uncooperative DISCOM officials and an absence of dedicated personnel for solar-panel installation procedures, force homeowners and vendors to navigate a complex, ever-changing process.</p>	<p>Social norms and social influence: Solar panel adoption is increasingly seen as a status symbol and a sign of forward thinking. This perception predisposes upwardly mobile consumers to purchase solar panels so that they, too, can be seen in a positive light. This has been evidenced by campaigns by influential political figures like Prime Minister Modi, which have encouraged people in Gujarat to purchase solar panels.</p> <p>Long-term cost savings: The savings on electricity bills, with consumers typically recouping purchase costs within a few years, along with minimal maintenance costs and long warranty periods, are a driver of solar panel purchase and installation.</p> <p>Brand recognition: The presence of trusted brands in the solar industry increases customer confidence and encourages purchase.</p> <p>Purchase triggers: The purchase of solar panels can be triggered by other household decisions or circumstances, such as home renovations, an increase in income, government subsidies, a recent rise in electricity bills, and plans to purchase electric vehicles (EVs).</p> <p>Government policies and initiatives: Government mandates and financial incentives significantly encourage solar adoption for newly-constructed housing complexes by reducing upfront costs, thereby improving affordability.</p>

LOW-CARBON ENERGY-CONSUMPTION BEHAVIOUR	DEMAND-SIDE OR INDIVIDUAL BARRIERS	SUPPLY-SIDE OR EXTERNAL BARRIERS	FACILITATORS
<p>Purchase of 5-star ACs: How can households be motivated to purchase a 5-star AC?</p>	<p>Knowledge gaps about environmental impact: Despite widespread awareness about the system of energy-efficiency star labels, consumers show limited understanding of the environmental benefits of higher-star products. In consumers' minds, the star ratings are primarily associated with cost savings rather than environmental benefits.</p> <p>Present bias: Given the higher upfront cost of 5-star ACs and the lack of understanding of long-term cost savings, consumers often opt for lower-star or no-star ACs.</p> <p>Misperception around AC performance: Consumers express scepticism about the tangible performance superiority of 5-star ACs; this serves as a deterrent to purchase.</p>	<p>Inadequate sales strategies: Inadequate communication from sales agents hampers consumer understanding of the full benefits of 5-star ACs. Agents often promote only a limited set of benefits such as decreased electricity bills and reduced compressor damage. Agents sometimes even convey doubts about the superiority of higher-rated ACs, hindering informed decision-making by consumers.</p> <p>Limited supply: The limited availability of 5-star ACs stocked by retailers limits access to higher-rated, environmentally-friendly alternatives (Khosla et al., 2021).</p>	<p>Word-of-mouth recommendations: Credible, positive recommendations from friends, family members, and neighbours help drive the sale of 5-star ACs.</p> <p>Trained sales agents: Sales agents who possess strong communication skills and have the knowledge and ability to answer key questions about the long-term cost savings and operations of 5-star ACs are a powerful driver in the sales of these products.</p>
<p>Improving AC Usage: How can households using ACs be encouraged to use them at optimal temperature settings?</p>	<p>Knowledge gaps about optimal AC usage: Consumers have little to no awareness about optimal AC settings despite guidelines by the Bureau of Energy Efficiency (BEE) guidelines recommending a temperature set point of 24 degrees Celsius and fan at speed 2 for both comfort and electricity savings. The study found that: a) respondents set the temperature at an average of 21 degrees and b) many of them had misconceptions like believing that keeping the thermostat low was better for maintenance.</p>	<p>Limited outreach: Consumer awareness programs run by BEE and AC manufacturers do not highlight the significance of regular servicing in optimising the energy utilisation of ACs (Bhasin et al., 2020).</p>	<p>N/A</p>
<p>AC Maintenance: How can households be encouraged to regularly maintain and service their ACs?</p>	<p>Knowledge gaps about optimal maintenance practices: Consumers typically fail to adhere to guidelines which suggest servicing ACs twice a year to optimise energy efficiency. This is due to a lack of understanding amongst consumers about when to service their ACs and what a comprehensive maintenance routine entails.</p>	<p>Lack of standardised checklists for AC maintenance: There is an absence of clear guidelines and standards for consumers to understand what AC maintenance and services look like, beyond basic cleaning.</p> <p>Limited access to credible technical expertise: 5-star ACs require specialised training for servicing technicians. With no standardised training and certification programme in India, identifying the right service provider presents a barrier to adequate maintenance (Bhasin, 2020).</p>	<p>N/A</p>

LOW-CARBON ENERGY-CONSUMPTION BEHAVIOUR	DEMAND-SIDE OR INDIVIDUAL BARRIERS	SUPPLY-SIDE OR EXTERNAL BARRIERS	FACILITATORS
<p>Reducing Household Electricity Consumption: How can nudges motivate households to reduce electricity consumption?</p>	<p>Perception of electricity-saving behaviours as being high-effort: The effort of electricity-consumption reduction behaviours, such as turning off appliances when not in use, is perceived to be high. Habit inertia, and the convenience of leaving appliances on, results in excess emissions. (Karlin et al., 2012)</p> <p>Lack of awareness about household energy use: Consumers do not always know or understand their current energy use, as bills are focused on the price of electricity, not how many units are consumed monthly, or which appliance consumes how much electricity. This information should ideally be presented in an accessible, jargon-free format (ideally as part of the monthly bill) that would not impose a high cognitive processing load. In the absence of such information, consumers lack the information and motivation needed to adopt electricity-saving behaviours. (Joshi & Sen, 2021; Salamon, 2017)</p>	<p>Energy savings are limited by the need for structural investments: Residential energy demand can be reduced significantly through structural investments, including upgrades to more energy-efficient appliances and retrofits to existing household equipment (Kasser, 2017; Suárez-Varela et al., 2016).</p>	<p>Well-designed bills: Given that electricity bills are the point of contact between consumers and energy suppliers, a well-constructed billing format can inform and educate consumers even as it charges them (Brühl et al., 2019). Providing energy-saving tips in a visual format is more user-friendly and transparent than standard energy bills, and can enable them to easily comprehend helpful information.</p> <p>Possible nudges include:</p> <p>Goal setting: Ambitious goals focussed on household energy savings and feedback on how a household is faring with respect to its goals can motivate reductions in electricity consumption (Becker, 1978).</p> <p>Information provision: Providing households with power-saving tips can reduce electricity consumption (Ehrhardt-Martinez, 2011).</p> <p>Continuous feedback: Real-time information about electricity consumption and the costs of electricity use can reduce electricity consumption (McClelland & Cook, 1979).</p> <p>Rewards: Monetary rewards, based on the amount of energy saved or the percentage of month-on-month reduction, can motivate a reduction in electricity consumption (Hayes & Cone, 1977).</p> <p>Social comparison: Information about the electricity consumption of the consumer's social reference group (neighbours and peers), as compared to one's own use, can elicit competitiveness and motivate reductions in electricity consumption (Hernandez et al., 2022).</p>

SOLUTIONS AND INTERVENTIONS

A contextual understanding of the behavioural and structural barriers that limit the adoption of low-carbon mobility modes is pivotal in identifying policy levers, interventions, and solutions to improve uptake. The following are a set of strategies that can be employed to address the aforementioned barriers and encourage low-carbon mobility at the level of individual consumers and households :

Rules and Regulations:

Policies can shape consumer decision-making by mandating or prohibiting actions and behaviours. For household energy consumption, regulations and incentives can make it easier to adopt certain behaviours like purchasing rooftop solar panels.

- **Reduce sludge by streamlining rooftop solar purchase processes:** Electricity Departments and Boards and Distribution Companies (DISCOMs) can streamline processes for solar panel installation, such as prompt online approvals for plans, real-time information on available subsidies and rebates, and creating databases for certified vendors, to facilitate the purchase process for households.

Implement Development Control Regulations (DCRs):

Urban Local Bodies and Development Authorities can implement DCRs to mandate the provision of rooftop solar panels and energy-saving technologies for buildings of a certain size.

Information Provision:

Consumer misconceptions about energy reduction practices obstruct sustainable consumption behaviour. Providing accessible, jargon-free information can help address these challenges and provide knowledge that individuals can act upon.

- **Reframe and improve communication about the installation costs of rooftop solar panels:** Campaigns, information on government portals, and even mobile and computer applications can be redesigned to clearly present the cost of solar panel purchase, installation, and long-term maintenance to address consumers' information gaps. Presenting the price of solar panels as a percentage of household expenditure or via a long-term energy savings calculator can make salient the long-term savings and help overcome consumers' present bias.

PILOT: IMPROVING ENERGY-EFFICIENT USAGE OF ACS: PROVIDING JUST-IN-TIME NUDGES

The project has designed a randomised control trial (RCT) to test nudges that can encourage households to use air conditioners at an optimal temperature of 24 degrees celsius. The study is ongoing and is being conducted in five residential societies in Mumbai. The interventions being tested include: a) placement of stickers on AC remote controls to encourage households to set AC temperature at 24°C for optimal thermal comfort and reduced electricity bills; and b) a communication campaign via the housing societies' Whatsapp groups to nudge households towards adopting energy-efficient behaviours.

Insights from this pilot will be scaled up in 60,000 households in Mumbai; we are hopeful that this pilot and future work can help inform energy-savings campaigns nationwide.

This pilot is being conducted in partnership with Recylink.



Image by Freepik

Our decisions and behaviours are shaped by the influences, pressures, and examples set by others in our social reference groups. Energy-saving behaviours will seem more attractive if consumers believe that their peers are also adopting them.

- **Sales scripts:** Sales agents' biases and information gaps can be addressed through sales toolkits and improved sales scripts. Equipping sales agents with accurate information about rooftop solar will give them the confidence and ability to better promote rooftop solar panels to customers.
- **Make salient the multiple benefits of 5-star ACs:** Information campaigns can help address consumers' information gaps and highlight the multiple immediate and long-term benefits of 5-star ACs. Cost comparison charts, reframing 5-star ACs as an exciting new technology, and information about long-term savings are all points that can address information gaps and persuade customers to purchase and use energy-efficient ACs.
- **User-friendly guides for optimal AC use:** Toolkits and tips (provided at time of purchase, online, or through manufacturers' social media accounts) can help improve consumers' knowledge about how to optimise AC use for energy savings.

Choice Architecture:

The way energy-saving behaviours are framed can deter or motivate households from adopting such practices. Altering the environments and structures within which sustainable energy consumption behaviours are presented can make them easier to adopt.

- **Leverage purchase triggers for solar-panel promotion:** Target consumers who are currently making or have recently made a purchase, such as

an EV, that is a known trigger for purchasing solar panels. If rooftop solar is positioned as a beneficial product and part of a comprehensive package of sustainable consumption choices, users might be more likely to adopt it.

