How to build a Net Zero society

Using behavioural insights to decarbonise home energy, transport, food, and material consumption

A guide for policymakers and businesses

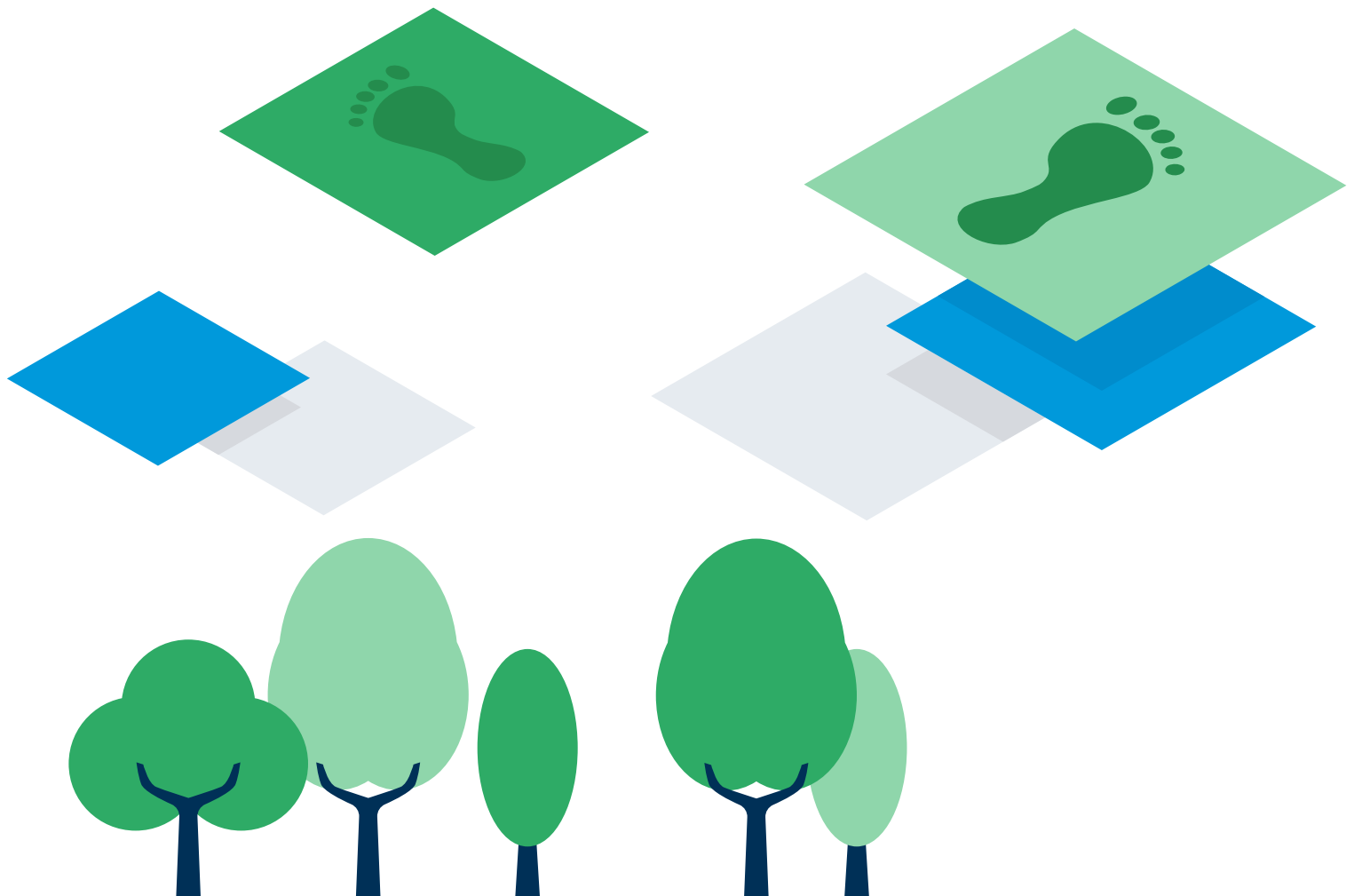**Lead Author:** Toby Park
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THE
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INSIGHTS
TEAM**

Acknowledgements

Foreword

This is a formative period for the global effort on climate, as Net Zero is established firmly as the common goal. In the UK, the setting of a legal Net Zero target in 2019 has inspired an extensive national strategy, shaped recently by a new focus on energy security in the wake of the Russian invasion of Ukraine. The extraordinary recent spikes in energy prices have also revealed the UK's exposure to price-volatile fossil fuels, establishing a new motivation to decarbonise. But the rising cost of living also raises new concerns about the affordability of some steps in the near term.

The Government's recent interventions in the energy market to insulate UK consumers from the full extent of the European gas price crisis are breathtaking in their scale and cost. They 'change the game', reinforcing the importance of energy efficiency and the potential for cheap home-grown renewable energy to reduce UK energy imports. But while we test the limits of government action in some areas, simpler and cheaper measures to inform consumers, reduce energy demand and influence consumer behaviour have been largely untapped.

The Climate Change Committee has long highlighted the central importance of these and other behavioural changes in reaching Net Zero. Put simply, shifting incentives towards lower-carbon choices will make the Net Zero transition more achievable. Many of the necessary technological changes also rest on the willingness of people to make changes, be that plugging in their car rather than taking it to the filling station or pre-heating their home with a heat pump instead of turning up the gas boiler. In other areas, a change in our consumption choices is an essential precondition for wider change, notably the challenge of releasing agricultural land for nature restoration and carbon sequestration, resting, in large part, on a change in the nation's diet.

There is clear interest among consumers and businesses about what they can do to protect the environment, but also confusion about what actions they should take to make a difference. Directing public interest to more effective action needs to be a key part of our plan to achieve Net Zero. Behaviours that can reinforce and shift the market outlook are particularly important, where consumers use their buying power to support growth in greener products and services.

The sheer extent of change necessary for Net Zero challenges conventional notions of innovation, stretching it beyond narrow technological improvements into broader societal changes, requiring a fresh consideration of how incentives, standards, nudges, labelling and public information can be brought together to drive decarbonisation as quickly as possible. This report from the Behavioural Insights Team is an exciting glimpse of what lies ahead and the ways in which changes in behaviour can be harnessed positively for the Net Zero transition. Not just to cut carbon but also to improve health, or save money or a host of other motivations. Tackling climate change certainly needs behaviour change, but there is nothing to be afraid of if we open up the discussion and engage people on the journey before us.

Professor David Halpern
CEO, Behavioural Insights Team

Chris Stark
Chief Executive, Climate Change Committee

Executive summary

Tackling climate change is not only a moral and legal obligation in the UK, but is also the growth opportunity of the 21st century, and is backed by huge public support.

The Government's own data reveal high public concern for climate change (84%),[1] and polls have shown that over half of Brits think that 2050 is too late for Net Zero.[2] Our own latest data show nearly 9 in 10 UK adults want government and business to show stronger leadership on this issue.

But delivery of Net Zero depends on substantial social and behavioural change. Achieving such widespread changes in behaviour is one of the biggest public engagement, political and technical challenges of the Net Zero transition. But it's also a huge opportunity, with climate scientists pointing out the massive carbon reductions afforded if we all just adopt a handful of changes in our lives.[3] Indeed the Climate Change Committee estimates that 62% of the necessary emissions reductions in the UK depend on behaviour. The biggest carbon reductions (53%) come from the adoption of new technologies (electric vehicles, heat pumps, home energy-efficiency improvements), while 9% depend on lifestyle changes including less red meat and dairy, more active travel, and less flying and driving.[4] We further argue that much of the remaining 38% also depends on social and behavioural constraints, including public support for green infrastructure and policy.

The good news is that consumers want this change in their own lives, at least in principle. Our data show that 9 in 10 want to make more sustainable choices.

But many of the necessary behaviours are currently too expensive, too inconvenient, too unappealing or simply not the default or norm we are used to. For instance, heat pumps are too expensive; electric vehicle ownership is too inconvenient for those without off-street parking; all of the 20 most popular dishes cooked by Brits are conventionally meat-based; and there are no cheap and quick alternatives to long-haul flights.

Put simply, our economy, infrastructure, norms, and media environment are not well designed for those who wish to live sustainably, but without great personal effort or compromise (that is, almost everyone). This may be why some - politicians included - recoil from the idea of widespread 'behaviour change', either disavowing what they see as the necessary means (a nanny-state telling people what to do) and/or the ends (an abstemious existence, sacrificing modern conveniences).

That's not our approach. It's not necessary, desirable, or even effective. As behavioural scientists and policy professionals, our job is to find a more practical pathway that is rooted in the evidence of what works, but which is also appealing in both its means and its ends - if it's not, it won't work. **By understanding (i) the barriers people face when trying to make greener choices, (ii) the evidence and theory of behavioural change, (iii) the complex processes of innovation and diffusion of ideas and technologies, and (iv) the data on public attitudes and support for policy, we can begin to sketch out a viable blueprint for a society in which green lifestyles can actually flourish.** And flourish they must, whether you want to buy a new car, fix your boiler, go on holiday, or eat a sunday roast. All without wrecking the planet.

Box 1. How does behavioural and societal change happen, at scale?

Is it more valid to frame societal outcomes through the lens of individuals and their proximate drivers of behaviour (attitudes, incentives, cognitive biases)? Or through the systems and structures they find themselves in (investment and infrastructure decisions, cultural norms, regulation, and market economics)? Depending which 'mental model' of society you find most intuitive, or indeed which strand of the social and behavioural sciences you come from, your instincts on this may differ. And nowhere is this question more pertinent than with the delivery of Net Zero. Afterall, individual agency and choice matter: we could all choose to turn down our heating or change our diets today. Yet, so does the environment which individuals face: pricing, norms, weak environmental regulation, the built environment, and businesses' profit motives all mean unsustainable consumption has become an ingrained social practice which is hard to escape.

None of this is contradictory - it simply depends which end of the telescope you are looking down. But the distinction does highlight the need to grapple with these problems across multiple levels. This demands a simple model of human behaviour-within-the-system. We propose that an evidence-based and sophisticated understanding of behaviour reveals the interplay between three levels of analysis: **individuals make choices as a function of their preferences, knowledge, values and biases (downstream), within choice environments that exert profound influence due to the proximate effects of pricing, convenience, salience and norms (midstream), which exist as they do largely because of a system of commercial incentives, regulation, investment, infrastructure and institutional leadership (upstream).**

We explain this further in Chapter 2 with our 'upstream-downstream' model. The central analogy is one of a swimmer in a stream - free to swim in a different direction, but constrained and influenced by the current.

Which raises the questions - at which level should we target our intervention? And what does this imply about who is responsible? We argue that all levels matter, and each brings different tools to bear. However ultimately the biggest carbon impacts will be achieved by addressing the major cost, convenience and desirability barriers. **Our emphasis is therefore on interventions which operate at the 'midstream' (changing proximate choice environments to make green options easy, appealing, affordable, salient and normal) and 'upstream' (leveraging commercial incentives, institutional leadership and regulation in ways which ultimately create those choice environments at scale).** This approach to 'behaviour change' is less about targeting individuals to implore different choices, and more about targeting people's environment, so that greener behaviours can naturally flourish. It's a big difference, practically, ethically and politically.

Figure 1. Upstream-downstream model of behaviour

Upstream: 'Redirect the flow'
Align businesses, markets and institutions with Net Zero

We can target the mechanics of the system, shifting norms through institutional leadership, or unleashing competitive markets towards sustainable ends rather than away from them. **Fundamentally changing the direction of flow, so the natural direction of travel for society is towards low-carbon ends rather than environmental decline.**

Midstream: 'The back-eddy'
Create an enabling environment

We can target the individual's immediate physical, social, economic and digital 'choice environment', making sustainable options easier, more available, cheaper, more socially acceptable, more timely or the default choice. **This is like creating a 'back-eddy' to take people more effortlessly in the other direction.**

Downstream: 'Swim harder!'
Encourage citizens to take direct action where they can, and build public support

We can target individuals, by educating, training, persuading, or encouraging them to make more sustainable choices. **'Swim this way! Harder!'**

'Downstream' we should inform and encourage individuals to take direct action where they can, pointing them towards worthwhile steps with guidance, tips and prompts. But the direct impacts on behaviour will be small - so downstream engagement must also focus on public dialogue to develop effective and acceptable policy.

'Midstream' we should alter aspects of the choice environment to enable green actions. There is a wide range of proven techniques (many from the *Nudge* playbook) to make green choices *easier* (such as defaulting the green option; making it more available; and removing small frictions), more *attractive* (such as using incentives and pricing; more appealing framings; or increasing prominence and salience), more *socially normative* (such as making green actions more visible), and more *timely* (such as prompting action during moments of disruption).

Many of these midstream strategies are best suited to businesses, local authorities or service providers, who are often the 'architects' of our daily choices: supermarkets, airlines, banks, appliance manufacturers, public transport providers, city planners, universities and so on.

'Upstream' we must ask ourselves why these organisations, particularly private firms, would bother? So the Government and industry bodies should invest, regulate, establish market incentives, and show norms of leadership. The behavioural dimension here is to incentivise or mandate businesses and other organisations in ways that, in turn, create the best possible choice environments for consumers and citizens to go green.

The rest of this executive summary summarises our recommendations across public communications, domestic heat and power, transport, food, consumption and waste.

Public engagement and communications:

Build a strong foundation of knowledge and public support through comms, leadership and market signals

The role of public engagement is two-fold: to encourage direct action where possible and to listen and work with the public to develop policy and public services which are effective and attract high levels of support. Recommendations A1-A5 focus on the former, with a key emphasis on public awareness and knowledge. They cut across all sectors of the consumer economy and operate both downstream (encouraging direct action among consumers) and upstream (aiming to 'de-shroud' markets to tilt competitive forces between businesses towards greener outcomes for consumers).

Government and other communicators should:

A1. Provide simple guidance.