- **Redesign AC remote controls:** By changing the buttons and symbols on AC remotes, the optimal setting can be made prominent, making it easier for consumers to use ACs more efficiently.
- **Promotion of 5-star ACs in store display windows:** By promoting 5-star ACs in display windows or in other prominent positions, like at the front of showrooms or at eye level on shelves, sales agents are indicating the desirability of these products. Placing energy-efficient AC models in highly visible locations allows them to be the first ACs consumers see, and thus likely to spark interest.

Social Influence:

Our decisions and behaviours are shaped by the influences, pressures, and examples set by others in our social reference groups. Energy-saving behaviours will seem more attractive if consumers believe that their peers are also adopting them.

- **Frame solar panels beyond their environmental benefits:** Use behaviour change campaigns to motivate households to embrace solar panels by showcasing them as a cutting-edge, high-tech lifestyle. These campaigns could highlight immediate benefits like resilience against power cuts (depending on the kind of solar system chosen) and positioning solar energy as a reliable and uninterrupted power source.

Leverage social influencers for solar adoption: Work with influential households in a community, encouraging or incentivising them to install solar panels on their roof and serve their community as a role model for solar adoption.

Emotional Appeal:

Behaviours and decisions are often driven by our emotions, values, and current personal concerns. Messaging that directly appeals to emotions can help motivate sustainable energy consumption.

- **New symbols in the AC energy-efficiency ratings system:** New symbols, such as leaves (as opposed to the current system of stars) can give prominence to the environmental benefits of 5-star ACs, and directly link a consumer purchase with a greener planet.
- **Employing social messaging on AC usage:** By collaborating with influential figures, we can develop narratives around responsible AC usage (optimal temperature settings, frequent and holistic maintenance). Messaging can also include the use of 5-star ACs to encourage adoption.

As India transitions to renewable energy sources, the imperative to reduce energy consumption becomes increasingly important, foregrounding the need for proactive measures by households and individuals to reduce emissions that are currently largely derived from thermal power.

CONCLUSION

Household energy consumption plays a crucial role in the pursuit of decarbonisation, especially in urban areas where significant opportunities exist to both shape energy generation (e.g. via encouraging the uptake of rooftop solar) and curb rising rates of electricity consumption. As India transitions to renewable energy sources, the imperative to reduce energy consumption becomes increasingly important, foregrounding the need for proactive measures by households and individuals to reduce emissions that are currently largely derived from thermal power.

The findings of the present study in this aspect of behaviour underscore the importance of leveraging social norms and socially-influenced behaviour to drive the adoption of renewable energy generation technologies, specifically rooftop solar panels. Fruitful directions for future research include studying how information provision, purchase triggers and choice architecture, and social influences can enable widespread adoption of renewable energy technologies at the level of individual consumers and households.

The present study highlights the potential for energy savings through behavioural interventions, especially in domains like household cooling. However, beyond interventions to drive optimal cooling practices and investments in energy-efficient technologies, consumers' high effort perception associated with energy-saving behaviours warrants further research. Reshaping consumers' perceptions of the relative costs and benefits of energy-saving behaviours and technologies will be key to helping India transition to a low-carbon economy.

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CHAPTER 3

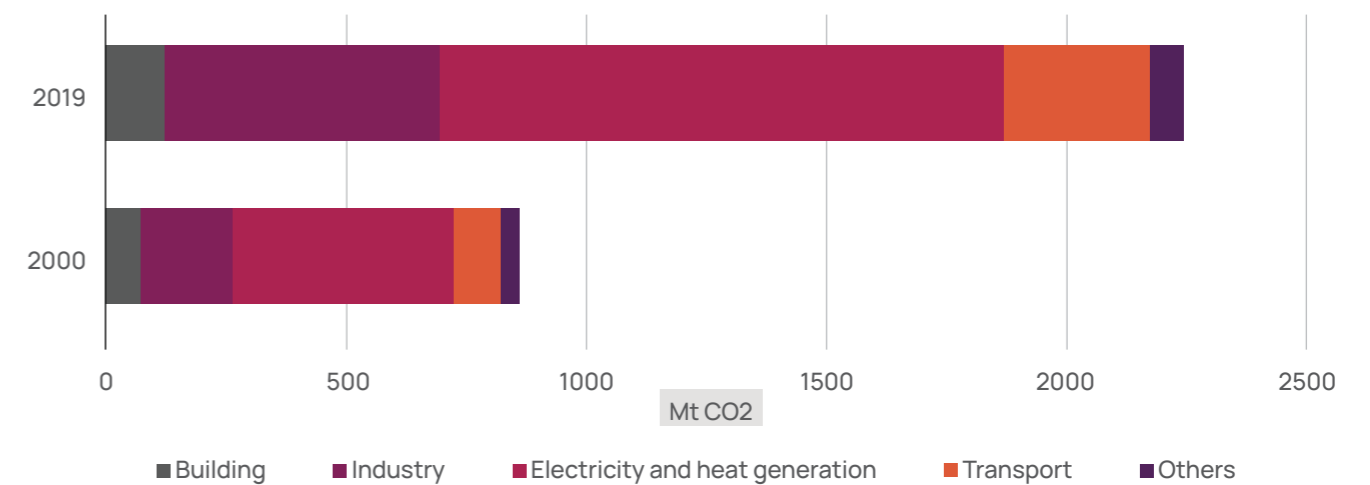
INSPIRING BEHAVIOUR CHANGE FOR LOW-CARBON URBAN MOBILITY

TRANSPORTATION EMISSIONS: THE INDIAN CONTEXT

Over the last twenty years, India's transportation sector has seen rapid growth of emissions, increasing by 224% between 2000 and 2019 (see Figure 2) (IEA, 2022). While transportation currently generates only 14% of total carbon dioxide (CO₂) emissions from fuel consumption, this figure is expected to continue to grow, both in total volume and as a proportion of total emissions.

India stands at a pivotal moment to shape the future of its transportation emissions, especially in cities: as of now, only 30% of urban residents rely on private vehicles (Jana & Malladi, 2015), and transport emissions contribute to a smaller share of emissions than the global average (IEA, 2022). However, with increasing income and rising aspirations,

FIGURE 2: CO₂ emissions by sector, India 2000 - 2019



Source: International Energy Agency, 2021

more households are likely to acquire private, motorised vehicles. There is great potential to leverage emerging low-carbon innovations and technologies such as electric vehicles or ride-splitting applications, and to promote non-motorised and public transportation through modal shifts, in order to decarbonise urban mobility.

However, the adoption of low-carbon mobility modes is contingent on public acceptance of these technologies. Increasing the uptake of sustainable mobility in cities requires addressing demand-driven barriers to adoption through behavioural change interventions as well as infrastructure improvements.

OVERVIEW OF LOW-CARBON MOBILITY MODES IN INDIAN CITIES

As part of the project, we conducted a comprehensive study of low-carbon mobility modes. Based on the global literature, 13 distinct mobility modes were identified and then evaluated within the context of mobility in Indian cities. The modes were examined based on their current

adoption rates, emissions mitigation potential, and alignment with existing policies. The 13 modes underwent prioritisation according to their capacity for substantial carbon emissions reductions, equity considerations, and scalability (see Table 2). Additionally, the prioritisation factored in the feasibility of implementation, encompassing supply-side facilitators such as robust policy support and existing uptake levels.

The project selected four target behaviours for behavioural research: private electric vehicles (EVs), walking, cycling, and using public transport, especially metro systems. It then identified five low-carbon behaviours to examine:

1. Encourage people to purchase an EV
2. Encourage sales agents to sell and promote EVs
3. Encourage people to use the metro to commute
4. Encourage people to walk for short-distance trips
5. Encourage people to cycle for short-distance trips.

TABLE 2: Prioritisation matrix for low-carbon mobility modes

Mobility Solutions	Potential Impact		Feasibility		Total
	Mitigation	Scalability	Uptake	Supply-Side Facilitators	
Electric Vehicles	3	3	2	3	11
Non Motorised Transport	3	3	3	2	11
Public Transportation	3	3	2	2	10
Hybrid Vehicles	2	1	1	2	6
Fuel Switch	3	1	1	1	6
Work from Home	1	2	2	1	6
Paratransit	2	3	2	1	8
Car-pool	3	3	1	1	8
Ride Sourcing	1	2	2	3	8
Vehicle Sharing	1	1	1	2	5
Shared Micro-Mobility	1	2	2	2	7

The project conducted diagnostic fieldwork over four distinct studies:

(1) The first study was conducted in Mumbai and Delhi to understand the barriers and facilitators related to the purchase of electric vehicles. Both cities were chosen due to the presence of government EV policies with varying incentives, and with non-negligible existing levels of uptake. Semi-structured interviews were conducted with 16 respondents across both cities from

two categories: (a) residents who had already purchased an electric car in the last year, and (b) residents or who were looking to buy a new car (not necessarily an EV).

(2) The second study was conducted in Delhi to understand the barriers and facilitators related to the sale of electric cars. Delhi was selected for project fieldwork given its EV-incentivising policy, the relatively high number of EV dealerships, and the relatively high current uptake of EVs. The



Photo by Shivam Pandey from Pexels

project conducted semi structured interviews with 12 respondents in Delhi, including car dealership managers and floor sales agents to understand sales tactics, strategies, and training for selling EVs. The project also conducted mystery shopping, where researchers visited nine dealerships and posed as potential customers to evaluate sales agents' effectiveness in answering questions and promoting EVs.

(3) The third study was conducted in Delhi NCR to understand the barriers to and facilitators of the use of the city's metro-rail system. Delhi was selected for fieldwork given the city's extensive metro coverage and high metro ridership. The project conducted semi-structured interviews with 29 participants who both use and do not use the metro, and who live and work within one kilometre of a metro station.

(4) The fourth study was conducted in Panaji to understand the barriers and facilitators related to the use of non-motorised mobility modes, namely cycling and walking. Panaji was selected as the site of this study due to its infrastructure, compact size, and the design of its road network. The study conducted semi-structured interviews with 30 respondents from two categories: (a) residents who already walk or cycle as a transportation mode, and (b) recreational walkers or cyclists, who currently use a private motorised vehicle to commute, but who live within a reasonable distance from workplaces for using non-motorised modes of transport .