Create a central, easy-to-use and tailored information hub to inform citizens on what they can do, and how, to reduce their carbon footprints. Our data show that a clear majority want to act, but most don't know what steps would make the biggest difference or how to do them. Include a clear ranking of actions, articulate Government plans for Net Zero, provide helpful tips and guides, highlight co-benefits such as reduced energy bills and improved health, and signpost to all relevant support.
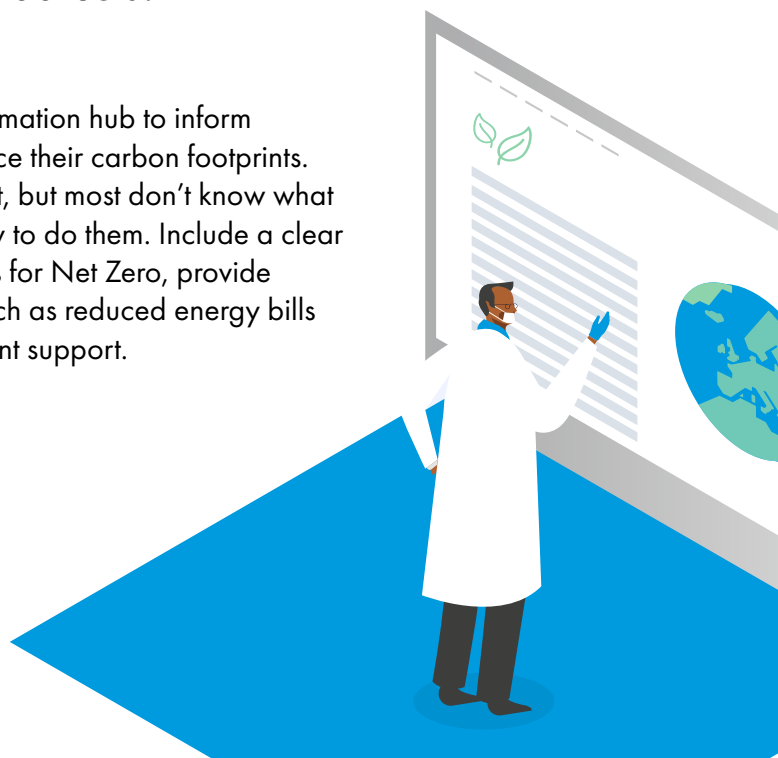
83%
support

A2. Introduce ecolabels on products, and on firms.

Create a simple system of ecolabels across key product sectors (food, clothing, pensions) and businesses (supermarkets, banks, airlines, retail chains) to help engaged consumers choose green. By extension this incentivises businesses to become more sustainable, helping us all buy greener products and services. Credible ecolabelling also reduces the need to rely on dodgy marketing claims, thus supplementing the CMA's clamp-down on greenwashing.*

87%
support

A3. Lead by example.

Commit to a Net Zero Government well ahead of 2050: build on existing Net Zero procurement standards and rapidly decarbonise public-sector buildings, vehicle fleets, officials' travel, and catering.

A4. Regulate advertising and greenwashing.

In addition to cracking down on all forms of greenwashing, follow other countries' lead by restricting advertising of high-emitting sectors: explore the benefits of banning fossil fuels ads and, in time, advertising from firms within key sectors (e.g. air travel) who fail to meet decarbonisation targets compatible with UK carbon budgets.

A5. Target communications and support during timely moments of disruption.

Provide tailored communications and relevant support at timely moments when taking action is easier for individuals. We may be more able to make home energy improvements when moving home; more likely to change our travel habits when moving home or job; more likely to adopt sustainable diets when starting university and learning to independently shop and cook - and so on.

> **Businesses, charities and other organisations *additionally* could:**
>
> - Support their customers to make green choices with clear labels, prompts or filters - for example allowing customers to filter by sustainable options on search results.
> - Work with trusted messengers - climate scientists, respected activists, and relatable peers ('people like me') regularly rank highest in credibility and trust.
> - Develop campaigns, content, and other communications that make green actions salient, clear, familiar, appealing, normalised, and easy to understand and do - rather than only talking about the climate threat.

* The % support figures in this report represent the full list of policy measures we polled with the public - we have not only chosen to include data for ideas with high support. See the ends of chapters 3,4,5,6 and 7 for the full split of 'agree' 'disagree' 'don't know'.
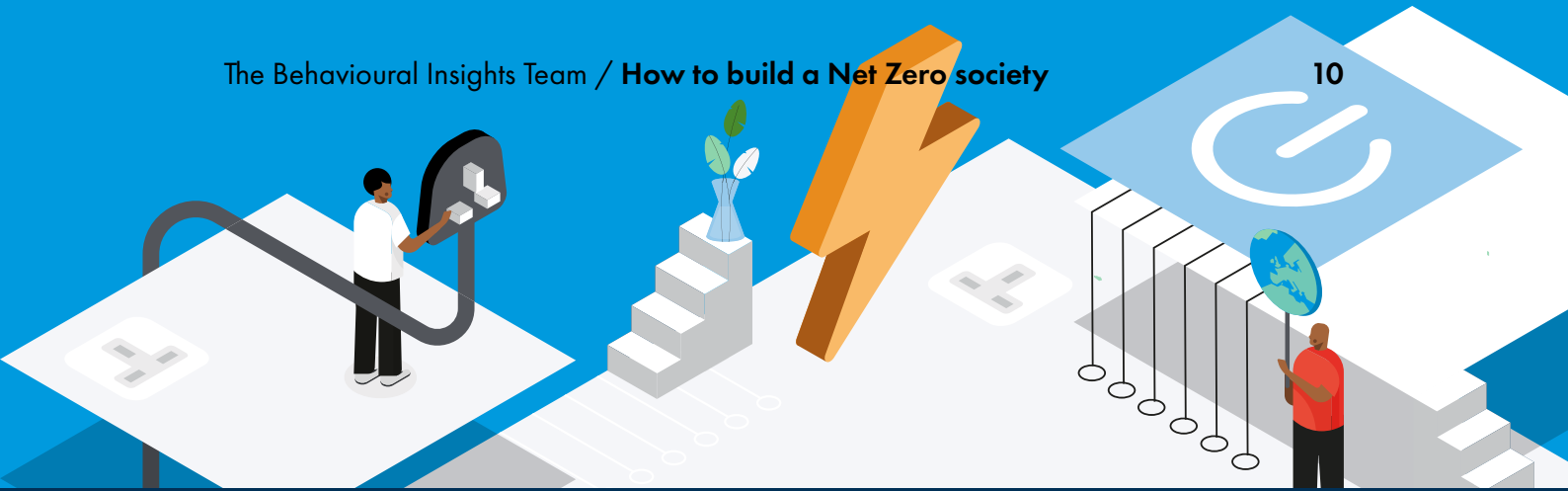
Greening our homes: domestic heat and power

23% of UK emissions (5.3% domestic electricity use, 17.2% heating and hot water)

Key behaviours:

44% willing
(if priced well)*

Heat pump adoption

72% willing

Household energy efficiency retrofits

86% willing

Smarter home energy use

E1. Reduce electricity prices relative to gas.

Consumers respond to price signals, but despite heat pumps having a 300%+ efficiency benefit over gas boilers, this won't translate into cost savings so long as electricity is 3-4 times the price of gas.

a. Explore options to permanently decouple renewable electricity prices from gas prices, building on the recent Energy Prices Bill.
b. Switch environmental levies from electricity to gas tariffs.
c. In the short term, consider offering a stronger price cap on electricity than on gas (which also maintains slightly sharper incentives to reduce gas usage or adopt retrofits).

E2. Introduce a national 'Green Homes One Stop Shop' (OSS):

85% support

This should include access to home surveys, a network of approved suppliers, guarantees of fair pricing, high quality installations and consumer protections, and extensive advice and support to get the right measures for your home. Cover heat pumps, efficiency

* All '% willing' data = those 'already doing it or willing to in the coming year' from a survey of 8000 UK (gen pop) in June 2021, with the exception of the data for heat pump adoption, which comes from our dedicated study, see Case Studies 5 & 6. Note the data presented in Section 3.1 is very similar (more recent, but smaller sample, very comparable figures). Note also that willingness would tend to be higher for some actions if we didn't stipulate 'in the coming year', e.g. EV adoption.

retrofits, solar and battery storage. Several of the 'businesses could...' ideas below could also be bolted-on to an OSS.

E3. Create financial and market incentives for retrofits among owner-occupiers and landlords.

Support with access to finance, particularly at timely moments such as home moves. Specifically:

78% support

a. Link stamp duty to property EPC rating, with a rebate if property standard improved within 18 months of sale. Provide interest free bridging loans to buyers or sellers to support the works.
b. Mandate 'warm rent' property listings, inclusive of estimated energy bills (tenant remains the bill payer, to avoid risk of moral hazard). This gives efficient properties a more salient market advantage, incentivising landlord retrofitting.

85% support

E4. Permit and encourage recipients of the Winter Fuel Payment to opt for retrofits instead.

£2.2bn per year (£150-300 per eligible household) could instead be used for a smart thermostat this year, or cavity wall insulation by bundling the next 5 years' payments.

E5. Address market failures in the supply of trusted skills and services.

For example:
a. Subsidise plumbers to put in their first heat pump to more rapidly transition existing skills.
b. Set training or apprentice quotas for large suppliers and developers.
c. Elicit greater volumes of independent consumer feedback on providers and contractors to help 'de-shroud' the market and incentivise quality.
d. Ensure that trustworthy 'whole of market' consumer guides are available (not behind a paywall).
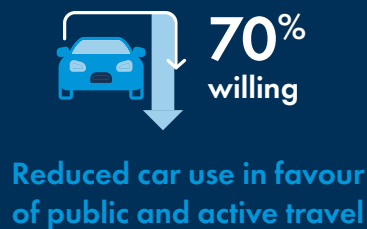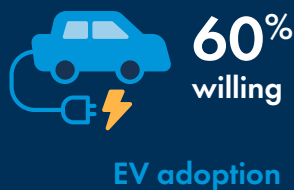

Businesses, local authorities and other organisations additionally could:

- Default energy customers into renewable tariffs or ensure existing default standard variable tariffs have a high renewable blend.
- Coordinate collective purchase agreements to enable households within a postcode to achieve bulk discounts and streamlined installation on heat pumps, solar and energy efficiency (could be part of an OSS).
- Make heat pump adoption and deep energy efficiency retrofits more visible and normal, e.g. with house signage during installation ('I'm being insulated through the One Stop Shop') and 'heat pump ready' or 'low energy bills' tags on property listings - more salient that the obligatory provision of the EPC certificate.
- Organise informal showhome networks so interested homeowners can see heat pumps, solar systems and smart energy technologies in action.
- Offer 'bridging boilers' (short-term, quick-fix boiler leases) to those whose boiler breaks down, providing support and, critically, time through the heat pump adoption process to avoid fossil-fuel lock-in for another 15 years.

Greening transport: electrification, public and active travel, and aviation

24% of UK emissions. 13% cars and taxis, 7.7% HGVs and vans, 8% from domestic and international aviation.*

Key behaviours:

60% willing
EV adoption

70% willing
Reduced car use in favour of public and active travel

71% willing
Reduce aviation

45% support

T1. Reduce the cost of EVs relative to ICEVs.

With electric vehicle grants now largely withdrawn, accelerate EV adoption by reducing VAT on new EVs to 10%, more than paid for by increasing VAT on new combustion vehicles to 25%.

T2. Normalise and address uncertainty across the public charging network.

Though there are now 60k public charge points (cf 8k petrol stations) issues remain with unreliability, potential unavailability, unawareness of their volume and locations, and non-compatibility. Government should:

a. Provide greater standardisation for vehicle-to-charger compatibility.
b. Ensure greater certainty on functionality (e.g. penalties to operators for out of order units, and universal real-time data via app).
c. Install charge points in predictable and universal locations (e.g. all petrol forecourts, all public car parks), made more salient (e.g. standardised signage and green asphalt).
d. Encourage businesses to install public charge points: provide technical support; remove barriers for large installations (planning and substation upgrades); and incentives for SMEs (e.g. feed-in-tariffs).

* Only domestic aviation emissions are included in the 24%, which is why these figures don't add up.

T3. Focus on measures to support later-adopters of EVs.

Range, cost, long-term battery use, and charging convenience are all bigger barriers for later adopters. Government should:

a. Prioritise convenient and low-cost overnight charging solutions for those without off-street parking.
b. Accelerate penetration into the used market, e.g. via commercial fleet adoption.
c. Introduce standardised battery tests to give confidence to second-hand buyers.
d. Provide greater accessibility of charge points.

76%
support

T4. Adopt and expand more pedestrianised city centres, low-traffic, neighbourhoods and low-emission zones,

while improving access to and affordability of public and active transport.

T5. Consider heavily subsidising public transport,

even if that means more congestion charges, road tax, or fuel duty to pay for it.

57%
support

### T6. Introduce a frequent flyer levy.

60%
support

Use the revenue to support domestic tourism initiatives, bringing local economic growth benefits. Consider also following France's lead by banning (or, more modestly, greatly increasing passenger duty on) short-haul domestic flights where a reasonable bus or train option is available - subsidised with revenue from said duty.

Businesses, local authorities and other organisations additionally could:

- Default airline customers into carbon offsets (though watch out for moral licensing leading to increased demand and ensure credible offsets are used).
- Provide more salient CO_2 comparisons on all airline bookings to encourage greener choices and discourage inefficiencies such as over-fuelling, under-seating or inefficient routing.
- Local authorities can offer collective purchasing for EVs or EV home chargers for residents to achieve discounts on purchase cost and installation.
- Explore new vehicle price labelling standards for purchase or lease, which communicate the total cost of ownership (loan repayment + all running costs). This will highlight how EVs are relatively more affordable than combustion vehicles for many drivers, but also highlight the true cost of driving compared to active and public transport.
- Local authorities and businesses can use the green number plate system to more widely offer small recurring incentives, such as free parking.
- Local authorities and businesses can reduce availability of parking and use variable parking charges (e.g. differentiated by income, disability or shift work) to discourage driving to work, and use revenues to incentivise use of public/active travel (e.g. showering facilities, e-bike discounts).
- Extend the cycle to work scheme, improving eligibility for gig-economy, self-employed and short-tenure workers, and allow similar tax breaks on pension incomes, particularly for e-bikes.
- Target home-movers and job-movers with timely prompts and support to adopt public or active travel - e.g. information about local bus routes and cycle networks, signposting to cycle confidence training or free social bike tours for new residents.
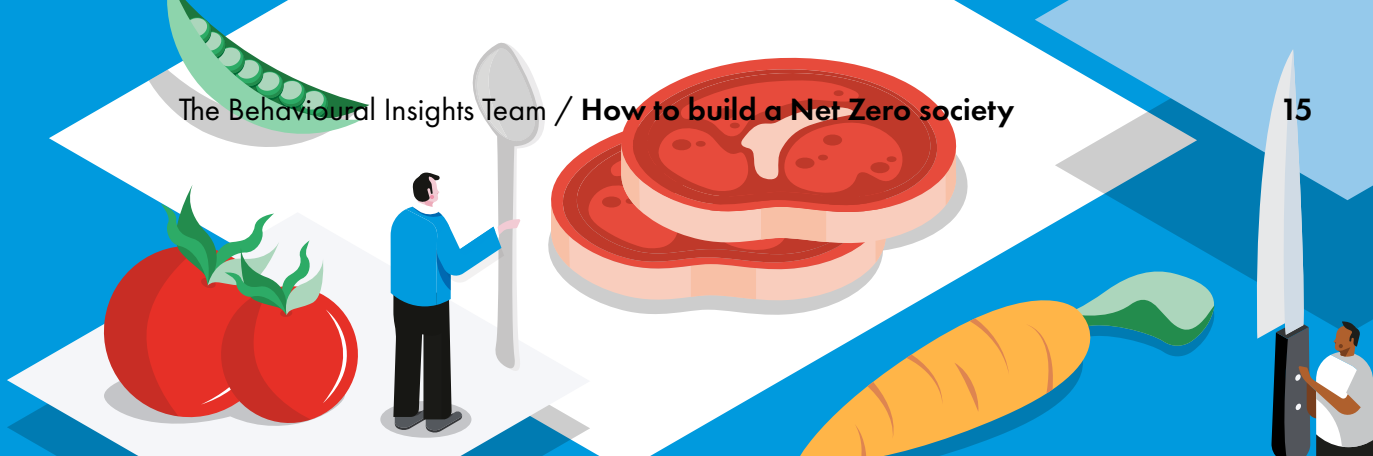
Greening food: diets and waste

11% of UK emissions from agriculture, c. 20% from the whole food sector, or 35% including imported food.

Key behaviours:

59% willing

Reduced consumption of red meat and dairy in favour of more plant-based

81% willing

Reduced food waste

Government should:

53% support

F1. Introduce a supplier-facing carbon levy to incentivise innovation of lower-carbon foods.

Mirroring the UK's sugar levy which successfully led to the widespread reformulation of sugary drinks, a supplier-facing levy based on the carbon intensity per portion (initially on red meat and dairy) can be used to incentivise a range of more sustainable production methods and product innovation. Simultaneously, support such innovation by directing agricultural subsidies towards decarbonisation initiatives for livestock farmers. Impose the same standards on imports so that more sustainable UK farmers benefit over more carbon-intensive imports.

F2. Update existing national dietary guidelines

to promote healthy and sustainable diets (like recently in Spain), and impose those guidelines where appropriate through public sector catering
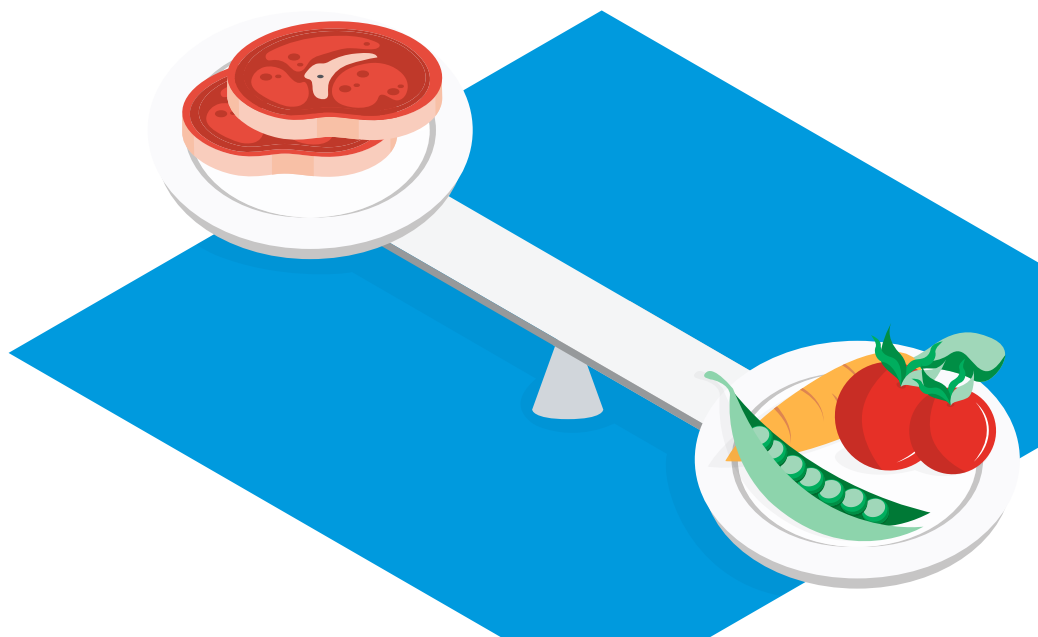
65% support

## F3. Incentivise supermarkets and restaurants to eliminate food waste, by:

a. Targeting incentives upstream at the hospitality or retail level to shape the customer food environment. This could include introducing tax incentives for businesses donating food (e.g. as in Italy) or adding extra charges and fines for businesses wasting food (e.g. as in France).

b. Mandating food waste disclosure for large food businesses.

Note also recommendation **A2**, which would particularly apply to the food sector (traffic-light ecolabels for food, and green ratings for supermarkets) as well as **A3** (Government leading by example through public procurement of food, which totals c. £2.4bn per year).

Businesses, local authorities and other organisations additionally could:

- Reduce portion sizes in restaurants, canteens and supermarkets, which reduces waste even when second portions are permitted.
- Increase the availability of sustainable food options. Do this by dedicating more shelf space and having relatively more options on menus and in canteens.
- Increase the prominence or salience of sustainable options. Do this by utilising end-of aisle, eye-height or front-of-fridge locations, and first placement in menus and canteens.
- Normalise plant-based food by integrating it into restaurant menus and 'normal' shop aisles. Displaying side-by-side more traditional choices may increase its perceived normalcy - and the likelihood that new customers may try it.
- Provide low-carbon defaults across different public and private catering settings such as flights, conferences, weddings and school canteens.
- Local authorities could consider charging households for extra food waste.

UK CARBON TAX

Recycle Me
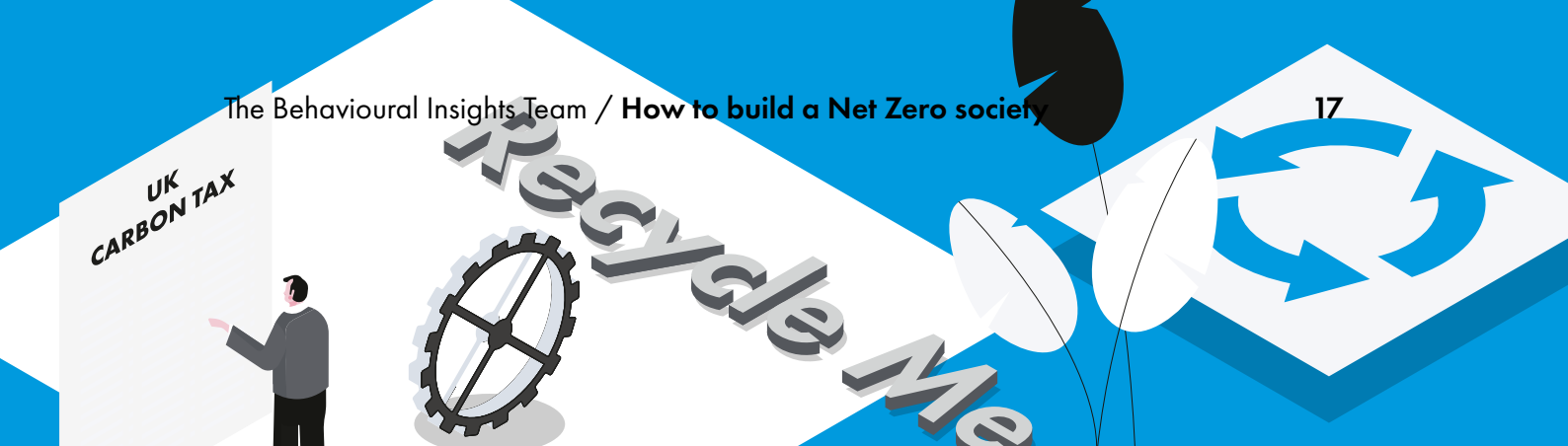
Greening consumption: waste and circular economy

Key behaviours:

77% willing

Choosing more sustainable products

79% willing

Repairing and re-using

90% willing

Recycling

Government should:*

C1. Sharpen and extend the UK carbon tax to incorporate consumables.

74% support

Including clothing, electricals and household goods - so that prices reflect environmental impacts. Include border adjustments to mitigate against carbon leakage, given these product categories are widely imported.

C2. Greatly simplify recycling standards and labels, and explore novel behavioural strategies.

93% support

Evidence reveals significant confusion around recyclability. Forthcoming plans to standardise regional systems and introduce new labels should help. We advise:

a. The simplest possible 'recycle me' labels, salient on front-of-pack, are effective.
b. Explore the use of a lottery-based deposit return scheme (e.g. pay 10p deposit, but have a 1-in-1 million chance of winning a £100,000 prize draw upon return).

* A range of strong policies are on the horizon including to promote recycling: extended producer responsibility to recover the costs of waste processing; a deposit return scheme (DRS) for drinks containers; standardised recycling rules across england; a simplified labelling scheme for recycling; as well as 'right to repair' regulations for electricals. Hence, our suggestions in this chapter are more around subtle but important behavioural improvements.

90%
support

C3. Encourage greater repairability and re-use of appliances and other items.

Forthcoming 'right to repair' legislation may help, but there is a need to regulate against excessive costs or consumer friction for spares and repairs (and consider making repairs VAT-free) to ensure most typical repairs are cheaper than buying a replacement and ` easy to do.

Note also recommendation **A4. Regulate advertising and greenwashing**, which particularly applies to daily consumption of products and services.

Businesses, local authorities and other organisations additionally could:

- Create easily accessible, local hubs which can host a variety of circular economy initiatives, for example an 'appliance library', repair shops, or repair skills classes.
- Businesses need to transition to more circular consumption models, including take-back schemes, refillables, rental models and modular products which can be more easily repaired and upgraded.

Navigating this report

This report interweaves three main elements:

i) our recommendations and ideas for UK policymakers and businesses for reaching Net Zero, though many of these will be relevant internationally too;

ii) background evidence, theory and principles of behaviour change as they relate to green choices. Specifically, we've taken a holistic view spanning both individual behaviour, and systemic shifts; and

iii) bringing this to life with many case studies of relevant BIT research and trials.

If you're interested in the recommendations, you can jump back to the executive summary, or the end of Chapters 3 (public engagement and comms), 4 (home energy use), 5 (transport), 6 (food), 7 (material consumption and waste), and **get in touch**. The chapters have a little more detail on these recommendations, and the full contents of each chapter provides the underlying research and evidence.

If you work in a particular sector, each of those sector-specific Chapters 3-7 are largely self-sufficient.

We encourage all readers to dip into Chapter 1 (Setting the scene) to understand our rationale and framing of this complex topic, and Chapter 2 to understand the underlying theory and principles for how behavioural and societal change can be enabled at the scale necessary to deliver Net Zero.
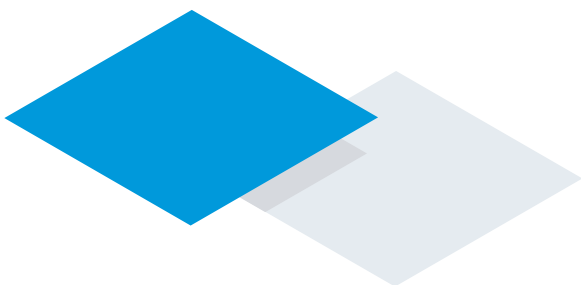
Contents

Chapter 1. Setting the scene: We need to reach Net Zero, and doing so depends on social and behavioural transformation

In 2019, the UK was the first major economy to commit to Net Zero emissions by 2050 and over 130 countries, and many thousands of major corporations, have now done the same. The great majority of global GDP is now under some kind of Net Zero commitment.[5] And as the impacts of climate change become increasingly severe and obvious to us all, delivering on these commitments is more urgent than ever.

The UK's legal commitment is also matched by a very strong public mandate. According to the Government's own data, 84% are extremely/very/fairly worried about climate change (2022 data).[6] 64% are supportive of Net Zero by 2050, and this drops only to 54% 'even if it's going to be expensive, as we need to stop damaging the environment'.[7] Just 9% oppose the 2050 commitments, and in fact over half of citizens think 2050 is too slow.[8] Moreover, this high level of public concern has sustained for several years, through multiple Prime Ministers and the turbulent events of leaving the EU, Covid-19, the Russian invasion of Ukraine and the ensuing energy and cost of living crisis. This is not a fad, but an issue the public are rightly identifying as long-term and critical.

A new survey from BIT further highlights the desire to take action. But it also reveals the public's recognition that doing so is hard, meaning the Government and businesses must do more to show leadership and make green choices easier.

% agree with the statement...

Nov 2022, n≈1000, UK gen pop.

88% — I would like to make more sustainable choices in my life if I could

88% — It's often too hard to make more sustainable choices because of high costs, inconvenience, limited knowledge or other barriers

86% — I wish leadership on the environment (from government and businesses) was stronger

86% — I would like government and businesses to do more to help me make more sustainable choices (e.g. better information, stronger policy)

People are well aware that good intentions and bold national commitments are the easy bits. But fulfilling them requires nothing short of a total transformation of the energy and land-use systems that underpin our lives. That means big changes in the way we travel, power our homes, spend, save and consume.