The project identified a series of demand-side and supply-side facilitators of and barriers to the uptake of these low-carbon mobility behaviours:

BARRIERS TO AND FACILITATORS OF THE UPTAKE OF LOW-CARBON MOBILITY MODES

LOW-CARBON ENERGY-CONSUMPTION BEHAVIOUR	DEMAND-SIDE OR INDIVIDUAL BARRIERS	SUPPLY-SIDE OR EXTERNAL BARRIERS	FACILITATORS
<p>Purchase of Electric Vehicle: How can consumers who are planning to buy a new car be motivated to opt for an EV?</p>	<p>Present bias: Thanks to present bias, the higher upfront costs of EVs (as compared to conventional cars) are more prominent in consumers' minds than are the long-term savings. Consumers also lack understanding about available subsidies/rebates that can bring down the upfront cost of acquiring an EV.</p> <p>Risk aversion: Consumers believe that the range of an EV, even when fully charged, won't meet their needs. Consumers also overestimate the risk of getting stranded while driving an EV due to perceptions that charging infrastructure is limited and unreliable. These beliefs and perceptions combine to make an EV appear a high-risk purchase.</p>	<p>Ability to charge at home: Consumers who lack a secure parking spot in their residential societies express concerns about unreliable access to a parking space with an outlet to charge an EV.</p>	<p>Environmental values and beliefs: Our survey finds that consumers who express pro-environmental attitudes are more likely to be concerned about low-carbon mobility and air pollution, and to buy an EV.</p> <p>Prior experience with an EV: Consumers who have experienced driving or sitting in a friend or family member's EV are more confident about the new technology and more likely to buy an EV.</p> <p>Designated parking spot: Consumers who have a designated parking spot where they can install a charger are less likely to express range anxiety and loss aversion and more likely to express the intention to buy an EV.</p> <p>Buying a second car: Consumers who already have a car are more likely to be comfortable with an EV, since they know that they have a backup vehicle for longer trips.</p>
<p>Sale of Electric Vehicles: How can sales agents at car dealerships more effectively influence consumers to purchase an EV rather than a non-EV?</p>	<p>Knowledge gaps: Our survey finds that car sales agents are underprepared to promote EVs, despite training. Many agents have knowledge gaps about government subsidies and incentives specific to EVs, and are unable to provide potential buyers with estimates of the total cost of ownership and long-term savings.</p> <p>Under-identification of "suitable" buyers: Sales agents have biased perceptions of who is a suitable potential buyer of an EV. These perceptions are based on limited information, such as buyers' jobs and income levels and the brand of their current car. Mis-categorising buyers, and under-identifying likely prospects, results in sales agents missing opportunities to sell EVs.</p> <p>Biases around range and charging: Sales agents express doubts about their own car company's official data about EVs' ranges, exacerbating customers' fears. They also have limited awareness about charging infrastructure in the public realm, and may incorrectly inform potential buyers that there is not enough charging infrastructure available to safely drive an EV.</p>	<p>Limited availability of EVs in the market: Consumers use multiple criteria when choosing a car. Not all of these criteria are fulfilled by the currently available models of EVs. The stock of EVs at any given showroom is limited. Expected delivery times may also be long. These market limitations sway some potential buyers away from an EV.</p> <p>Poor visibility of EVs in showrooms: Some showrooms place EVs at the back rather than in prominent spots. Thus, consumers without prior knowledge of and interest in EVs are less likely to notice available EV models or ask sales agents about them.</p> <p>Difficult test-drive processes: Test drives are a key factor in motivating consumers to opt for an EV, since consumers understandably want to test the performance and features of the car. However, many showrooms have lengthier procedures to approve a test drive for EVs as compared to other vehicles.</p>	<p>N/A</p>

LOW-CARBON ENERGY-CONSUMPTION BEHAVIOUR	DEMAND-SIDE OR INDIVIDUAL BARRIERS	SUPPLY-SIDE OR EXTERNAL BARRIERS	FACILITATORS
<p>Commuting via Delhi Metro: How can commuters using private vehicles to commute be motivated to switch to taking the metro?</p>	<p>Perceptions around lack of comfort (status quo bias): Car users prefer the comfort of door-to-door commuting in their private vehicles as compared to the metro, which often requires combining with other modes of transport, and which also tends to be crowded during rush hour. Problems with first-and-last-mile connectivity also render the metro an inconvenient option.</p> <p>Perceptions around lack of safety (availability bias): Non-metro users' perceptions around lack of safety on the metro stem from anecdotal experiences where an acquaintance took the metro and was pickpocketed.</p> <p>High effort perception: Car users perceive the metro as a more time-consuming mode of transportation, despite the fact that, given dense traffic, private vehicles are often the slower option. The effort of taking the metro, getting to the metro station, walking inside the station, and getting from the end station to their destination, confounds commuters' perceptions of total travel time.</p> <p>Social norms: Vehicle ownership is associated with higher status, with motorbikes and cars being regarded as a symbol of success, while the metro is perceived as catering to a lower-income demographic. Our study showed that commuters think of the metro as a stepping stone and stop using it after being able to afford a private vehicle.</p>	<p>Metro infrastructure and fare structures aren't designed for trip-chainers: Women and caregivers are likely to have to make multiple trips every day (e.g. to schools, workplaces, shops, etc). The fare structures of the Delhi Metro are not conducive to multiple trips, which may become expensive.</p> <p>Inaccessibility: Some stations are not accessible to non-able-bodied commuters due to the lack of elevators and long walking distances to switch lines.</p>	<p>Time savings for long-distance commuters: Long-distance commuters are more likely to use the metro, since the time saving is significant.</p> <p>Ladies' compartment: Women feel comfortable and safe due to the provision of a separate ladies' compartment.</p> <p>Reliable and frequent trains: The metro schedule is reliable as trains adhere to a predetermined schedule, unlike traffic, which is unpredictable.</p> <p>Parking can be expensive or difficult to find: Commuters tend to opt for the metro when parking might be expensive or difficult to find at their destination.</p>
<p>Walking for short trips: How can commuters be encouraged to walk for short-distance trips (up to 4 km to commute and 800 meters for last-mile connectivity*)?</p> <p>*Distance estimates as per MoUD (2014)</p>	<p>Perceptions around safety: Women are more likely to be hesitant about walking, especially after dark or when they are unfamiliar with the city or neighbourhood.</p> <p>Social norms: Vehicle ownership is associated with higher status, where motorbikes and cars are regarded as a symbol of success, while walking is perceived as a mode of transport suitable for lower-income communities.</p> <p>Perceptions of the purpose of walking: Among wealthier survey respondents, walking is not associated with purpose-driven trips like running errands, travelling, or commuting and is instead viewed exclusively as a form of exercise or a recreational activity.</p>	<p>Limited walking infrastructure: Due to the absence of continuous, well-lit, and safe walking paths, pedestrians often find themselves walking on the road alongside moving vehicles, endangering their health and comfort, and would thus prefer to commute in a motorised vehicle rather than walking.</p> <p>Extreme weather: Walking in the extreme heat or in rain can make the experience unpleasant, difficult, and/or dangerous.</p>	<p>Health-consciousness: Commuters are more likely to incorporate walking into their daily commutes and routines when they have a health-related goal like maintaining a healthy weight, reducing stress, or staying fit.</p> <p>Environmental values: Survey respondents who reported caring about the environment and their carbon footprint, especially youth and young adults, were more likely to walk as a means of commuting.</p>
<p>Cycling for short trips: How can commuters be encouraged to cycle for short-distance trips*?</p> <p>*Defined by Jeroen et al. (2010) as <7.5 km.</p>	<p>Perceptions of the purpose of cycling: Cycling is not associated with purpose-driven trips like running errands, travelling or commuting and is instead viewed exclusively as a form of exercise or a recreational activity. This functional fixedness prohibits people from cycling to commute.</p>	<p>Limited cycling infrastructure: Recreational cyclists enjoy cycle rides outside rush hour, which allows them to drive safely on city streets that lack designated cycling infrastructure. Cyclists state that without designated lanes, safe bicycle parking, adequate lighting, and workplace infrastructure like showers, cycling is inaccessible as a means of commuting.</p>	<p>Cycling as bonding activity: Some survey respondents enjoy cycling in groups, with family members or friends, and look forward to cycling as time spent with loved ones.</p>

SOLUTIONS AND INTERVENTIONS

A contextual understanding of the behavioural and structural barriers to and facilitators of the adoption of low-carbon modes of mobility is pivotal in identifying policy levers, interventions, and solutions to improve uptake. The following set of strategies can be employed to address the aforementioned barriers and encourage low-carbon mobility:

Rules and Regulations:

Policies can shape decision-making by mandating or prohibiting certain actions and behaviours. For low-carbon mobility, regulations and incentives can make it easier for consumers to adopt certain behaviours, like purchasing an electric car. The following behaviourally-informed regulations and policies might encourage the uptake of low-carbon mobility:

- **State EV policies:** Through EV policies, states have the ability to generate and boost demand for electric vehicles through the following provisions:
 - o **Financial incentives:** To overcome present bias and allay concerns around the high upfront costs of EVs, states can provide subsidies and other financial incentives like road-tax exemptions and registration-fee waivers to mitigate the high upfront cost of purchasing an EV, and make EV ownership more attractive.
 - o **Regulations:** State EV policies can set benchmarks and standards for EV charging infrastructure. This in turn, could improve the number of chargers available in the public realm, the design and visibility of chargers so that consumers are aware of their locations, and even enable private actors and charging operators to set up more stations through profitable business models.
- **City parking policies:** The easy availability of on-street parking for private vehicles, especially at a low cost, is one of the biggest deterrents to the adoption of low-carbon transport modes such as the metro. Cities can employ the following tactics:
 - o **Increase parking fees:** While city-specific analysis is required to understand the price elasticity of parking, our study confirms that

at least some private vehicle owners would switch to public transportation if parking fees became exorbitant.

- o **Reduce the number of parking spaces:** Similarly, commuters become less likely to drive when parking spots are unavailable at their destination. There are many examples of cities successfully reducing parking spaces (e.g. Berg, 2016) and reinvesting this space in parklets and non-motorised infrastructure.
- o **Priority EV parking:** Cities can also choose to prioritise EV parking (spots with EV chargers) in prime locations, to encourage EV purchase by making it an easier and more attractive option.

Information Provision:

Misconceptions about low-carbon mobility modes prohibit sustainable transportation choices. Information can help address these challenges and provide knowledge that consumers can act upon.

- **EV sales toolkits:** Sales agents' biases and information gaps can be addressed through sales toolkits and scripts. Equipping agents with accurate information about electric vehicles will give them the confidence and ability to promote EVs to potential buyers.
- **Real-time information about the Metro:** The high effort perception of using the metro can be countered with real-time information about train status and timings on wayfinding apps so that commuters can accurately estimate the duration of their travel. Improved maps and signage in metro stations can also reduce the burden of travel by making it easier for commuters to find the correct platforms, entry and exit gates, and other services such as ticketing and security.
- **EV parking:** Providing real-time information on EV chargers, such as location, availability, cost, type of charger, charging time, queue status, and online payment options can significantly reduce information gaps. This enhanced accessibility and transparency can encourage more commuters to use EVs, addressing both range anxiety and misconceptions about the inadequate availability of public charging infrastructure.