So, how are we doing so far? Success to date has been noteworthy (UK domestic emissions down by 47% since 1990)[9] but also comparatively easy, as the impact on our lives has been minimal. The biggest achievement has been to almost entirely phase out coal power plants, a fact that many are unaware of because it makes no difference as we turn on the lights. However, not all steps to Net Zero will be so unobtrusive. Driving, flying, eating beef burgers, burning gas, buying new, and throwing out - these are usually the easy, familiar, normal, cheap or enjoyable options. Their alternatives are too often costly, novel, or rife with difficulties and compromise. With individual effort, willpower and attention being precious and finite, this won't cut it. We desperately need solutions which provide a frictionless path that leads consumers and businesses towards a green future. **The first law of behaviour change should be to minimise the burden of action for the greatest number.**

The reality is that we want Net Zero, and want to live sustainably, but don't always want the personal inconvenience, effort or cost that come with it.[10] That's the behavioural rub that this report aims to address, which is why we've tried to highlight ideas and supporting data on solutions which are *publicly acceptable*, as well as effective.
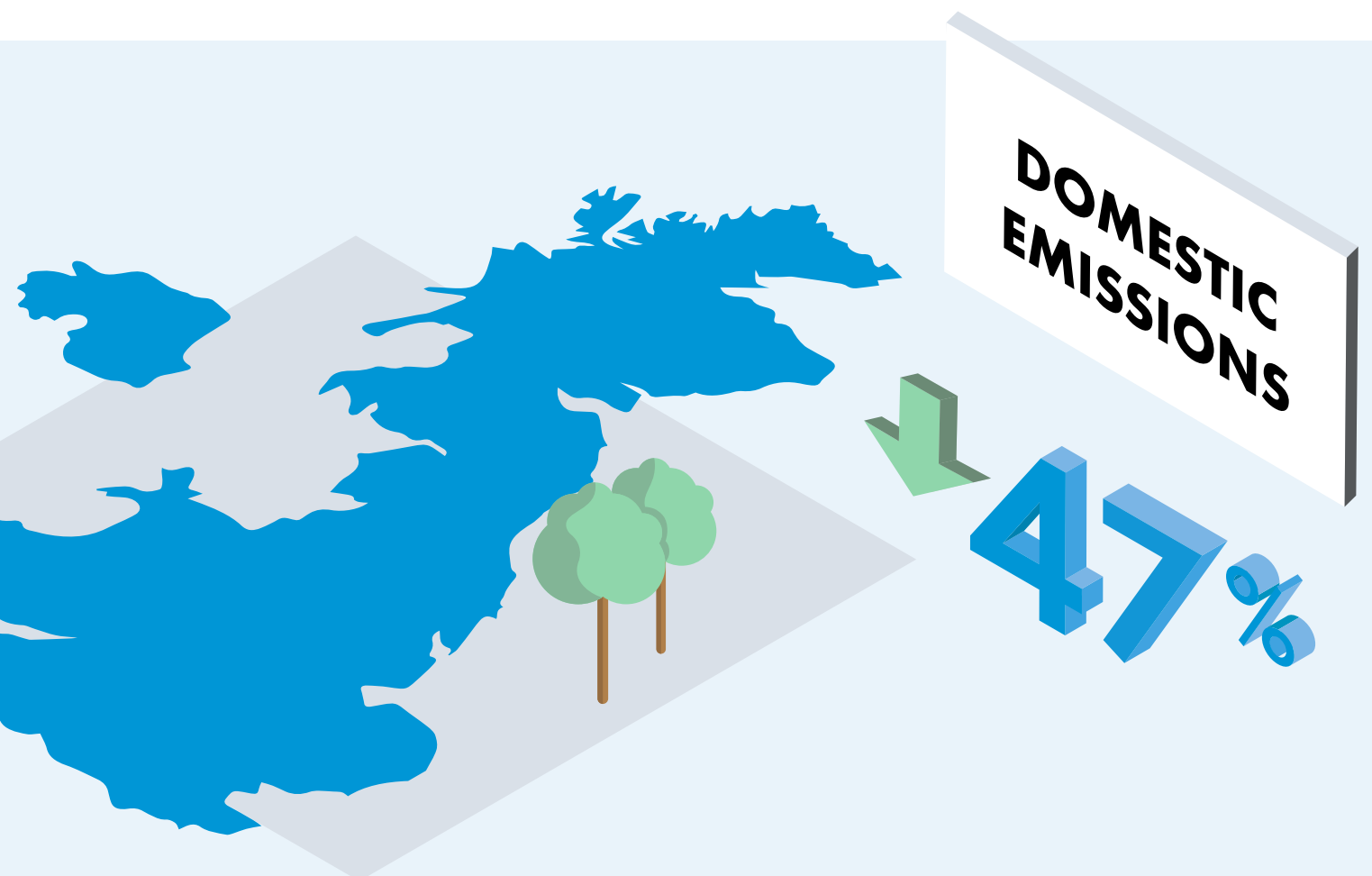
1.1 What is the pathway to Net Zero, and how much behaviour change is necessary?

Rapid and deep changes in demand make it easier for every sector to reduce emissions...
... socio-cultural changes can offer Gigaton-scale CO_2 savings, and represent a substantial overlooked strategy."

(Intergovernmental Panel on Climate Change, Working group II, 2022)

CARBON FOOTPRINT

There are many conceivable pathways to Net Zero, and for all the rhetoric about the necessity of lifestyle changes, it's worth emphasising that we do have some choices as a society. Each carbon-emitting sector, broadly speaking, faces three options:

I.   do less of it (e.g. cut back on the amount we drive)
II. innovate to create low-carbon versions of the same products and services (e.g. continue driving cars, but switch to electric or hydrogen), or
III. leave things as they are, but offset the emissions.

Option (iii) might seem appealing, but there are real limits to negative emissions solutions. Mass tree-planting is constrained by competition for land for agriculture, wildlife, and development - since food security, biodiversity, housing and infrastructure all matter too. The alternative - mechanical extraction of carbon from the atmosphere - is unproven at scale and is likely to be more costly. So, this becomes a de-facto carbon tax that, in any case, incentivises (i) or (ii). Put simply, shifting behaviours towards lower-carbon choices will make the transition easier, cheaper and more achievable.

The UK's Committee on Climate Change therefore present a 'balanced pathway' to Net Zero, in which 62% of the required emissions cuts depend on behaviour change:[11]

Figure 2. Role of behaviour change in emissions reduction

Curtailment behaviours
9.0%

Supply-side changes
38.0%

Low-carbon tech adoption
53.0%

i)   9% from 'curtailment behaviours', including reducing demand for polluting choices such as aviation and ruminant meat.
ii) 53% from 'adoption behaviours', including shifting to cleaner technologies such as electric cars and heat pumps.
iii) the remaining 38% from supply-side changes not dependent on consumer action, for example decarbonising electricity generation, heavy industry and aviation fuels

The important nuance is that iii) and ii) are no less deserving of a 'behavioural lens' than i). While only 9% of emissions reductions depend on true 'lifestyle changes', the adoption of new technologies (53%) are equally behaviours, which in many cases face real cost, hassle and psychological barriers that need to be solved. Moreover, even supply-side changes (38%) will often depend on supply-side behaviour change, e.g. among farmers and businesses. They can also depend profoundly on social and behavioural conditions among the general public. For example public consent and NIMBYism will have a huge impact on the expansion of nuclear and onshore wind. Even something seemingly as distant from consumers as the development of clean aviation fuel will be accelerated if public support for climate policy is strong and if airlines feel consumer pressure to provide greener services. **So, a behavioural and social perspective is critical across the whole endeavour.**

1.2 What behaviours need to change?

Current attitudes are green, but behaviours not so much - we've a long way to go.

We know that a great majority (9 in 10)[12] want to live more sustainable lives. Our own survey data also reveal many who say they are already taking steps to reduce their environmental impacts, with the most popular actions being recycling, reducing food waste, using appliances efficiently and using less energy in the home.

However, a look at administrative, sales and consumption data shows we have a long way to go. There are some emerging successes - such as electric car sales which continue to increase almost exponentially.[13] But even here, the transition is only just beginning, with around 1.3 million electric or hybrid cars on the roads out of 39 million registered vehicles.[14] In other sectors too, our data show a mix of partial successes (often on issues where there is strong policy) but a lot of individual action that is best described as 'greenwishing': our actions are sincere, but usually biased towards the easiest (and least impactful) actions, done only to modest degrees within the comforts and constraints of our lives. This means that many of us are taking our own bags to the supermarket, saying no to plastic straws and using the eco-mode on the dishwasher. But very few are buying heat pumps, giving up flying, or getting rid of their car. No judgement is implied: it often feels like we really are trying to do our bit, but there are genuine cost and convenience barriers to living up to our green values, as well as massive unawareness of the relative magnitude of certain actions over others.*

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* See section 3.1 for more on this point, including some of our data on perceived vs. real impacts of green actions.
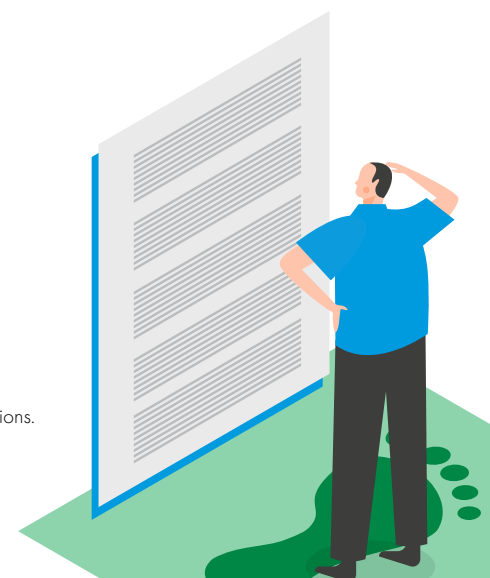
Below we summarise the key changes that are necessary across various aspects of our lives.

Box 2. What behaviours need to change to hit Net Zero by 2050?

Drawing from the CCC's balanced pathway to Net Zero, as well as the Government's own Net Zero Strategy and relevant white papers, the following changes have been identified as instrumental.

Household energy

- Widespread adoption of heat pumps (600,000 per year from 2028)
- Ban on new fossil fuel boilers from 2035
- Potential role for hydrogen - feasibility studies ongoing
- Widespread adoption of household energy efficiency: cavity wall, underfloor and solid wall insulation
- Acceptance of smart meters, time-of-use tariffs, home storage and smart appliances

Transport

- Transition to electric cars and vans. No new sales of petrol or diesel from 2030, or hybrid from 2035
- HGVs may go to hydrogen
- 9% reduction in car use by 2035
- Increased public and active travel, particularly in towns and cities.
- 25% increase in aviation demand permitted by 2050 = significant reduction relative to baseline expected growth

Diets and agriculture

- 20% reduction in beef, lamb and dairy by 2030; 35% cut by 2050.
- 50% cut in food waste by 2030, 60% by 2050

Waste and circular consumption

- 70% recycling by 2025, up from ~45% current rates
- More circular consumption: repair, re-use, pre-owned, and take-back schemes

Other 'catalyst' behaviours

There are several other steps we can take which don't reduce emissions directly, but can act as catalysts:

- Green finance choices, e.g. green pensions, or choosing banks which don't lend to fossil fuels
- Choosing green careers
- Voting for green policies and politicians; advocating for change
- Supporting local green development (nuclear, onshore wind)
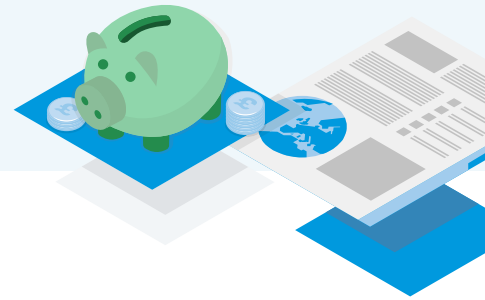
1.3 Is this feasible, politically?

We've already emphasised that public support for Net Zero is high - both in the abstract, but also with respect to a wide range of specific policies such as frequent flyer levies (60% support vs. 32% oppose), more low-traffic neighbourhoods and pedestrianised areas (76% vs 19%), product pricing which reflects environmental impacts (74% vs 17%), and many more. Even a carbon tax on meat and dairy (53% support vs, 38% oppose).[15] This indicates a strong political mandate.

Box 3. Are you surprised by such high support for environmental policies?

If you find the high level of willingness to change behaviour and high levels of policy support surprising, you're not alone, and may be experiencing 'pluralistic ignorance' - a shared misconception about how others think or act. A recent study on a representative sample of Americans (N=6,119) explored whether they accurately perceive public concern for climate change, and found evidence of a 'false social reality'.[16] Almost all Americans (80-90%) underestimate the prevalence of support for major climate policies and of climate concern. 66-88% of Americans supported the policies presented in the study, but they estimated that figure to be 37-43% among their compatriots. In other words, supporters of climate action outnumber opponents two-to-one, yet the common perception is almost the opposite.
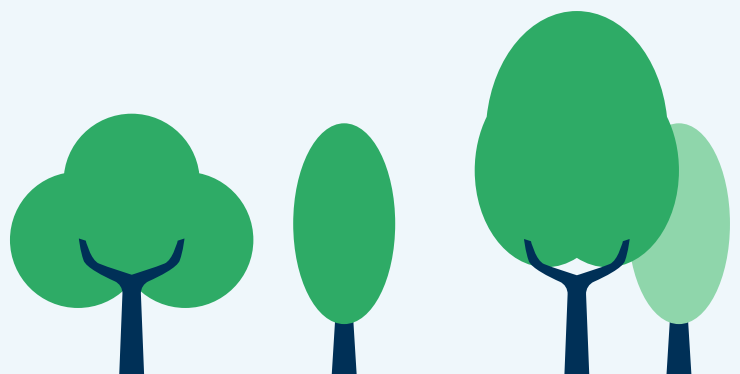
But despite such high levels of public support, we mustn't be naïve. Once real costs, hassle, or unwanted restrictions are felt, policies can become far more challenging to deliver. There is a general sense that people 'don't like being told what to do', and massive intervention in people's lives is not something to be considered lightly.

But we mustn't confuse the ends with the means. When we speak of 'behaviour change' we are talking about the ends.

In other words, life needs to be different in 2050. And, inevitably, it will be, because societies, cultures and behaviours shift all the time. Consider a trigger topic: diets. In 1957, pasta was so exotic in the UK that the nation fell for a famous BBC prank showing spaghetti growing on trees. Half a century later, Brits were eating 6,000 tonnes of it every week.[17] We got used to it, we learnt to like it, and no one forced it on us. So the idea that in 2050 we might, for instance, on average, be eating less beef, should not in itself worry us.

The more politically salient question is: how do we get there?

This is where the term 'behaviour change' can be misleading (and off-putting) to those unfamiliar with this field of study. To many, it implies too much responsibility is being put on the individual to make different choices, or it hints at a coercive or nagging approach to influence those choices. This is rarely the case - in fact, we're more often looking to target the economic, material or social context to build an environment in which green options are naturally the more appealing, easy or default choices. As quoted in the recent House of Lords Environment and Climate Change Committee's report on behaviour change:

When I say 'behaviour change by intervention' I am thinking of any intervention… that changes behaviour. I am not using it to define the intervention but rather the outcome."

Prof Dame Theresa Martheau, University of Cambridge

We are talking about something more akin to building a world in which low-carbon choices and behaviours can flourish."

Toby Park, Head of Energy & Sustainability, The Behavioural Insights Team
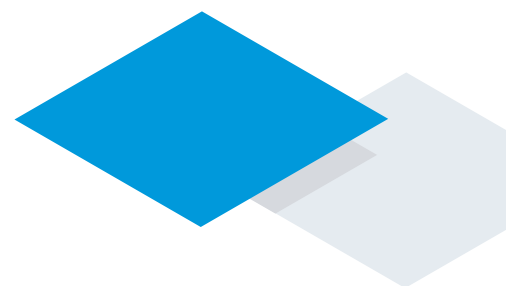
This is a very different proposition, politically - and as revealed by the stats at the beginning of this chapter, is exactly what 9 in 10 people want.

A key purpose of this report is therefore to show you that 'telling people what to do' is certainly not the only option, and rarely the most effective. Many tools are available. This can include incentives, disincentives, mandates or even bans, but preferably done in such ways that drive innovation so the green choice becomes the preferable choice before the policy really stings. There may also be nudges that alter our choice environments, but done transparently and often in ways which improve greener options before they need to significantly curb the less green choices. And when we do directly ask citizens to take action, it can be about building a collective sense of positive efficacy and helping individuals to take the steps they are able and want to do, not admonishing or guilt-tripping.

And of course throughout all of this, research highlights a number of critical conditions: it must be done in a way which is fair, inclusive, proportionate, takes people on a journey at a speed they are comfortable with, and really delivers on the many co-benefits of climate action, from cheaper bills and economic growth, to improved physical and mental health.

We believe this is 100% do-able, politically and practically, and something we can all get behind.
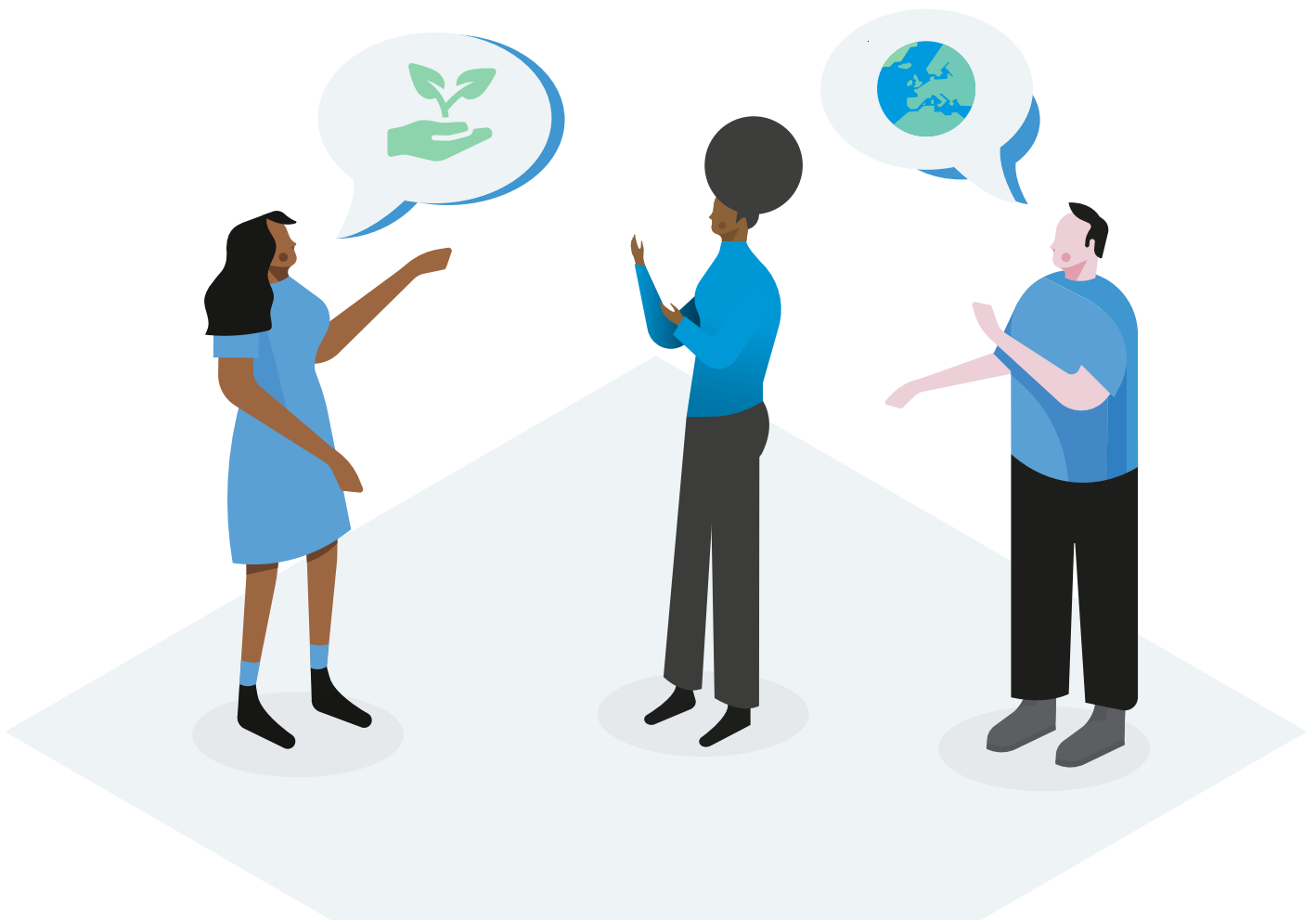
Chapter 2. How does social and behavioural change happen, at this scale?

This is a complex path down which to steer a whole society. It requires a deep understanding of human psychology, but much more than that. We must also understand how society functions as a complex system: how do business decisions influence consumer choice and vice versa? What is the role not only of citizens, but of institutions, markets and governments? How does innovation occur, and how do ideas, technologies and social norms spread? Our 'upstream-downstream' model attempts to lay out the basic mechanics of behaviour change across these levels.

2.1 Three levels of analysis: Behaviour, the Choice Environment, and the System

"I wish I could believe life really is something more than a stream that carries us along, belly-up." "All right, if it's a stream, you're still free to be in this part of it or that part, aren't you? The water will divide again and again. If you bump, and tussle, and fight, and make use of whatever advantages you might have..."

Memoirs of a Geisha, Arthur Golden

Solutions to climate change lie within individual actions and choices, which are shaped by our motivations, our knowledge and our capabilities. But it would be profoundly wrong to ignore the primacy of the economic, social and material 'choice environments' which make some choices easier, more normal, and more affordable than others. And those choice environments exist as they do largely because of systemic factors beyond any individual's control - bad commercial incentives, market economics, weak environmental regulation, investment and infrastructure decisions, cultural norms, and the leadership of institutions.

So, in this chapter, we aim to present a model of human behaviour which captures the interplay between these levels. We do this with a simple analogy - we're all swimmers in a stream. Like swimmers, we have some agency to swim one way or the other. But the stream also has a current of its own. Figure 3 below highlights three levels of analysis, each of which invites a distinct strategy for decarbonising society.

Figure 3. Three levels of analysis for behavioural and social change

Upstream: 'Redirect the flow'
Align businesses, markets and institutions with Net Zero

We can target the mechanics of the system, shifting norms through institutional leadership, or unleashing competitive markets towards sustainable ends rather than away from them. **Fundamentally changing the direction of flow, so the natural direction of travel for society is towards low-carbon ends rather than environmental decline.**

Midstream: 'The back-eddy'
Create an enabling environment

We can target the individual's immediate physical, social, economic and digital 'choice environment', making sustainable options easier, more available, cheaper, more socially acceptable, more timely or the default choice. **This is like creating a 'back-eddy' to take people more effortlessly in the other direction.**

Downstream: 'Swim harder!'
Encourage citizens to take direct action where they can, and build public support

We can target individuals, by educating, training, persuading, or encouraging them to make more sustainable choices. **'Swim this way! Harder!'**

Downstream behaviour

Individuals have agency. We are free to make different choices based on our beliefs, values and capabilities. Free to turn our heating up, or down. Free to choose a beef burger, or a bean burger. Free to fly on holiday, or stay local. **Like a swimmer in a stream, we can go in one direction, or the other.** To 'change behaviour', governments, businesses, charities, and activists might simply ask, encourage, inspire, implore, inform or cajole individuals into making different, more sustainable, choices. *'Swim this way!' they cry. 'Harder!'* We call this downstream intervention, defined by the fact that the *locus of change is individual agency* - people taking direct action. Intervention techniques here tend to be informational, including labels, campaigns, and social persuasion.

Midstream choice environments

Encouraging individual action is important, but we're too often expecting people to swim against the current. It's unreasonable to put too much onus on individuals' agency and willpower when they're acting in a system which makes it so hard: prevailing norms, high costs, infrastructure, product design and hassle discourage green choices.

So, to 'change behaviour', **we can also change the stream, rather than the swimmer.** The last few decades of research in the behavioural sciences highlight the primacy of the proximate 'choice environment' (the context) in shaping and influencing our behaviour, often much more so than 'internal' factors like attitudes and knowledge, particularly when looking across whole populations. We call this **midstream** intervention, which in practice involves a wide range of well-evidenced techniques including pricing, availability and salience of options, convenience, perceived social norms, and defaults.

The upstream system

Editing consumer choice environments is an incredibly powerful way to enable and promote green behaviours. But there are only so many rocks we can throw in the river in an attempt to deflect the current. **Eventually, we have to ask why the river is flowing so strongly in such an unhelpful direction to begin with?** For example, we consume so wastefully and unsustainably in large part because businesses make profit from us doing so, and thus present consumers with a choice environment which encourages it. But why? Does it have to be that way? Must the environmental agenda forever fight against this commercial incentive? Or can profit motives align with Net Zero?

This demands that we dig deeper into the underlying norms and economic incentives of commerce, and the influence of institutions and regulators. These are the rules of the game for organisations - in a sense, *their* choice environments, which shape their actions which in turn shape *our* choice environments as consumers.

We also need to understand the complex *dynamics* of these systemic factors: the way that competitive forces operate between firms; feedback loops and tipping points emerge and compound change; the spreading of ideas; and the interplay of supply and demand. To alter these systemic forces (from our perspective, through a behavioural-science lens) is to act **upstream**. There are many aspects to this, but in practice, we've highlighted the role of market incentives, regulation, infrastructure, and the role of leadership by institutions.*

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* Though not always easy, these levers are often the only way to achieve scale of impact. An example of why this is true: Research shows that offering more plant-based options in restaurants is a very effective way to promote sustainable diets. However, this result simply bumps the problem further upstream: why would a restaurant choose to do this? And how can we encourage tens of thousands of restaurants to implement these kinds of nudges? We've just created another behaviour-change challenge for ourselves. One solution would be to mandate restaurants (there are examples of government regulating businesses in order to create a consumer choice environment which is better for society, such as banning junk food adverts aimed at children). But this can be a heavy-handed and blunt approach, and politically fraught. The general principle is instead one of setting the right incentives to shape the behaviours of the organisations (such as restaurants), that in turn shape our behaviours as consumers.

2.2 Principles for downstream intervention

Downstream intervention tends to rely heavily on communications and public engagement. Chapter 3 covers this in much more detail, but the key principles below represent two sides of public engagement: to inform and support the public to make green choices where they can, but also to listen and co-create, to ensure we develop policies, services and products which are fair, inclusive, effective and widely supported.

1. **Build knowledge and ask the public to take steps where they can.** Knowledge about the green transition and what individuals can do is an important foundation. Steer public will and effort towards worthwhile but manageable steps, using clear advice and market signals (e.g. ecolabels).

Example:

- The Scottish Government are a step ahead the rest of the UK with their Net Zero Nation website: a trove of user-friendly information about Net Zero, what the Government is doing, and what steps individuals can take across diets, energy use, travel, consumption and more. It also signposts relevant Government support, guides for businesses and dozens of case studies and personal stories to inspire action.
- Covid-19 demanded that governments provided information and strong calls to action to the public. Best known in the UK, the 'hands, face, space' campaign was notable in its clarity, simplicity and its focus on concrete actions. A three-word tagline was enough to convey clear instructions on how to reduce exposure and transmission risk.

2. **Communicate a positive, fair narrative, and listen to the public's needs.** The direct impact of communications on consumer behaviour is often small (typically 2-3% shifts in behaviour)[18], but communications can also have important indirect benefits, such as building broad public support for Net Zero and for specific policies which in turn do have bigger impacts. This requires two-way engagement, both understanding your audience and their legitimate concerns, and communicating a compelling narrative which shows a greener future as aspirational, healthy, and prosperous for all - from warmer homes, to healthier diets, to cleaner air, and cheaper energy bills.

Example: Citizen assemblies have been used to successfully unblock a wide range of challenging and polarised policy issues, such as abortion rights in Ireland. The UK Climate Assembly brought together 108 members of the public (representative on age, education, region, ethnicity and environmental attitudes), leading to an ambitious range of recommendations. Like all such events, their success depends upon government responses to those recommendations, but there is one clear finding from many similar assemblies around the world: the public support bold action, and are perfectly capable of working through and accepting reasonable trade-offs to achieve this.

Who can act downstream?
Anyone who has an opportunity to engage with, or to inform, inspire or encourage people to make greener choices for themselves. Educators, campaigners, charities, influencers, media outlets, businesses, governments, consumer bodies, employers, social clubs...

Putting it into action.
Recommendations A1, A2, A5 and F2 are downstream interventions (though A2 and F2 have upstream elements too), and our whole chapter on public engagement and communications (Chapter 3) provides a more in-depth analysis.

Nudge playbook

2.3 Principles for midstream intervention

There are myriad well-evidenced ways to influence consumer behaviour by altering their choice environment. Many come from the nudge playbook. Here we've organised some of the most well-evidenced and usable techniques within our EAST framework (Easy, Attractive, Social, Timely).

3. **Make green choices easy: remove frictions, use defaults, and increase the availability of good substitutes.** Many of the green actions we need to adopt are rife with small 'frictions' which can make a big difference to our ability to follow through. A detailed behavioural audit of all green 'consumer journeys', such as the adoption of energy efficiency retrofits, can help identify and eliminate these points of hassle. More specifically, we emphasise:

a. **Defaulting audiences into the green option.** We tend to stick with defaults because it's low-effort and often interpreted as a safe, normal or recommended option, whether that's the default portion size or energy tariff.
b. **Nudging towards easy substitutions.** A lot of behaviour change happens at the margins of substitutable options. Find the marginal gains that make the change easy - whether that's an electric vehicle (easier than modal shift), or an easy blend of veg into familiar recipes (easier than wholesale diet change).
c. **Make green options more available.** Along with green defaults, research shows that one of the most effective things we can do is increase the relative availability of green options vs. non-green options.

Example:

- Defaulting customers into green energy tariffs, though retaining the option to switch, led to a 10-fold increase in uptake and high consumer satisfaction.[19][20] In our own work, defaulting to smaller portions in hotel canteens (and allowing seconds) reduced food waste by up to 45% ([case study 17](#)).