Misconceptions about low-carbon mobility modes prohibit sustainable transportation choices. Information can help address these challenges and provide knowledge that consumers can act upon.

Improved Infrastructure and Choice Architecture:

Providing better infrastructure and reframing information about mobility modes can help commuters to make low-carbon mobility choices. Altering the environments and structures within which low-carbon mobility options are presented can make them easier to adopt.

- **Non-motorised transportation (NMT) infrastructure provision:** Cities can provide designated, safe, well-lit and easy-to-access walking and cycling infrastructure to encourage users who have safety concerns to adopt modes of transport like walking and cycling. Cities can nudge citizens to think of NMT as the default mode of transport by allocating more parking spaces and road lanes for NMT.
- **Declutter metro entrances:** The approach to metro stations in India can be overwhelming, since public roads tend to be multi-use (retail and vending, taxi and auto stands, recreation and seating), and lacking in easy, clear, and visible means of access. To address this challenge, which adds to the high perceived effort of metro use, metro authorities and public works departments can create designated vending and taxi/auto zones, ensuring clear visibility and accessibility of metro stations.
- **Promotion of EVs in display windows:** By promoting EVs in display windows or other prominent locations in showrooms/dealerships, sales agents can signal the high value of EVs. By positioning these vehicles in highly visible locations, they are likely to be the first options potential buyers see, and will thus seem more attractive and interesting.

Social Influences:

Our decisions and behaviours are shaped by the influences, pressures, and examples set by others. Low-carbon mobility modes will seem more attractive if consumers believe that their peers are also adopting them.

- **Frame non-motorised transport (NMT) as a social activity:** Participating in events such as designated cycling or walking commute days, along with friendly competitions among colleagues or friends to achieve the highest step count or most frequent cycling days per month, can effectively encourage shifts in transportation preferences and habits. Such activities are socially engaging, involve participation and positive competition, and foster a sense of collective endeavour with shared goals related to sustainability.
- **Normative shifts to encourage uptake of public transport:** Normative shifts to promote metro use can help dispel stigmas and the perception of public transport as a low-income option. Campaigns depicting influential and aspirational figures using public transport can motivate others to do so too.
- **EV promotional events:** Events that provide hands-on experience allowing consumers to test drive electric vehicles (EVs) while engaging in discussions with current EV owners can serve to bridge knowledge barriers related to EV purchases. By uniting prospective EV buyers with existing EV owners in a setting that encourages dialogue, and the dissemination of credible information, potential vehicle buyers can be encouraged to opt for EVs.

Emotional Appeals:

Behaviours and decisions are often driven by how we feel, our values, and our personal and emotional concerns. Messaging that directly appeals to emotions and feelings can help motivate sustainable mobility behaviours.

- **Environmental campaigns:** Tailored messaging that links the use of low-carbon transportation methods like the metro, walking, or cycling to their environmental advantages, such as decreased emissions and air pollution, have the potential to resonate with a shared sense of societal responsibility, optimism for a better future, and a feeling of pride and empowerment through purposeful action. These emotions collectively contribute to fostering the adoption of sustainable modes of transportation.
- **Health campaigns:** Personalised campaigns that connect health benefits with active mobility modes like walking and cycling are likely to appeal to a sense of pride in making health-conscious choices, a sense of accomplishment for achieving personal goals, and self-improvement and happiness due to the release of endorphins associated with active mobility. All of these are likely to encourage the adoption of NMT.

It is imperative to foster a normative shift away from the reliance on private vehicles, which requires society to reframe cars from being aspirational status symbols to being environmentally unfriendly.

CONCLUSION

Tackling transportation-related emissions is an urgent priority in the fight against climate change. It is clear that a multifaceted approach, that incorporates technological advancements, like electric mobility, urban planning and service provision, and behavioural shifts, is required to transition to a future of low-carbon mobility.

While policy is largely focused on advancing innovation and supporting the creation of infrastructure for low-carbon mobility, there is a gap in the need for normative shifts in society. The current overemphasis on electric private mobility as a key low-carbon mobility solution obfuscates the challenges associated with rising private vehicle ownership, including the fact that emissions are still being generated as India's electricity sources are largely thermal. It is imperative to foster a normative shift away from the reliance on private vehicles, which requires society to reframe cars from being aspirational status symbols to being environmentally unfriendly. It also necessitates an effort to confront ingrained stigmas and biases associated with public transportation, especially buses, and non-motorised transport modes, to shape the future of transportation emissions.

Moving forward, future research must challenge the prevailing car-centric culture and aspirations of car ownership. Efforts also must be focused on addressing the needs of underserved communities, such as women, whose transportation habits and preferences are inadequately accounted for in traditional public transportation systems (Nikore et al, 2022). Gaps in mobility infrastructure provision, combined with the perceived lack of safety while travelling, reduces access to social and economic opportunities for marginalised communities. Reimagining what safer gender mobility looks like is essential for imagining low-carbon mobility futures in Indian cities.

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CHAPTER 4

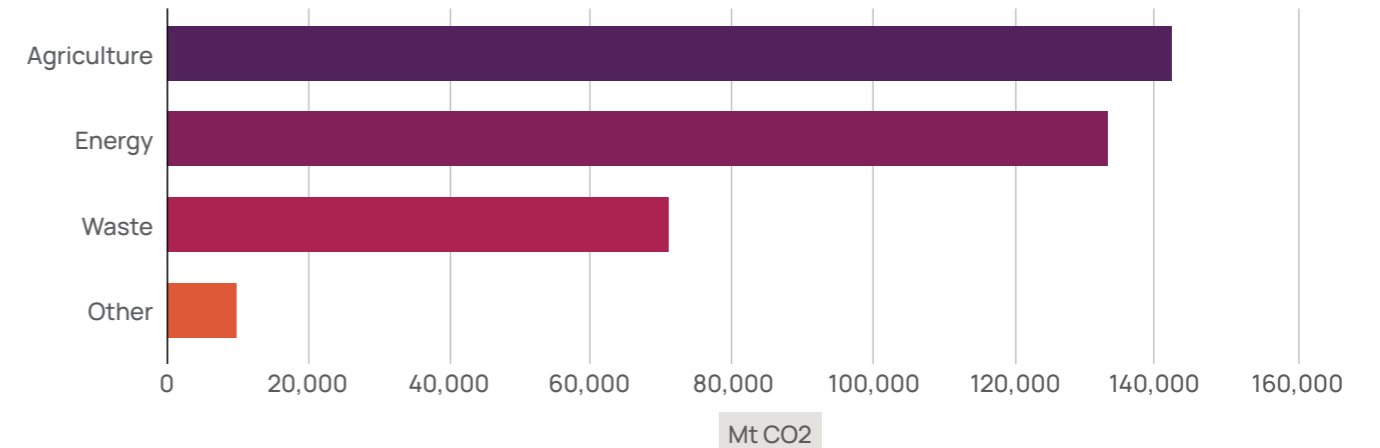
INSPIRING BEHAVIOUR CHANGE FOR LOW-CARBON HOUSEHOLD WASTE MANAGEMENT

WASTE MANAGEMENT: THE INDIAN CONTEXT

Waste in India contributes about 4% of total greenhouse gas (GHG) emissions (GHG Platform India, 2018), out of which municipal solid waste and domestic and industrial wastewater are the key drivers of GHG emissions. Waste generation and material use are the largest contributors of emissions of greenhouse gases like methane (see Figure 3) and nitrous oxide.

Effective waste management practices are intrinsically linked to mindful material use, as the reducing, reusing, and recycling of resources can greatly minimise emissions. However, choices around material use are influenced by various factors including: the availability of materials, infrastructure, and systems for sustainable choices and disposal practices (Abdel-Shafy & Mansour, 2018; Fiksel et al., 2021); the cost of different materials and waste practices, since higher-income households may have more flexibility to choose

Figure 3: India methane emissions from all sources, IEA estimate



Source: International Energy Agency, 2019

sustainable or environmentally-friendly materials (Rathore et al., 2021); awareness and knowledge of sustainable practices (Joshi et al., 2021); and social norms: when households observe their neighbours or peers adopting eco-friendly materials and practices, they are more likely to do the same (Gammoh et al., 2016). There is great potential to leverage waste management practices such as recycling, waste segregation, conservation, and circularity to decarbonise material use.

With waste generation expected to grow in India to 165 million tonnes by 2030 (Ministry of Housing and Urban Affairs, 2021), addressing waste segregation is critical. India is at a pivotal moment to shape its materials use and waste management systems to improve public health and resource management and to address rising emissions.

OVERVIEW OF LOW-CARBON WASTE MANAGEMENT IN INDIAN CITIES

The project conducted a landscaping study of sustainable waste management behaviours and choices. Based on global literature, three distinct practices were identified and then evaluated within the context of Indian cities. These practices were examined based on their current adoption rates, emissions mitigation potential, and alignment with existing policies. The three ideas underwent prioritisation according to their capacity for substantial carbon emissions reduction, equity considerations, and scalability. Additionally, the prioritisation factored in the feasibility of implementation, encompassing supply-side facilitators such as robust policy support (See Table 3).

TABLE 3: Prioritised low-carbon waste management solutions

Energy Solutions	Potential Impact		Feasibility		Total
	Mitigation	Scalability	Uptake	Supply-Side Facilitators	
Waste Segregation	3	3	2	2	10
Recycling/Upcycling	3	2	2	2	9
Water Conservation	2	2	2	2	8



Photo by Gaurav Ranjitkar from Pexels

The project identified one primary behaviour and multiple secondary behaviours to examine:

1. Encouraging waste segregation at source (primary behaviour)
2. Encouraging the recycling of plastics (secondary behaviour)
3. Encouraging composting at home (secondary behaviour)
4. Discouraging the use of plastic (secondary behaviour)
5. Encouraging the reuse of materials and products (secondary behaviour)
6. Encouraging the use of secondhand or rented items (secondary behaviour)
7. Encouraging frugality and the general reduction in consumption (secondary behaviour)

The project conducted diagnostic fieldwork in two cities, Indore and South Delhi, to understand high-income Indian households' barriers and facilitators related to material use and waste management. These cities were selected due to their existing waste segregation policies and models. Semi-structured interviews with 21 participants, including households and waste collectors, were conducted across the two cities.