- By adding simple and salient 'recycle me' stickers onto plastic bottles, we roughly halved the number of people not recycling their bathroom plastics ([case study 20](#)). The reverse strategy (introducing friction to behaviours you wish to discourage) can also be effective. For instance studies have found removing the plastic tray from a canteen environment can slash food and drink waste by up to 40%.[21][22]

- Research from the University of Cambridge found a 41 - 71% increase in plant-based food selections when doubling the prevalence of options in canteens (from 1 in 4 to 2 in 4).[23]
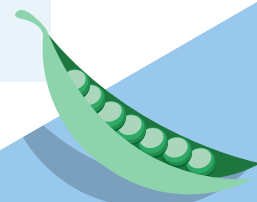
4. **Make green options attractive: affordable, appealing and salient.** Most of us want to be green, but research shows time and again that the environmental impact of a product tends to rank somewhere behind value for money, convenience, and performance/enjoyment/taste. Green options must therefore capture our attention more effectively, and deliver on these other priorities too:

a. **Salience.** Whether its use of colours, positioning first on menus and lists, amount of shelf space, or the use of clear signage and labelling, we need to cut through the noise and bustle of our decision environments by drawing attention to the green options.

b. **Pricing and incentives.** Both incentives (e.g. grants, tax breaks) and disincentives (e.g. levies, carbon taxes, penalties)[24] can be highly effective.* But behavioural economics provides a fresh perspective on incentive design. For example, (i) we strongly bias towards the present, meaning upfront costs and rewards are felt more keenly than those in the future.[25] This really matters when so many green choices are more expensive upfront but save money in the long term (going against our present bias). (ii) Lotteries can be effective because we tend to overweight small probabilities and focus on the size of the prize.[26] [27] (iii) We are more sensitive to losses than equivalent gains.[28] More broadly, all incentives carry psychological weight since the existence of a price or reward can change the implied intrinsic value of that choice, or act as a reminder of a social norm or expectation.

c. **Leverage other motivations, such as enjoyment.** Research shows that overtly 'green' messaging can sometimes backfire (likewise with overtly 'healthy' framings) due to the perception that if it's eco / healthy, it's likely a bit rubbish.[29] Sustainable choices need to delight - be fun, delicious, aspirational, comfortable, convenient and attractive.
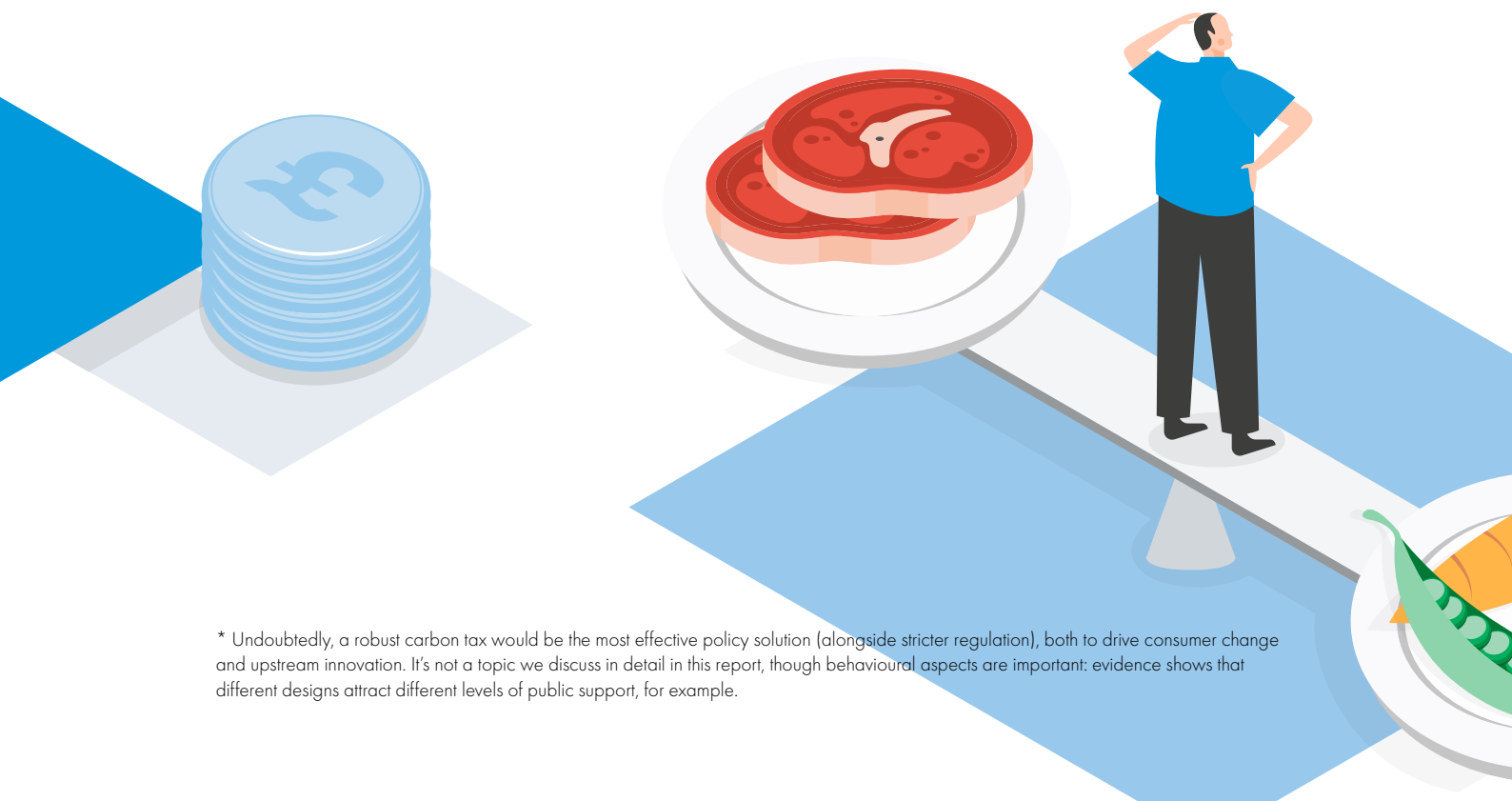
* Undoubtedly, a robust carbon tax would be the most effective policy solution (alongside stricter regulation), both to drive consumer change and upstream innovation. It's not a topic we discuss in detail in this report, though behavioural aspects are important: evidence shows that different designs attract different levels of public support, for example.

Example:

- We found that not all subsidies are created equal. Presenting participants in an online experiment with a hypothetical choice of an electric or a petrol car, 64.8% chose the EV when offered a £3,500 subsidy, while 70.5% chose the EV when offered 'free charging for 100k miles'. The catch - at the time of this research, 100k miles of charging would cost around £3,500, so the two incentives were of equivalent value.[30]

- The 10p plastic bag levy is a wonderful example of an incentive that brings additional psychological value: in the UK it has reduced usage by as much as 97% according to Defra research. Yes, it's a small economic disincentive, but perhaps more importantly it also sets a default against using a plastic bag, strongly implies a social norm and acts as a salient reminder to make the green choice.[31]

- Our own work has found that moving items to more prominent canteen positions (front of displays) led to a 12% increase in sales over items at the back.

- Online experiments run by BIT have found that making plant-based food more attractive through language (e.g. 'field grown' rather than 'meat free') can roughly double selection, with somewhat smaller but similar effects found by Sainsbury's in real-world trials.[32] This aligns with other research finding that more indulgent, taste-oriented language outsells overtly green or overtly healthy language.[33]

5. **Normalise green choices by making them social.** We're social creatures and benchmark our own behaviour against the actions and expectations of others. We're therefore more likely to be green if it's socially rewarding, or if we see other people like us doing it.[34]* This often isn't the case, as many pro-environmental actions are hidden in the home, and some (e.g. heat pump adoption) are still very nascent. Making these behaviours more noticeable to others is therefore an important strategy.

* The social dimension of human behaviour is particularly critical to green choices, because they are public goods - i.e. the benefits are dispersed across society. It is in our collective interest if we all act sustainably, but often of no benefit to an individual to do so, who may face a rational incentive to take the cheap or convenient option while freeloading off others' effort to save the planet. One solution is to remove the tension between self-interest and collective interest, by making the sustainable choice also the cheap, convenient, enjoyable choice. Conventional economic solutions also include strict regulation or privatisation of public goods. However, we also have natural tendencies towards pro-sociality: cooperation, conformity and reciprocity, mediated by feelings such as obligation, guilt, and social kudos or disapproval. Our social nature is very much an evolved solution to problems which require collective action to solve, such as the sharing of unpredictable resources, or cooperative hunting and battle. This is why the behavioural approach to overcoming a tragedy of the commons is to amplify positive social norms, for instance by making green behaviours more observable to others, emphasising the high prevalence of positive norms, or increasing transparency and accountability of firms' actions.

Example:

- Studies across California and Europe have found that solar panels are socially contagious to neighbouring households, particularly if they're more visible on the front of properties.[35] [36] This is also the logic behind the UK's adoption of green number plates for EVs.

- Simply communicating social norms also works: energy consumption reduces by 1.5 - 3% when people are informed they use more than other similar households.[37] This use of social norms (or social comparisons) on communications is one of the best evidenced techniques in the field, having been replicated across energy conservation, water use,[38] reuse of towels in hotels,[39] and selection of sustainable food options.[40] [41]

6. **Make it timely.** Much of our behaviour is habitual and routine, meaning we're far more open to change at key moments of disruption or during windows when key barriers to action are momentarily diminished. Job and home moves; starting at university; getting a boiler repaired - each provides an opportunity to encourage green actions such as changes in how we commute to work, installing energy efficiency improvements, learning to cook sustainable food, or preparing for a future switch to a heat pump.

Example:

- We found that targeting new home-movers with a timely cycle share offer led to 4-times higher uptake than with a matched cohort who already lived in the area.[42]

- Studies revealed that 2014 rail strikes led to a sizeable minority of users sticking to the new travel routes that they were forced to try during the strike, showing the power of disruption as a moment for resetting habits.[43]

Who can act at the midstream?
Anyone who is able to alter some aspect of the environment or choice structure for consumers or citizens. These 'choice architects' include local authorities, public service providers, government agencies and, in particular, businesses (supermarkets, retailers, restaurants, airlines, public transport providers, banks and pension providers, energy suppliers...).
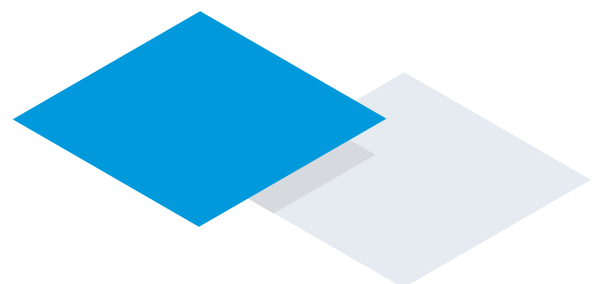
Putting it into action.

Recommendations E1, E2, E4, T1, T2, T3, T4, T5, T6, and C2 all act the midstream by making direct changes to the choice environment faced by citizens and consumers: making the green options cheaper, more available, or easier to adopt. Many of our other ideas for businesses and other organisations within Chapters 3-7 are also midstream ideas.

Box 4. The role of businesses: choice architects for their Scope 3 and 'Scope X' emissions.

Many businesses are now making Net Zero commitments. We shouldn't be naive about this: in the short-term, they are feeling commercial benefits of this green rhetoric and some businesses are over-marketing their under-whelming actions. Profit still rules. But increasingly, we are seeing sincere commitments made. So what happens when the rubber hits the road? How are businesses going to deliver on these promises?

This is where behavioural insights can help, particularly for the harder-to-tackle Scope 3 emissions which lie outside of a firms' own operations, embodied instead within the actions of their supply chain upstream and their consumers downstream. An important truth is that almost all businesses are 'choice architects' whether they realise it or not, and therefore have enormous power in stimulating demand and shaping the way that we consume. This responsibility is unavoidable as there is no such thing as a neutral choice environment: you're either part of the problem, or part of the solution. So, we implore firms to use the techniques above to support greener consumption.

But we think businesses can go even further. If a business leveraged every ounce of influence it has to accelerate Net Zero, what would that look like? Businesses should consider their 'Scope X' emissions - entirely outside their own products and services but over which they may nonetheless have some influence. What norms and lifestyles are conveyed in their marketing, even in the background? What are their lobbying and advocacy aims? How do they try to bring competitors along to raise the playing field for all? The work we have done with Sky (BIT case study 2) is a good example: as a media company, decarbonising their own emissions is laudable, but is also trivial compared to their biggest impact on the world: their content. Taking a behaviourally-informed approach to their creative output has the potential to impact the mindsets, perspectives and behaviours of tens of millions of viewers.

2.4 Principles for upstream intervention

We can't curate every conceivable 'choice environment' one by one - every supermarket, airline booking website, car dealership, pension dashboard, and so on. And certainly not through goodwill alone. The only way that will happen is if the underlying rules, norms or incentives, through which a given sector operates, work to encourage businesses to do that through their own self interests. So we must move upstream to set these parameters. In particular, if we can truly align green outcomes with profit motives, and not just for a single firm but across a whole sector (meaning competition between firms to be greener than each other is also leveraged), we may find that progress can be remarkably quick. There are various ways in which governments, trade bodies and other institutions of power can use behavioural thinking to make the system a little bit closer to this ideal.

7. **Incentivise businesses to 'reformulate' their products and services to create low-carbon options which don't require difficult behaviour change.**
    We want consumers to choose green by default without even needing to think about it. That means removing the carbon from products and services at the outset. The most obvious solution is a more robust carbon tax: higher carbon prices, and greater coverage across consumer goods and services.[44] We absolutely support such an approach and so does the public: 7 in 10 support the idea of 'changing product prices to reflect their environmental impact'.[45] But there are also difficulties: carbon taxes can be regressive and can be perceived as a 'sin tax' on consumption of high-carbon products like red meat, thus being politically difficult.[46] [47]

    We therefore recommend a range of sector-specific incentives (which can be taxes or levies, but could also be positive incentives such as agricultural subsidies) which are specifically calibrated to maximise product 'reformulation'. This typically means having a stepped design which creates a very sharp incentive to innovate one's product so that emissions fall just below a taxable CO_2 threshold. Perfect success would be for producers to innovate their products, meaning no tax is collected and no consumers are hit with higher prices, but still reducing the carbon footprint for all consumers (whether engaged or not; price sensitive or not). This makes for a more politically feasible prospect in contentious sectors like meat and dairy. The CO_2 threshold at which the tax applies can be ratcheted down over time to drive ongoing reformulation. This could be applied to food, cement, aviation, building efficiency, and more.
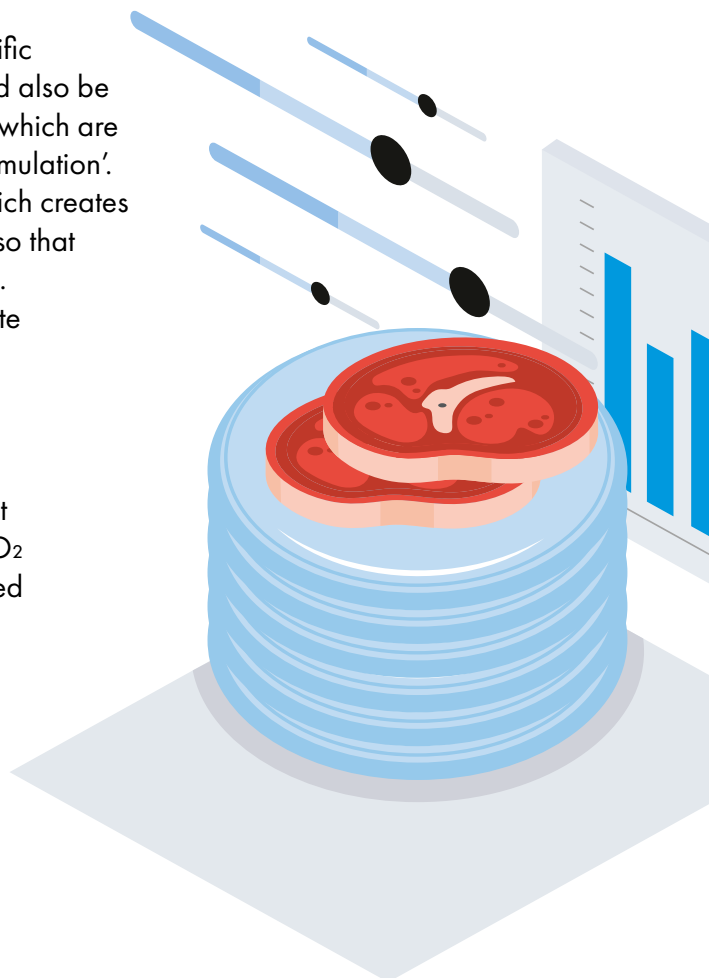
Example:

- The UK's sugar levy is the poster-child of success for this approach. By introducing a tax which applies to drinks above two distinct thresholds of sugar content, it successfully incentivised producers to reformulate, taking significant quantities of sugar out of the UK diet even though volumes of beverages sold did not change.[48] [49] The magic is that it only requires a minority of price-conscious consumers to make it commercially favourable for companies to reformulate to avoid the tax, yet doing so means all consumers have less sugar in their diets. A tax which is bluntly passed on to consumers (e.g. tobacco tax) doesn't achieve this - it simply disincentives consumption, and raises revenue for the state.