The project identified a series of demand-side and supply-side facilitators of and barriers to the uptake of these low-carbon waste management behaviours:

BARRIERS TO AND FACILITATORS OF THE UPTAKE OF SUSTAINABLE WASTE MANAGEMENT BEHAVIOURS

DEMAND-SIDE OR INDIVIDUAL BARRIERS	SUPPLY-SIDE OR EXTERNAL BARRIERS	FACILITATORS
LOW-CARBON WASTE MANAGEMENT BEHAVIOUR		
Segregation at Source: How can households be encouraged to segregate waste at home?		
<p>Knowledge gap: A limited understanding of how to segregate waste, and what constitutes wet and dry waste, prevents households from adopting effective waste segregation practices.</p> <p>High effort perception: There is a perception among our survey respondents that waste segregation is a high-effort activity that imposes a high cognitive load and requires extensive training, while the benefits are intangible and unclear. This perception limits uptake.</p> <p>Status quo bias and diffusion of responsibility: Households have ingrained habits related to waste management, which are resistant to change. Survey respondents also express the belief that it's someone else's responsibility to manage waste.</p>	<p>Lack of clear guidelines and infrastructure related to waste segregation: Municipal authorities often fail to provide clear guidelines for waste segregation. They also do not provide standardised disposal infrastructure (such as separate bins for different types of waste). These factors obstruct household waste segregation.</p> <p>Lack of expertise amongst waste collectors: Waste collectors, both informal scavengers and municipal employees, lack detailed knowledge about segregation practices, their rationale, and their benefits.</p> <p>Limited coordination at residential societies: Residential societies play a crucial role in ensuring compliance, as long as guidelines for segregation have been provided. Without the cooperation and support of residential societies, waste segregation at the level of individual households may not be possible.</p>	<p>Environmental values: Households who express concern about the environment and already practice recycling are more motivated to adopt waste segregation behaviours.</p> <p>Awareness campaigns emphasising proximate goals: Households require information and training on how to correctly segregate waste. Along with technical information, campaigns that emphasise proximate goals, including improved hygiene and public health, and cleaner neighbourhoods, are likelier to result in behaviour change.</p> <p>Infrastructure and clear guidelines: The provision of segregation infrastructure (such as multiple, well-labelled bins) and clear segregation mandates from urban local bodies can drive action by households on waste segregation. Waste segregation guidelines should be displayed in accessible, clear, graphical format at eye-level at the location of the bins.</p>

DEMAND-SIDE OR INDIVIDUAL BARRIERS	SUPPLY-SIDE OR EXTERNAL BARRIERS	FACILITATORS
LOW-CARBON WASTE MANAGEMENT BEHAVIOUR Recycling: How can households be encouraged to recycle?		
<p>Knowledge gaps: There exist information gaps about recycling processes. While plastic is a material that households most commonly associate with recycling, many households are unaware that other materials can also be recycled. These knowledge gaps limit the scope of recycling behaviours. Many households also express a lack of understanding the environmental benefits of recycling, believing that it's only beneficial to companies who sell recycled products.</p>	<p>Lack of recycling infrastructure: In the absence of prominently placed recycling bins with clear signage, the cognitive load of recycling may be too high. Similarly, if there are no disposal methods for recyclable materials, households are unlikely to adopt this practice.</p>	<p>Environmental values: Households who express pro-environmental values tend to have higher levels of understanding about recycling and its benefits, and are more likely to recycle.</p>
LOW-CARBON WASTE MANAGEMENT BEHAVIOUR Composting at Home: How can households be encouraged to compost their food waste at home?		
<p>Status quo bias: Many households believe that composting is not their responsibility, but rather that of municipal authorities.</p> <p>Hygiene-related challenges: Composting is associated with a foul smell and insects/pests. This is a barrier to uptake as survey respondents are averse to confronting these challenges at home.</p>	<p>Composting infrastructure: Without composting khambas or space to compost, households are unable to compost even if they are motivated to do so.</p>	<p>Culture: Composting is associated with traditional and rural life. Households who resonate with these values are more likely to be motivated to compost.</p>

DEMAND-SIDE OR INDIVIDUAL BARRIERS	SUPPLY-SIDE OR EXTERNAL BARRIERS	FACILITATORS
LOW-CARBON WASTE MANAGEMENT BEHAVIOUR Discouraging Plastic Use: How can households be discouraged from using plastic?		
<p>Status quo bias: Many survey respondents expressed the belief that "wet" items like fresh fruits, vegetables, and liquid products can only be securely carried in plastic bags, limiting their acceptance of bags made from other materials.</p>	<p>Lack of alternatives: Plastic is the primary option available while shopping. Shoppers are not accustomed to carrying their own bags while shopping and therefore resort to using plastic bags, which are also the default in stores.</p>	<p>Environmental Values: Survey respondents who expressed pro-environmental values and attitudes are more likely to opt for shopping bags made from alternative materials (jute, cloth, and paper) and to carry their own bags in order to reduce plastic consumption.</p> <p>Fragility of plastic: Some respondents expressed the belief that plastic bags are unsuitable for carrying heavy items, and prefer more durable materials for heavy-duty use.</p>
LOW-CARBON WASTE MANAGEMENT BEHAVIOUR Encouraging Reuse: How can households be encouraged to reuse their materials and products?		
<p>Knowledge gap: A lack of understanding around what "reuse" means and how it can be beneficial contributes to a limited uptake of this behaviour.</p> <p>Status quo bias: Many households express a preference for "new" products as they are perceived to be "cleaner" and more hygienic. Reused products are perceived as being cheap and unhygienic. This perception was exacerbated during COVID-19.</p>	N/A	<p>Aesthetics: Certain materials, specifically glass, are perceived as aesthetically pleasing to reuse. Many respondents indicated a preference for reusing glass jars and containers for storage given their superior aesthetics.</p>

DEMAND-SIDE OR INDIVIDUAL BARRIERS	SUPPLY-SIDE OR EXTERNAL BARRIERS	FACILITATORS
LOW-CARBON WASTE MANAGEMENT BEHAVIOUR		
Use of Second-Hand Items: How can households be encouraged to purchase or rent second-hand items?		
<p>Status-quo bias: In India, second-hand markets are associated primarily with vehicles; this is the only product with public acceptance for second-hand purchase. Other products are considered “cheap” or “low quality” if purchased second-hand.</p>	N/A	<p>Perceived as good value for short-term use: Households are willing to purchase second-hand goods for products that will be used for a short duration. For example, clothes for a one-time use, or a second-hand vehicle purchased in order to learn how to drive.</p>
LOW-CARBON WASTE MANAGEMENT BEHAVIOUR		
Reducing Consumption: How can households be encouraged to reduce their overall consumption?		
<p>Status quo bias: Consumption per se is not associated in the popular imagination with environmental or climatic challenges, nor other negative impacts for society. In our study survey, consumption is largely seen as a positive thing and there is very little awareness or interest in reducing consumption.</p>	<p>Limited options: Respondents who are interested in reducing consumption are largely in favour of reducing their consumption of plastic specifically. However, the low availability of bulk products in a single package (which would reduce purchases of multiple items packaged in plastic or alternative packaging materials) limits their ability to do so.</p>	<p>Environmental values: Environmentally-conscious consumers express higher degrees of intention to reduce their overall consumption.</p>

SOLUTIONS AND INTERVENTIONS

A contextual understanding of the behavioural and structural barriers that limit the adoption of the primary behaviour, waste segregation, is pivotal in identifying policy levers, interventions, and solutions to improve uptake of sustainable low-carbon material use and waste segregation practices. The following are a set of strategies that can be employed to address the above barriers and encourage waste segregation:

Rules and Regulations:

Policies can shape decision-making by mandating or prohibiting certain actions and behaviours. For waste segregation, regulations, incentives, and disincentives can modify specific behaviours:

- **Waste management policies:** Through mandates and regulations for waste collection, cities can enforce waste segregation at the level of individual households and other waste producers. This would require adequate training for waste collectors, the provision of dustbins with

segregated compartments to households and other waste producers, and disincentives (either through financial means like fines/penalties for non-compliance, or service-related penalties, such as refusing to collect unsegregated waste).

Providing Information:

Misconceptions about waste management practices limit segregation practices and behaviours. Providing actionable information can help address these challenges.

- **Waste segregation in schools:** By raising awareness and conducting training sessions in schools, young people can be encouraged to become advocates for waste segregation and can influence households and communities to adopt responsible practices around material use and waste segregation.
- **Visual reminders:** Citizens may forget or may not know how to correctly segregate waste. Visual reminders on packaging, periodical refresher courses, and clearly labelling everyday items like dustbins can function as nudges that make it easier for households to correctly segregate waste.
- **Campaigns for waste segregation:** Campaigns are required to raise awareness about waste segregation practices. An effective campaign should link to the immediate goals and benefits of waste segregation beyond the environmental benefits. For example, Swachh Bharat campaigns foster a sense of pride, and focus on tangible benefits like enhanced aesthetics, prevention of disease, and elimination of odours.

Choice Architecture:

Infrastructure provision and the way waste management choices are framed can either facilitate or deter certain behaviours. Altering the environments and structures within which waste segregation is presented can make this practice easier to adopt.

- **Design of dustbins:** Dustbins that well-designed, with clear language, visually distinguishing elements such as unique colours, intuitive logos and icons, and descriptive language (eg. “kitchen waste” instead of “wet waste”), can reduce the

PILOT: IMPROVING HOUSEHOLD WASTE SEGREGATION – CHANGING LANGUAGE TO CHANGE BEHAVIOUR

The project has designed a randomised control trial (RCT) to test whether using more intuitive terminology (e.g. moving away from “dry” vs. “wet” terminology to “kitchen waste” and “paper”) can improve waste segregation. This study is ongoing and is being conducted in fourteen residential societies in Mumbai. The interventions being tested include: (a) Stickers with simplified terminology and iconography on household and community dustbins; and (b) Interactive communication campaigns delivered via each society’s WhatsApp group. QR codes facilitate household-level tracking as waste collectors scan and upload data using these codes, creating a systematic approach to monitoring and improving waste segregation practices.

Insights from this pilot will be scaled up in 60,000 households in Mumbai and can inform scaled-up waste segregation campaigns nationally.

This pilot is being conducted in partnership with Recylink.



Photo by Mumtahina Tanni from Pexels

PILOT: ENHANCING WASTE SEGREGATION – ENGAGING ACTIVE CITIZENS

The project has designed a pre/post pilot to enhance waste segregation through active engagement of citizens in residential societies. This study is ongoing and is being conducted with 400 households in Windlass River Valley, Harrawala, Dehradun. The interventions being tested include: (a) Identifying active citizens in the society and providing them with a change-maker toolkit for citizen engagement (including ideas like tower-level competitions, engagement of children, and housekeeping staff); (b) Employing stickers on community rubbish-bins, within households and on rubbish-bins in high-visibility locations; and © Communication campaign on resident WhatsApp groups and the MyGate app.

Insights from this pilot will be scaled up with our partner organisation, Waste Warriors, in Dehradun.

cognitive load of making decisions about what items go in which bin. This makes segregation easier, ensures accuracy, and improves uptake.

Social Influences:

Our decisions and behaviours are shaped by the influences, pressures, and examples set by others. Waste segregation will seem more important, doable, and attractive if individuals believe that their peers are also adopting this behaviour.

• Shifting norms using segregation champions:

Champion waste segregators can be trained to become advocates for sustainable waste practices. These and other kinds of success stories at the level of housing communities and cities can be showcased to serve as role-models for responsible waste management behaviours. This kind of social influencing could be made even more effective by roping in social media influencers, celebrities, and local community members who wield power and influence and can foster a shift towards responsible waste management practices.

CONCLUSION

Waste management is a crucial component in India's ability to decarbonise and achieve its net-zero goals by 2070. Waste management, especially waste segregation, has great potential to contribute to the establishment of a robust circular economy, where materials and resources are recycled and reused. The findings of this present study underscore the significance of addressing knowledge and infrastructure gaps through policy, planning, and behavioural campaigns in order to improve waste segregation.

However, it is essential to recognise that reuse and recycling are not sufficient in isolation. A reduction in overall consumption, and the broader consideration of frugality, are imperative to address the root causes of excessive material use, waste generation, and related emissions. This requires a normative shift towards more sustainable patterns of consumption, where individuals and communities minimise waste generation from the outset. Future research must prioritise approaches that combine waste segregation and management with behavioural barriers to reducing material consumption more broadly.

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CHAPTER 5

INSPIRING BEHAVIOUR CHANGE FOR LOW-CARBON FOOD HABITS

FOOD HABITS: THE INDIAN CONTEXT

The food sector accounts for around 30% of the world's total energy consumption and 20% of total GHG emissions (FAO, 2023). Primary farm and fisheries production accounts for approximately one-fifth of the total food energy demand, but produces two-thirds of food-related greenhouse gas emissions (UNFAO, 2022). In high-GDP countries, processing and transport account for a greater portion of food-related emissions; whereas in low-GDP countries, cooking accounts for the highest proportion (UNFAO, 2011). Around a third of food produced globally is wasted. In low-GDP countries, most food waste is due to deficiencies in harvest and storage systems; in high-GDP countries, most food waste occurs in the retail, preparation, cooking, and consumption stages (*ibid*).

Global food consumption emits 10.8-18.1 gigatons of carbon dioxide-equivalent (Gt CO₂eq) per year, i.e. between 22% and 37% of all anthropogenic emissions of greenhouse gases (GHGs) (Crippa et al., 2021). 6.3% of global food-related emissions come from India (*ibid*). This figure is likely to rise, given rising incomes and changing diets, including growing consumption of processed foods and animal products. By 2030, population expansion and economic growth are expected to raise global demand for food by 50%, which in turn may increase food insecurity (UNFAO, 2022). Hunger and macronutrient undernutrition are already prevalent in about 850 million people, i.e. 13% of the world's population (McGuire, 2015). Rising global temperatures will also impact food production, affecting half the world's population, especially people living in tropical and subtropical regions (*ibid*). The ongoing shift in food consumption also has serious health impacts. Thus, interventions in food consumption habits would benefit both people and the planet. For instance, a 30% reduction in red meat consumption would drastically reduce methane emissions, and might also help reduce ischemic heart disease by 15% (Papier et al, 2021). Food production and consumption, climate change, and health intersect in ways also informed by class divides and geopolitical factors.

OVERVIEW OF CHOICES AROUND LOW-CARBON DIETS IN INDIAN CITIES

The project conducted a study of behaviours and choices related to sustainable food habits. Due

to a dearth of existing research on this topic in the Indian context, the present study performed a preliminary, scoping analysis. We identified and focussed on six food-related behaviours with high potential for emissions reduction, keeping in mind concerns of equity and scalability:

1. Buying locally sourced food
2. Buying seasonal food
3. Buying processed/packaged food
4. Buying restaurant food
5. Conscious buying
6. Adopting a plant-based diet

The project conducted diagnostic fieldwork in two cities – Delhi NCR and Bengaluru – to study the food consumption behaviours of high-income Indian households. These cities were selected due to their high per capita food demand, related emissions, and young population with rapidly-changing food habits (Boyer et al., 2019). The project selected two cities in different parts of the country (North and South) to understand whether and how cultural differences impacted food consumption. We conducted semi-structured interviews with 30 households across two cities. The sample consisted of 10 couples, 10 nuclear families, and 10 joint families to understand variations within different household types.

The project identified a series of individual and supply-side barriers that limit the uptake of these behaviours:

Global food consumption emits 10.8-18.1 gigatons of carbon dioxide-equivalent (Gt CO₂eq) per year, i.e. between 22% and 37% of all anthropogenic emissions of greenhouse gases (GHGs).

BARRIERS TO AND FACILITATORS OF TO THE UPTAKE OF SUSTAINABLE FOOD-RELATED BEHAVIOUR

LOW-CARBON ENERGY-CONSUMPTION BEHAVIOUR	DEMAND-SIDE OR INDIVIDUAL BARRIERS	SUPPLY-SIDE OR EXTERNAL BARRIERS	FACILITATORS
<p>Buying locally-sourced food: How can households be motivated to buy locally-sourced food?</p>	<p>Knowledge gap: Consumers are generally unaware that 90% of the emissions from food-related transport comes from local or regional transport rather than international transport. Thus, foods grown within the country, but still geographically far from the consumer, might slip under the radar when consumers are considering ways to reduce their food miles.</p>	<p>Widespread availability in supermarkets of imported or well-travelled food: With rising prosperity, Indian consumers aspire to include more exotic produce and food products in their diets. Specifically, consumers in our sample voice high demand for dry fruits, whereas demand for more exotic fruits like avocados is more modest.</p> <p>Lack of clarity about food-related terminology: “Locally sourced” might be taken to mean a variety of things from “locally grown,” “sold by a local vendor,” or “traditional food.” This ambiguity around food-related terminology leaves consumers confused about how to reduce food miles.</p> <p>Difficulty of tracing the journey of foods: In the contemporary global economy, tracing any product from origin to end user is difficult; foods are no exception. Even when consumers are informed and motivated, identifying locally-sourced food is difficult.</p>	<p>Preference for local vendors: In our sample, most consumers preferred to transact with local vendors due to the availability of discounts and credit, assurance of consistent quality, and the building-up of a personal relationship with the local grocer, greengrocer, milk parlour owner, and/or butcher. This is good news, since smaller vendors are likelier to receive their wares from geographically proximate producers.</p> <p>Rising demand for organic foods: There is a growing demand for organic food, which, if correctly capitalised on, can help combat water pollution from agrochemical runoffs, and might also help reduce agricultural land use if organic farming occurs as part of polycultures (which often produce higher yields per acre).</p>
<p>Buying seasonal foods: How can households be motivated to build their diets around seasonal foods?</p>	<p>Knowledge gaps around seasonal foods: In many metros, most vegetables and fruits are now available year-round, brought out of cold storage. This makes it difficult for consumers, especially those from younger generations, to know which foods are in season. In our sample, in-season fruits were identified more accurately than in-season vegetables.</p>	<p>N/A</p>	<p>Taste perceptions: Many consumers believe that out-of-season produce will taste less fresh, and might even taste bitter. This might predispose them to buy in-season produce.</p> <p>Lack of availability of out-of-season produce: Some retailers simply do not stock out-of-season produce, limiting consumption of these foods by consumers in their catchment areas.</p>
<p>Processed/ packaged food: How can households be motivated to move away from processed/packaged foods?</p>	<p>Lack of clarity about terms: Only about a third of our sample clearly understood what was signified by “heavily-packaged foods.” Half our sample mistook this term as referring to takeaway/home-delivered foods from restaurants. Nobody in our sample was able to distinguish between processed vs. packaged foods.</p>	<p>Easy availability and convenience: Packaged foods are easily available, and in many contexts are more affordable, convenient, and quicker to prepare. In some remote locations with limited fresh-food markets, packaged foods are the only option.</p>	<p>Intrinsic preferences: Most respondents in our sample claimed to prefer fresh foods over packaged foods.</p> <p>Concern over children’s nutrition: Respondents placed particular emphasis on wanting to minimise their children’s consumption of packaged foods, for reasons related to health and nutrition.</p>

LOW-CARBON ENERGY-CONSUMPTION BEHAVIOUR	DEMAND-SIDE OR INDIVIDUAL BARRIERS	SUPPLY-SIDE OR EXTERNAL BARRIERS	FACILITATORS
<p>Buying restaurant food: How can households be motivated to reduce their consumption of takeaway and home-delivery meals?</p>	<p>Baseline habits: Most of our sample reported ordering in or eating out at least once a week.</p> <p>Easy availability: The boom in restaurants across India at a wide range of price-points, and of food-delivery apps, has made ordering in and eating out very convenient and affordable, especially since the pandemic and the concomitant boom in food-delivery apps.</p>	<p>Motivations behind eating out vs. ordering in: Our sample respondents perceived restaurant food as tastier. Going out was viewed as a treat, whereas ordering in was perceived as a convenience, and a way to occasionally skip time-consuming meal preparation.</p>	<p>Perceptions of restaurant food: Our respondents, especially in Delhi, perceived restaurant food as being high in oil, preservatives, and artificial colours, and also liable to cause digestive issues. This served as a deterrent to frequent eating out/ordering in.</p>
<p>Mindful buying: How can households be motivated to buy food more mindfully and reduce food waste?</p>	<p>Cultural perceptions around volume of food servings: Many respondents reported preferring to serve too much food rather than too little, especially to guests and children. These cultural norms that validate excess constitute a barrier to efficient meal planning and minimal food waste.</p> <p>Difficulties with food planning: Respondents reported difficulties with meal planning, leading to food wastage.</p>	<p>Retailer bulk discount policy: Many retailers offer discounts for bulk purchases, or offer buy-two-get-one deals. In this scenario, bulk buying can look like a financially sensible option, driving consumers to buy more than they need.</p>	<p>Baseline habits: Most of our sample claim to rarely waste food; they claim that any leftovers are donated to others, or to nonhuman animals.</p> <p>Stricter budgeting due to inflation: With rising rates of inflation, many respondents report already having become more mindful of food purchases.</p> <p>Storing habits: Many respondents claim to be adept in storing food in ways that minimise spoilage and wastage.</p>
<p>Adopting a plant-based diet: How can households be encouraged to adopt a plant-based diet?</p>	<p>Knowledge gap about vegetarian alternatives to meat: None of our respondents had heard of vegetarian meat alternatives. But, when questioned, they correctly identified textured soy protein and raw jackfruit as the plant-based foods that most resembled meat in some aspects.</p> <p>Shift in cultural attitudes to meat consumption: There is a generational shift in attitudes to food, with younger generations consuming more meat, and older family members increasingly tolerant of this trend, based on the belief that animal foods contain higher protein.</p>	<p>N/A</p>	<p>Religious beliefs restricting the kinds of animals consumed: For most respondents, religious beliefs continue to restrict the consumption of ruminants (sheep, cattle), which have a higher carbon footprint than the chicken, rabbit, and fish favoured by our sample for meat consumption.</p> <p>Perceptions around nutrition and digestibility: Animal products are perceived as being more fatty and less digestible, which inhibits excess consumption.</p>