- Incentives can also be designed to shift consumers towards more sustainable substitute technologies. For example, the so-called 'Market Mechanism' adopted in a number of sectors by the UK Government. For instance, a new Market Mechanism for heat pumps requires manufacturers of heating systems to sell and install a certain proportion of heat pumps for each gas boiler.[50] Failure to meet targets incurs a levy, which is tradable with other organisations who exceed their own target for heat pumps. This will not only make gas boilers more expensive and heat pumps cheaper, but will also create the market incentives necessary for R&D investment, product improvements, and myriad other creative solutions to issues of installation hassle and capacity, low consumer awareness and product desirability. In short, it incentivises whatever is needed to get more heat pumps into homes. We provide further comments on this new policy in Chapter 4.

8. **Unleash consumer preferences, using clear market signals (e.g. labels), to favour greener businesses and products.** Competition between firms is a strong driver of innovation. But businesses have little incentive to out-green each other if consumers cannot discern and choose the greener brand. Governments should therefore crowd-out the need to rely on dubious marketing and greenwashing, and instead 'de-shroud' markets by providing simple, credible, green ratings on businesses and products, thus helping motivated consumers choose greener options. BIT's new survey shows 8 in 10 support the Government introducing standardised green ratings for businesses and ecolabels for products and services.[51] Labelling tends to have quite a small impact on behaviour,[52] but often the main benefit is that a small shift in demand can be enough to threaten competing businesses with a small loss of market share, thereby tilting competitive forces towards environmental performance. This means all consumers end up consuming more sustainable products and services.
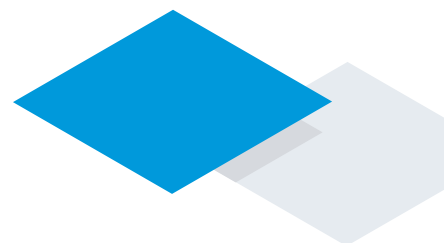
Example: Vehicle safety is complicated, yet the creation of the simple 5-star NCAP rating helps consumers to choose a safer car. Indeed, a recent survey suggests this is one of the most important considerations among new car buyers.[53] Consequently, manufacturers are continuously incentivised to up their game and compete on safety scores, meaning we all drive safer cars as a result. This simple rating system has been a major driver of improvements such as air bags, advanced crumple zones, ABS and more.

9. **Lead by example to establish green norms and long-term investment.**
To create a new green society, governments, businesses and other institutions need to 'walk the talk' and signal their own commitment to green choices, or else risk having little credibility. This also helps to instil norms and values through society, through the standards they set, e.g. through procurement requirements, as well as through their own actions across public buildings, services, vehicles fleets, travel and catering. As of 2022, our survey shows 9 in 10 expect the Government and businesses to lead by example, adopting green choices where possible.[54]

Leading by example also means making early and long-term policy and funding commitments that provide certainty and continuity beyond spending review periods. This is necessary to encourage businesses to invest in R&D, training, new supply chains and equipment. Similarly, early commitments on future bans and strategic infrastructure decisions are necessary to ensure industry has time to react and innovate before these policies really bite consumers. Key strategic decisions on hydrogen, district heat networks, land use and agriculture are urgently needed for this reason.

Example:

- The UK's relatively early commitment to phasing out new petrol and diesel cars from 2030,[55] and a more recent commitment to phasing out fossil fuel boilers from 2035,[56] has sent fair warning to both industry and to consumers. This means manufacturers have time to respond, invest and develop improved low-carbon alternatives (EVs and heat pumps) which, hopefully, will work as well (or better) and be equally affordable (or cheaper) before the bans take effect. If this were not the case, there is a severe risk of negative experiences among early adopters and of forcing higher costs onto late adopters with no choice, which may severely undermine public support and the feasibility of maintaining the bans.

- Among the many problems with energy-efficiency policy in the UK over the last several years has been uncertainty over long-term funding, which undermines suppliers' confidence to invest in training and installation capacity. For example, lack of long-term certainty with the recent Green Homes Grant (canned less than a year after launch) has been cited as one of the main failings.[57]

10. Directly regulate some aspects of the choice environment where appropriate.
For the most part, we promote upstream interventions which are market-based: ensuring commercial incentives align with green outcomes but otherwise allowing entrepreneurial innovation to determine how best to deliver. However, there are many examples of governments directly regulating industry in order to create a consumer choice environment which is better for society: such as the ban on open display of tobacco; the proposed ban on fast junk food adverts before 9pm; and school lunches regulated to ensure a balanced diet is provided. Other countries have started to translate these ideas into the Net Zero agenda, with bans on short-haul flights and advertising from carbon-intensive industries.

Example: France has banned fossil fuel adverts and short-haul flights where alternative modes are available.[58] [59] The Dutch city of Haarlem has, with some controversy, banned meat adverts in public places.[60]

Who can act upstream?
Mainly national governments and regulators, local and city authorities or industry bodies who have the potential to alter the norms, standards, mandates or incentives across a whole sector.

Putting it into action
Recommendations A2, A3, E3, E5, F1, F3, and C1 and C3 all have upstream elements, in that they seek to fundamentally shift the norms and incentives of businesses and other organisations which in turn create greener choice environments for consumers.
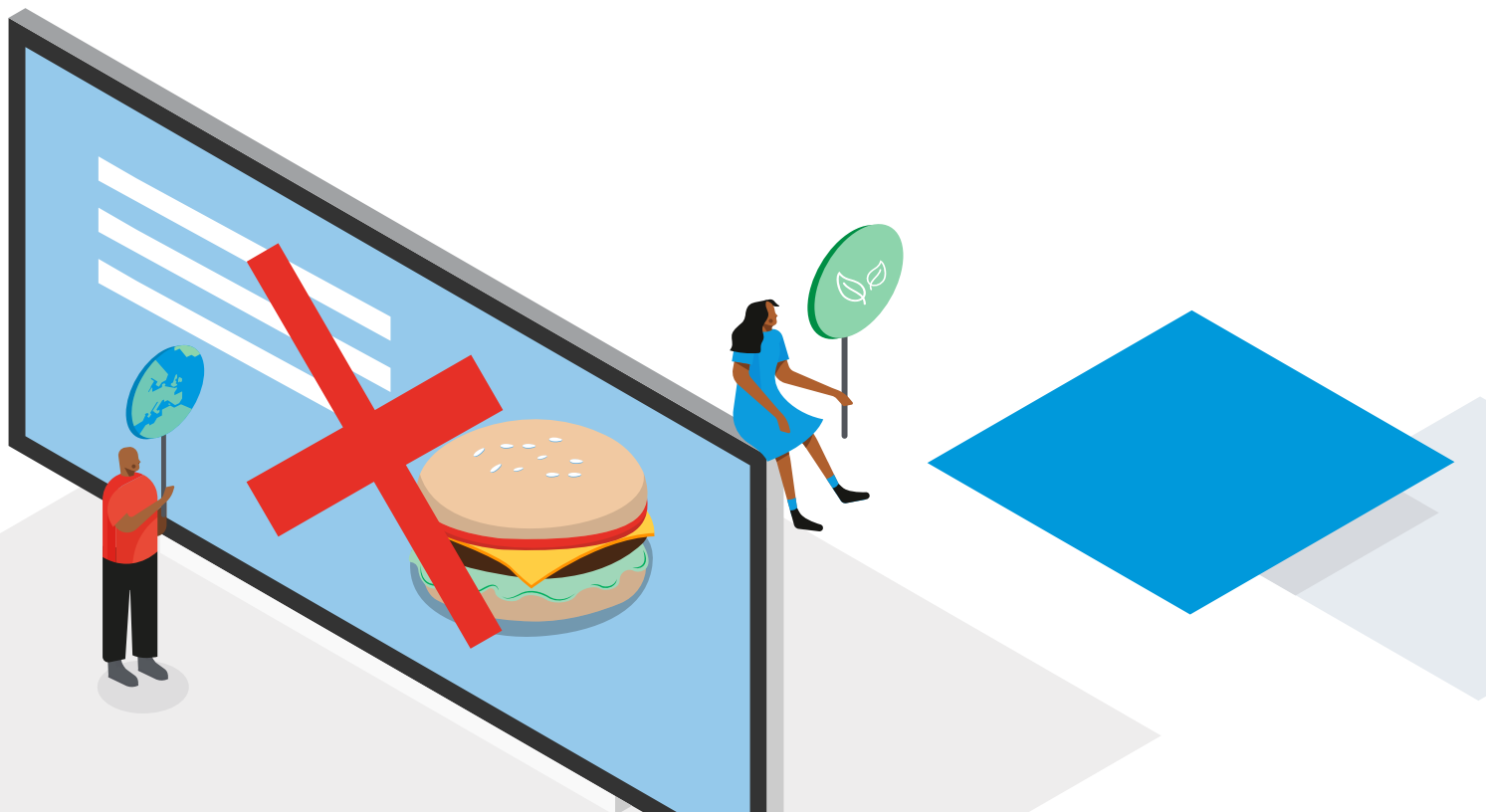
2.5 Leveraging positive feedback loops and tipping points for a rapid transition

Change rarely happens linearly. More commonly there are forces of stasis (negative feedback loops which dampen change) and continuity (path dependencies whereby past decisions 'lock in' future pathways), and their opposites: positive feedback loops (which reinforce runaway change) and tipping points (which take us rapidly into a new state of equilibrium). Think of a yacht in high winds. It's surprisingly stable because, as it starts to heel, two things happen: the sail catches less wind and the heavy keel protruding from the bottom of the hull arcs upwards, leveraging the boat back towards vertical. So as it leans further, the tipping force weakens and the restorative force strengthens. A negative feedback loop keeps it stable. But if that state of stability is perturbed enough, we reach a tipping point: a sudden acceleration of change as the boat capsizes, now in another stable state, extremely difficult to bring upright.

Our social and economic systems are no different,[61] and this is important because we need rapid change to tip us into new norms of green consumption. So we must ask ourselves: what dampening forces are maintaining the status quo? And where might reinforcing feedback and tipping points be leveraged to deliver exponential progress?

Negative feedback and path dependency
There are many aspects of our psychology which reinforce the status quo. Our aversion to risk and uncertainty; our tendency to focus on confirmatory information that aligns with an existing worldview; the pull of sunk costs that lead us pursue a chosen path beyond reason; our tendency to stick with default options; our need to 'save face' or rationalise past actions; our proclivity to conform to established norms; and the reinforcing nature of automated habit, to name a few. All dampen the likelihood of changing our minds and our behaviours. If our goal is to spread a social movement of environmentalism, these are real barriers that, in the terms of virology, significantly reduce the 'R rate' (the rate of reproduction).[62]

The same can also be said for several structural aspects of the economy and built environment. Consider the relationship between demand and finite supply (demand increases → price increases → demand stabilises) or city planning (where past decisions on infrastructure can lock-out the opportunity for radical changes in how we travel). We can change our ways, but neither our brains nor the system dynamics make it easy to escape the strong pull of inertia.

Positive feedback and tipping points
The good news is that there are also many forces of reinforcing feedback which have the potential to drive rapid change. In some cases these may carry us over tipping points. These typically occur as we pass thresholds of critical mass (e.g. a sufficient number of people now do something so it becomes a new social norm, with its own virus-like spread of conformity), or critical price (e.g. a new technology becomes cheaper than the old, turning it rapidly from a niche option to a default). Below we highlight several mechanisms of positive feedback and potential tipping points that we should be trying to leverage when designing policy.

Box 5. Mechanisms of positive feedback and tipping points

Supply and demand

Where supply is not constrained, increases in demand may spur suppliers to increase variety and quality of supply, thus further increasing demand. For example, as more people have become interested in plant-based food, producers are increasing their product ranges and investing in innovative food science, in turn creating a choice environment in which other consumers will be drawn to these products due to increased availability, quality and marketing.