SOLUTIONS AND INTERVENTIONS

A contextual understanding of the behavioural and structural barriers that limit the adoption of local, seasonal, plant-based, low-processed, and well-planned diets is pivotal in identifying policy levers, interventions, and solutions to improve uptake. The following are a set of strategies that can be employed to address the aforementioned barriers and encourage sustainable food consumption:

Rules and Regulations:

Policies can shape decision-making by mandating or prohibiting, encouraging or discouraging certain behaviours. In order to encourage the adoption of local, seasonal, plant-based, low-processed, and well-planned diets, we can target specific behaviours:

- **Changes in tax rates on foods and food products:** Carbon taxes of various kinds have been established worldwide as an effective means of nudging behaviour away from high-carbon activities, and/or generating funds from high-carbon activities that can be diverted to carbon-offsetting endeavours. Towards this end, carbon-intensive foods such as highly processed and packaged foods, exotic and imported foods, and animal products (which have a higher carbon

footprint than plant crops), could be subjected to higher taxes. The Goods and Services Tax, introduced in 2017, already offers a comprehensive nationwide system for indirect taxation of all kinds of goods and services nationwide. The existing GST system already accounts for market differences in consumption across product categories across the socioeconomic spectrum, with essential items being subject to no or low taxes, and luxury items subject to higher taxes. This progressive

taxing system could become the basis for a carbon-specific food-taxing system, with higher-impact foods being subject to higher taxes. Given that numerous underprivileged families depend on certain categories of affordable packaged/processed foods, and also on animal products (including, but not limited to, eggs and fortified milk) – this taxation system would have to be developed with great socioeconomic sensitivity, so as not to deprive underprivileged families of nutritious foods or affordable calories. Rather, the carbon/food-taxation system should be developed such that wealthier families are disincentivised from consuming large amounts of packaged, processed, exotic, luxury, or other high-carbon foods and food products.

- **Incentives to encourage recycling human food waste into animal feed:** Closing the food-production-and-consumption cycle in this way would help reduce total food waste. Concerns about the spread of pathogens has been the main limiting factor here.
- **Regulations to limit food packaging:** Both retailers and restaurants can be subjected to caps on how much packaging foods and food products can have.

Clearly, many Indians are increasingly thinking about how what they eat impacts their bodies and the planet. The food sector is responding, for example with increasing investments in the production and marketing of organic food.

- **Supermarket display regulations:** Consumers are known to preferentially see and purchase items displayed at eye-level on supermarket shelves, which are likely to be the most profitable rather than the most sustainable. Regulations requiring at least a few green options to be displayed at eye-level can increase consumer awareness of more sustainable options in supermarkets. Similarly, online retailers can be incentivised to periodically include low-carbon-footprint products in their “Featured” items list.

Providing Information:

While the paradigm that unsustainable behaviour comes primarily from a lack of information is outdated, it remains true that even motivated consumers with pro-environmental values might not always have the necessary information to make sustainable choices. Providing the right kind of information in the right context may help nudge behaviour:

- **Education about plant-based diets:** Educational programmes in school, on television, and on social media can help raise awareness about the health and environmental benefits of a plant-based diet. Additionally, in India, we can link plant-based diets to a more traditional, community-oriented, prosocial way of living, in order to increase the appeal of a vegan diet. This education should be in line with guidelines provided by organisations like The Planetary Health Diet.
- **Education about seasonal produce:** Since our survey suggests a knowledge gap regarding which vegetables and fruits are seasonal, pamphlets and other accessible, colourful educational materials could be distributed to help educate consumers about more sustainable and nutritious menu options.
- **Education about packaged/processed foods vis-a-vis food safety:** Packaged and processed foods are often perceived as being hygienic, and this perception may be partly true. Educating consumers about food hygiene, and guidelines for safely preparing, storing, and consuming fresh foods may go a long way towards equipping consumers with the skills they need to transition to a diet centred around whole, fresh foods.



Photo by Frédéric Barriol on Unsplash

- **Standardised Information on food packaging:** In order to steer consumers towards low-carbon food options, as well as to make carbon accounting part of consumers’ food choice decisions more broadly, central or state governments could introduce a standardised food certifying and labelling system. These labels could contain information on whether the food was grown organically; used renewable energy for cultivation, storage, and transport; and the total estimated carbon footprint of the food item. Just as consumers now routinely consult nutritional labels when making food purchase decisions, similarly, green labelling could help carbon footprints to enter and inform consumer decision-making. However, for this to be effective, central certifying bodies must be reliable, and standard in their assessment protocols.

Choice Architecture:

Altering the environments and structures within which consumers make food choices can make plant-based, low-processed-and-packaged, local, and seasonal diets easier to adopt.

- **Green default options on menus, and menu redesign:** Cafeterias at schools and workplaces can be encouraged to adopt a vegan-default format, foregrounding plant-based menu options. Furthermore, menus at restaurants and cafes can be required to include information on each item’s carbon footprint, and also to highlight plant-based options in prominent locations of the menu (e.g. “Chef’s Specials” or “Recommended” sections). The food industry has previously accepted similar, extensive, mandatory labelling requirements, e.g. with nutritional information. Information about the environmental impact of each menu option or supermarket food item can influence behaviour at these crucial choice points, right as the consumption decision is being made.
- **Reframing green options:** With rising prosperity and aspirations, the consumption of processed, packaged, animal-based, and exotic foods has become a status symbol. Plant-based diets, which might be perceived as traditional, backwards, and linked with the lower socioeconomic classes, can be made more appealing by reframing them from a health and freshness perspective. With growing

rates of lifestyle disease in India, and growing concerns among all generations about their health, reframing plant-based, local, seasonal, minimally-processed foods as healthier and fresher, may drive adoption.

- **Green defaults at restaurants and retailers:** The growing inclination to eat out and order in will probably not abate anytime soon. But consumers are already demanding more responsible restaurant practices, and producers have begun to respond to his demand. More restaurants can be encouraged to offer a Green Default, e.g. packing no cutlery or napkins unless specifically requested by the consumer. Similar green defaults have triggered significant behavioural shifts in other contexts across the service industry. Similarly, retailers should be nudged to offer foods in the minimum amount of packaging possible, and/or fully recyclable packaging.

Social Norms:

Human beings are social creatures, powerfully motivated by what members of our social groups think of us, and by the behaviours of role models.

- **Harnessing vegan celebrities:** Roping in vegan or vegetarian celebrities (e.g. M. S. Dhoni) to promote a plant-based lifestyle as better for human health and the environment can motivate fans to follow similar diets. Similarly, celebrity chefs cooking accessible, colourful plant-based recipes can be highlighted on television and social media.
- **Positive social competition:** Contests can be organised at the level of classes in a school, or housing associations in a neighbourhood, to motivate children and adults to patronise local vendors, consume local and seasonal foods, and

minimise their food waste. The power of social emotions like pride and admiration, and social motives like cooperation and competitiveness, can be harnessed to help make sustainable eating second nature. The power of social influencing can further be harnessed by roping in social media influencers, celebrities, and influential local community members who follow diets that are whole-foods-based, plant-based, and/or well-planned to minimise food waste. If consumers see green diets as markers of high social status, they will become more likely to adopt green diets themselves.

CONCLUSION

Food habits are often ingrained in early childhood, thus resistant to change – as public health practitioners, working on the obesity pandemic, have discovered. Food is intimately linked to culture, with a delicacy in one region evoking disgust in another.

Food is also linked with gender, such that women across many societies, when facing food stress, tend to sacrifice their own intake of calories and protein to prioritise the nourishment of the males in the family. This is a paradox. Firstly, because it is women who are disproportionately involved in food production. Secondly, because it is often women who are the guardians of traditional methods of food preparation, which, for instance, optimise the bioavailability of micronutrients from plant-based foods.

In India, food habits are also linked to caste, with lower-caste Hindus, as well as members of minority religions, having been traditionally more likely to consume animal products (apart from milk) than higher-caste Hindus.

On top of all this, rising affluence, a globalised food market, western-style aspirations, and a booming food-delivery and packaged-food market (especially post-Covid) have all rapidly changed India's food landscape. The net effect has been to rapidly increase total food emissions from India's food sector.

On the bright side, there is much work being done, at the level of farmers, non-governmental organisations, and government ministries, on preserving and promoting India's vast variety of traditional food grain seeds, many of which are resistant to drought, flooding, and/or pests. The Indian government's efforts to promote the breathtaking range of millet crops emblematises this recognition that traditional crops, seed varieties, and farming methods are key weapons in our arsenal for a more sustainable approach to farming. Permaculture, polycropping, and organic farming are also being increasingly adopted by Indian farmers, who are finding that these practices benefit not just their local environment, but also their own bottom-lines, which have been ravaged for too long by dependence on multinational seed conglomerates such as Monsanto.

Among consumers, too, awareness is rising about the link between the planet and what's on our plates. While a big percentage of the population

has traditionally followed various versions of a vegetarian diet, western-style veganism is now also on the rise among climate-conscious Indians. In 2015, India joined the global Slow Food Movement, marking the dissent of at least some part of the population against the fast food movement that is ravaging our health and our planet. The production, consumption, and export of organic foods in India has also been steadily rising for over a decade; the pandemic, by making prominent health-related concerns, has boosted this trend. Clearly, many Indians are increasingly thinking about how what they eat impacts their bodies and the planet. The food sector is responding, for example with increasing investments in the production and marketing of organic food.

While there remain significant information gaps, especially around packaged and processed foods, and while we also lack a system for measuring food miles and a food item's total carbon footprint – Indian consumers clearly have an interest in sustainable diets, and successful campaigns from other nations offer promising models for reducing the impact of our diets. Based on these trends, and on our findings in this report, we express cautious optimism about the prospect of nudging India towards a greener way of eating.

The power of social emotions like pride and admiration, and social motives like cooperation and competitiveness, can be harnessed to help make sustainable eating second nature.

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CHAPTER 6

CONCLUSION

HUMAN CHOICE AND CLIMATE CHANGE

Climate action has been ineffective because it is overwhelmingly framed as a technical issue which requires technological solutions. Our collective experience over the last few decades suggests that, while technological solutions have their place, climate change also urgently requires collective societal action. Choices made by individuals, families, communities, businesses, and governments will shape our climate futures. The issue then becomes one of radically and rapidly amending our public policies, social norms, behaviours, attitudes, and incentives in order to influence individual human choice (Rayner & Malone 1998).

The social and behavioural sciences play a crucial role in providing insights and directions for research and intervention. The current focus on technical climate solutions leads to irrational exuberance over potential future technologies, and glosses over the need for social and behavioural change. Socio-political arrangements and behavioural changes that can deliver the necessary changes remain understudied. Crucial conversations on questions of vested interests, political accountability, social and behavioural inertia, and climate justice need to take centre stage at both the global and national levels.

In the context of individual behaviour change, Rothschild (1999) stresses the importance of focussing on motivations, abilities, and opportunities. An individual must be incentivised, whether intrinsically or extrinsically, to adopt a given behaviour; he/she must feel equipped with the knowledge, information, and skills to act; finally, he/she must have reasonable opportunities for change. Thus, in our fight against climate change, technological solutions must be supplemented by large-scale behaviour change, which in turn depends on understanding the context of behaviour.

The social and behavioural sciences play a crucial role in providing insights and directions for research and intervention. The current focus on technical climate solutions leads to irrational exuberance over potential future technologies, and glosses over the need for social and behavioural change.

When they attain critical mass, individual actions can transform social norms, create momentum for large-scale systemic reform, and set the stage globally for a more equitable relationship between people and nature. When enough individuals change enough of their day-to-day behaviours, a sustainable lifestyle can become the norm not just prescriptively but also descriptively, creating pressure on other individuals, as well as systems, to change. A sustainable lifestyle, emphasising values like minimalism, eco-friendliness, and communal wellbeing, can gradually transform global consumption patterns. This makes our focus, in the present work, on promoting sustainable lifestyles at the individual level a key step in our fight towards climate justice and equitable development.

With a growing population, including a middle and upper class with soaring consumption rates, what India does – at the level of collective decision-making and individual behaviour – will play a key role in global climate outcomes. India has committed to ambitious climate goals, including the adoption of renewables and other mitigation technologies. Crucially, the LiFE Mission (Lifestyle for the Environment) acknowledges the need for behaviour change, and for a ‘behavioural bridge’ in climate policy. India thus offers the ideal context for testing and implementing interventions for behaviour change and for the transformation of social norms.

Here is a short summary of insights from our study in terms of structural, social, and individual barriers and facilitators to behaviour change across our four major domains of analysis:

How we move:

Private transport signals social status. Taking public transport, and walking or bicycling as a means of commuting as opposed to a means of recreation, are linked in the Indian consciousness with the lower class. Biases and heuristics, such as the availability bias, influence how people decide to move around: given that, in transport, as in other domains of behaviour, climate-friendly options in India tend not to be very salient or available in memory, leading individuals to default to choosing less sustainable alternatives.

Electric Vehicles (EVs) are being promoted by the Indian government as a low-carbon mobility alternative. The present work finds that knowledge



Image by Freepik

gaps about electric vehicles – e.g. their range and the availability of public charging infrastructure – limit their adoption, as do suboptimal sales scripts deployed by EV vendors. We offer insights around making non-motorised transport (NMT) more attractive, making public transport easier to use (including by improving last-mile connectivity), and linking NMT and public transport in the public consciousness with more healthful outcomes as well as higher social status. In particular, we explore in-depth the decision to purchase EVs, and find that access to attractive subsidies, and word-of-mouth from an acquaintance with positive experiences with EVs, facilitate the decision to acquire an EV. We offer suggestions about vendor scripts and automobile store displays to nudge consumers towards purchasing EVs.

What we eat:

Diets are deeply rooted in cultural practices, are acquired in early childhood, and are notoriously resistant to change. Thanks to the status-quo bias, most individuals prefer to stick with established

food habits and struggle to change their eating behaviour. The perceived effort of a behavioural shift related to diet is high.

A plant-based diet is known to be lower-impact than a diet relying on animal foods. However, in the Indian context, because of longstanding associations of meat-eating with the lower castes, any intervention designed to nudge people away from animal foods must be carefully conceived, and deployed with high cultural sensitivity.

Our survey finds an increasing shift to eating out and ordering in, with concomitant increases in food miles and in waste generation in the form of single-use food plastic. The consumption of processed and packaged foods is also rising. Convenience is the most commonly cited motive for the consumption of both convenience foods and takeaway. Conspicuous consumption has been made easier by rising incomes, changing social norms, and the infiltration of the Indian market with global brands at every price point.

Across these four domains of behaviour (transport, food, waste management and energy consumption), it is clear that information gaps constitute a significant barrier to action.

We suggest health as a possible framing to encourage more sustainable food choices, since our sample is already concerned about, for instance, the health impacts of highly-processed foods on their children. Given high uncertainty in our survey sample about terms like “locally-sourced foods” and “seasonal produce,” as well as the distinction between “processed” vs. “packaged” foods, another fruitful line for intervention would involve educating both children and adults about these terms, so as to enable them to make healthier and more sustainable choices.

How we power our lifestyles:

Respondents in our survey sample show high inertia about household appliances, and show only modest interest in replacing current appliances with more energy-efficient ones. The higher upfront cost of efficient appliances, combined with present bias and the hyperbolic discounting of future savings on electricity bills, means that, for most households, spending more money now to save money later would not be very effective as a nudge towards energy-efficient appliances.

Encouragingly, however, we find a foot-in-the-door effect, such that households that have recently purchased an EV show more interest in installing rooftop solar panels, or vice versa. This suggests a window of opportunity, whereby a household that has made one small commitment to a sustainable lifestyle can be nudged to perform other actions that are congruent with this new self-image of being a green household.

The Indian government is promoting solar energy as the renewable of choice for a low-carbon transition. Our study finds information gaps among consumers regarding the functioning of solar panels, as well as procedures for installing them. Informational campaigns would fill this knowledge gap and encourage uptake. Simplifying and streamlining the bureaucratic process for homeowners would also facilitate uptake. Similar information gaps exist about the performance and efficiency of five-star ACs, and about tactics for optimal AC usage.

The dissemination of accurate, up-to-date, and accessible information by trusted government authorities, or via manufacturers' campaigns, would help allay consumer uncertainty and nudge potential consumers to make a sustainable energy-related purchase, and to use their existing energy-consuming devices more sustainably.

How We Dispose of Waste:

Segregation of household waste at the source has become mandated in many states and union territories across India. However, many households report a knowledge gap about exactly what item should go into which kind of rubbish bin, and also perceive waste segregation at source to be a high-effort endeavour. Furthermore, many households report viewing waste segregation as someone else's problem. Clearly, in this domain of behaviour, as in others, we face the tragedy of the commons: the climate being a public good, most individuals lack sufficient incentive to work for the common benefit, leading to a diffusion of responsibility and behavioural inertia.

As a potential solution, which has been successful in other countries, providing more accessible and detailed sorting guidelines at appropriate locations, as well as disseminating the concrete downstream benefits of efficient waste segregation, would help to both motivate and simplify waste segregation.

Similarly, our survey respondents report lack of knowledge about recycling options: what items can be recycled, where, and how. Due to this information gap, perceived effort remains high, meaning the likelihood of adoption is low unless something changes in the system. On the bright side, consumers show some interest in composting organic waste at home. Here, again, access to information and resources would help overcome inertia. Many consumers show high interest in reusing certain items, such as glass containers.

All this is good news for the move towards a circular economy. We suggest establishing local, concrete, proximate goals that can help create motivation for change by making visible the outcomes of individual choices.

The potential for individual behaviour change in the fight against climate change is vast and mostly untapped.

KEY TAKEAWAYS AND THE WAY FORWARD

The present study constitutes an exploratory survey of attitudes and behaviours at the individual/household level in four environmentally-relevant domains: transport, food, waste management, and energy use. We explore a set of mitigation behaviours and identify relevant systemic and individual barriers and facilitators.

Across these four domains of behaviour, it is clear that information gaps constitute a significant barrier to action. Information about low-carbon choices, their availability, and associated costs and benefits should be disseminated in accessible formats, in neutral or positive terms. Low-carbon choices should be presented in positive emotional frames, appealing to emotions like pride, and can also be framed in terms of corollary benefits in the financial or health domains (e.g. financial savings and benefits to health from commuting on foot or via bicycle). Such framings might have wider appeal than framings that arouse high levels of negative emotion (e.g. fear or shame) or that call on individuals to ‘sacrifice’ their wellbeing for the environment.

The Theory of Reasoned Action/Theory of Planned Behaviour (Ajzen & Fishbein, 1980) identifies some conditions that determine whether an individual will actually undertake a desirable action (e.g. sort their household waste at source). One of these factors is a sense of perceived control. If individuals perceive a behaviour as being too difficult to perform, that constitutes a barrier. Further downstream, if individuals perceive that the eventual, distal outcome of their behaviour is miniscule, that would also discourage them from taking action. Our study finds that these and similar factors appear to correlate with why households do/do not adopt a given sustainable behaviour.

Another barrier to action at the level of the individual is an external locus of control (Cleveland & Kalamas, 2015). People lack motivation to take action when they feel that they have little control over events in general. Climate change is a huge and complex problem, requiring multiple actions and collective change; an individual may perceive his/her actions as having negligible value and may therefore opt out altogether. In this context, optimistic framing, as well as efforts to build a sense of community and

solidarity, can help individuals to feel less alone, and to realise that others, too, are working for change.

In this context, public policy should remove barriers to individual action, and also establish the concrete, proximal positive outcomes of individual action. There is general agreement that carbon emissions worldwide are on trajectory to peak in a few years, and slowly decline thereafter. Framing the draw-down, down-hill journey as an exciting, collaborative opportunity can help energise, unite, and direct communities to take collective action.

Nudges have been shown to be an efficient means of shifting individual behaviour without curtailing freedom of choice. But, humans being highly social creatures, susceptible to the influence of social norms, it is clear that we also need a shift in social norms. The kinds of aspirations we have (e.g. aspiring to acquire more status symbols vs. aspiring to live more simply) are shaped powerfully by our social groups, and the social benefits or sanctions

we experience can powerfully shape our behaviours. Our study finds, for instance, that attitudes towards public transport and NMT can be shifted by getting celebrity endorsements of public transport and/or private NMT, and associating these modes of transport in the public imagination with elites and other role models.

Contemporary mainstream economists, and popular writers who attempt to philosophically rationalise the capitalist motto “Greed is good,” would have us believe that human beings are inherently selfish and shortsighted. A growing body of evidence from diverse disciplines suggests otherwise – suggests that, on the contrary, human beings care deeply about those less privileged, including nonhuman entities, and are eager to discover ways to live more harmoniously. Clearly, the potential for individual behaviour change in the fight against climate change is vast and mostly untapped.

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