Increasing returns to adoption

Technology becomes more attractive as more people adopt it, as there are i) learning benefits which increase production quality, ii) economies of scale which reduce prices, and iii) technological reinforcement, e.g. through infrastructure decisions, development of other supplementary technologies which co-benefit each other, or industry standards which reinforce the use of a certain technology ecosystem. For example, the cost of manufacturing EVs has dropped significantly in the last decade and, where price parity with combustion vehicles has been reached (e.g. in Norway due to policy support), adoption has sky-rocketed (now well over 80% of new car sales in Norway, nearly 5-times the proportion in the UK).[63]
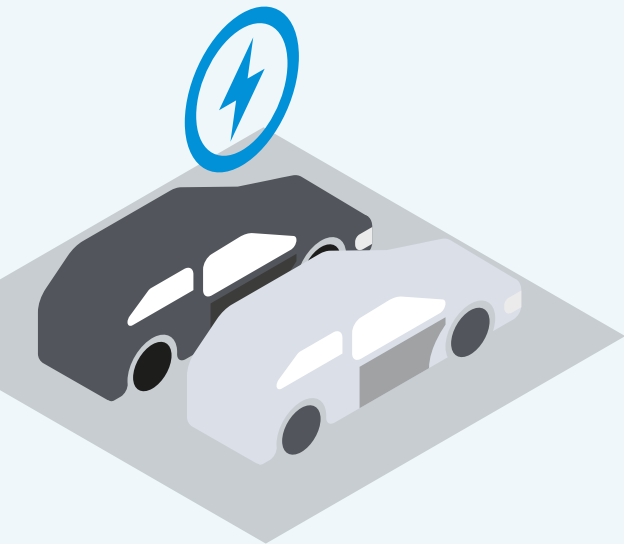
Market competition

The relationship between competing firms generates a positive feedback loop as advances in one firms' offering spurs improvements among their competitors', ad infinitum. However, this is helpful only to the extent that firms are actually competing on environmental performance (not just price, brand etc.), hence our inclusion of Upstream Principle 8 above.
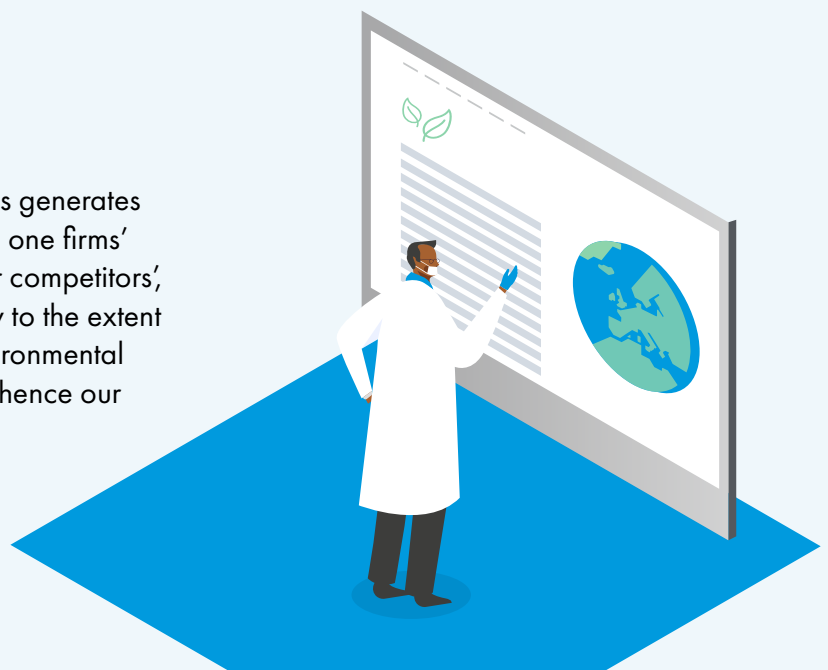
Information cascades

As information (and by extension attitudes, beliefs) pass through a network, like a virus, growth will tend to be exponential.

Social contagion

While social norms can reinforce the status quo, once change begins and passes a certain threshold, they can also be a reinforcing driver of change as new behaviours become seen as increasingly normal, socially valued or expected. Tipping points may occur when passing a critical mass, potentially involving the adoption of norms by major cultural institutions.

Policy support and rhetoric

Topics which were once niche can become mainstream as public support increases, leading to increased media air time, bolder political rhetoric, leading back to increased public interest, and so on. Stronger rhetoric on climate action could therefore become normalised just as stronger rhetoric on immigration or Covid-19 responses have done in recent years. The public's support for climate policy is not an inert variable around which politicians must navigate, but is itself altered by public perceptions of how seriously politicians are taking the issue of climate. * [64]

* For instance, research has shown that the public inferred the severity of Covid-19 in large part from the government response to it (lockdowns etc.). Analogously, quoted from Foad, Whitmarsh, Hanel & Haddock (2021): "...ambitious climate change policy was stalled for years because policymakers lacked a perceived social mandate for action, while sections of the public, conversely, presumed the risk of climate change was low because policymakers were not taking more radical steps to address it" - highlighting that political mandates are not inert, but part of a dynamic feedback loop of inference between the public and their politicians. This also echoes Darley and Latané's classic 1960s experiments in which participants in a room unexpectedly filling with smoke did nothing if other (actors) didn't react - the power of simply looking at those around us to infer whether we're in danger or ought to be doing something.
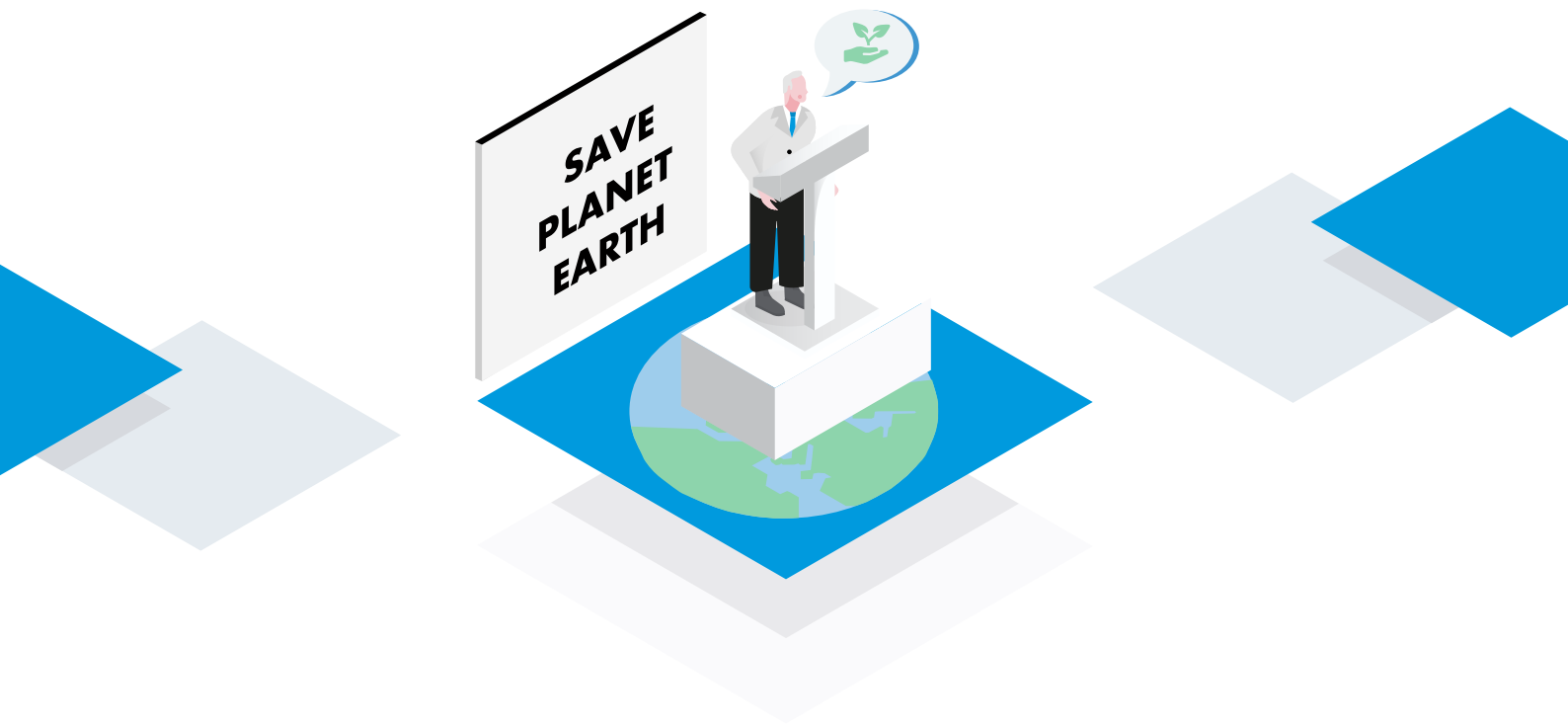
Tipping points can also trigger further cascades of tipping points. For instance, decreasing electric vehicle costs and increasing quality and vehicle range is already driving exponential growth in adoption, but an even more pronounced step-change in adoption will likely occur once the price drops below that of an equivalent combustion vehicle. This might drive a massive expansion in the battery industry which also brings down the costs of, and spurs innovation within, adjacent industries such as electrification of HGVs, aircraft, and storage for the renewable grid. This in turn might even be the tipping point that causes oil firms to rapidly reinvent themselves as assets become at risk of being stranded. Dominoes can fall quickly.

But none of this is inevitable. A less rosy chain of events is also imaginable: supply constraints on lithium for batteries or microchips might thwart exponential adoption of EVs, as well as causing adjacent industries to compete with each other for resources rather than growing off each other's success. This keeps prices high and supply constrained, meaning fossil fuels remain dominant, and in turn continue to attract investment.

Knowing that two such drastically different outcomes could spiral into existence as a result of subtle differences in the starting conditions really highlights the importance of understanding these dynamics, and preparing for them. And while it is impossible to forecast the future with any certainty, we can at least identify some key conditions that increase the odds of desirable tipping points.

What can we do?
Successful strategies can be viewed as both weakening the negative feedbacks and path dependencies that maintain the status quo, or strengthening positive feedbacks which can drive change. We offer a few principles below,[65] many of which overlap with the principles outlined in the upstream-downstream model above, albeit take on a new light when we understand their role in enabling tipping points:

Weaken or overturn dampening forces by:

- **Targeting timely moments when the status quo is more easily disrupted.** E.g. people moving home or job are more open to new travel routines or home upgrades.
- **Leveraging our tendency for the status quo to advantage.** E.g. setting green defaults.
- **Supporting higher-risk venture capital investment into clean tech start ups.** Currently most investment by far goes into listed business shares, thus supporting the status quo rather than maximising innovation and new ideas.
- **Watching out for dis-economies of scale** which can interrupt otherwise rapid adoption. For example, as the price of renewable electricity continues to drop and generation is expanded, at a certain point the intermittency of supply demands far greater energy storage solutions, increasing prices again. Similarly, installing five EV charge points may be more economical than installing one, but installing 20 (for example at a large taxi depot) can become prohibitively expensive if it requires upgrades to substations.
- **Using deliberative processes** which may help to reveal a more meaningful depth to the public mandate for policy action, addressing the tendency for the public to under-weight the severity of climate change because politicians aren't acting with urgency, and politicians to not act with urgency because the public aren't demanding them to.

Tap into positive feedback loops by:

- **Making green behaviours more observable** to accelerate social contagion. E.g. green number plates on EVs, signage outside homes being insulated or salient tags on property listings to highlight energy efficiency.
- **Strengthening or creating more connections within social networks.** E.g. refer-a-friend incentives for heat pumps or green tariffs.
- **Increasing firms' transparency and accountability** to increase the extent to which firms must compete on being green (e.g. mandated reporting of Scope 3 emissions, clear product labels, and crackdown on greenwashing).

Create and prepare for tipping points by:

- **Making the green option slightly cheaper than the dirty option**, such as through well-calibrated incentives or carbon prices. E.g. despite coal being cheaper than gas, it is twice as carbon intensive. So, increases in the UK carbon price between 2013 and 2016 created a critical transition point at which gas became cheaper than coal, leading to extremely rapid decommissioning of coal plants.
- **Ensuring supply chains and complementary infrastructure is prepared for very rapid adoption.** For example, EVs are no good without charging solutions for all and heat pumps depend on a large network of qualified installers. These bottlenecks can't be solved in an instant, so will put a brake on exponential growth if we don't prepare in advance.
- **Looking out for differences between early and later adopters.** For example, exponential adoption of EVs may not continue once we move beyond wealthy two-car households into an entirely different market: used-market, single-car households with no off-street parking. They face materially different adoption barriers, so addressing them ahead of time will be important to allow the adoption curve to maintain momentum.

The study of nonlinear dynamics within social and economic systems is a nascent field, but one we must surely understand in far greater depth if we are to deliver on the exponential progress required to meet short-term carbon budgets and limit global warming.
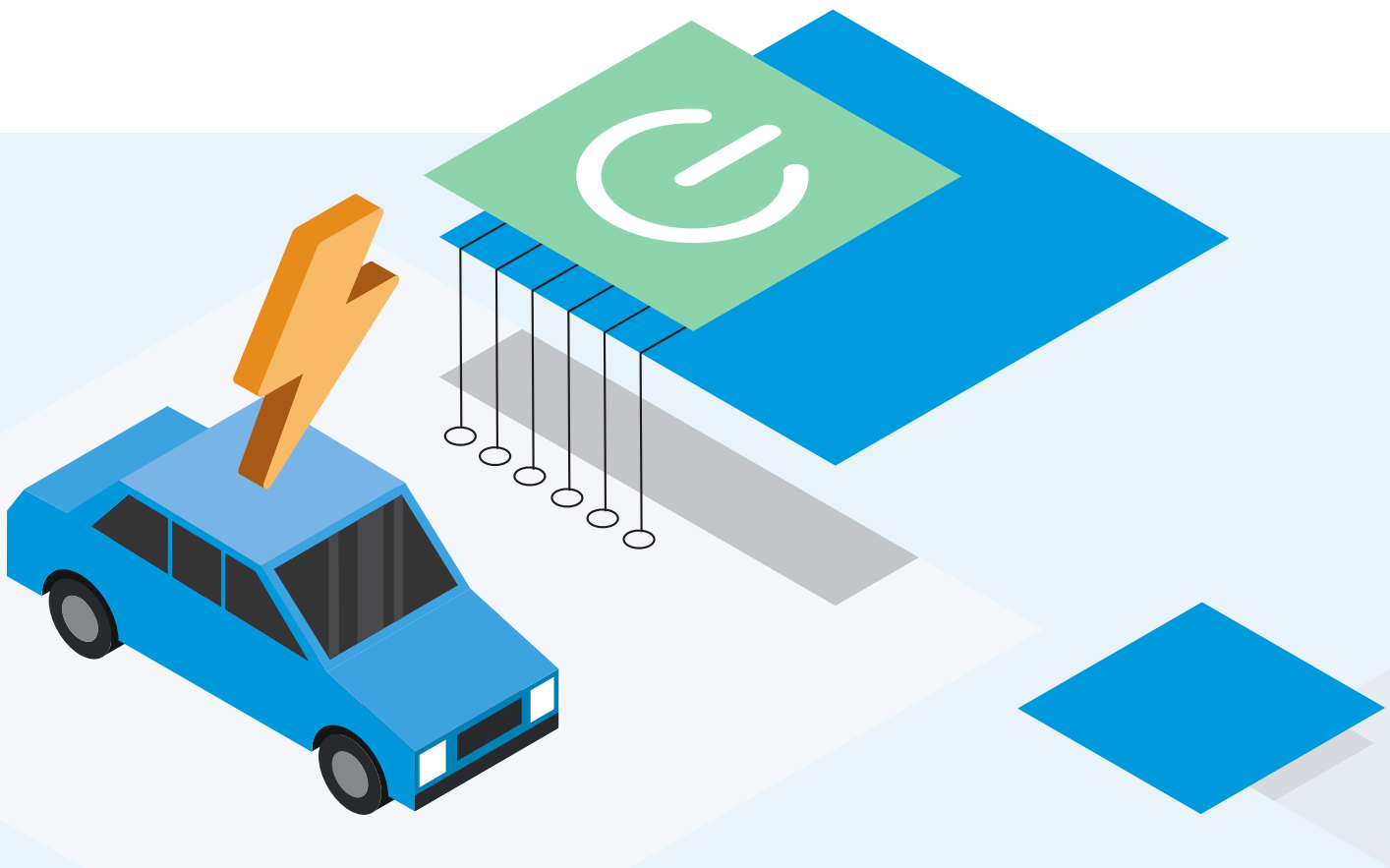
Chapter 3. Public engagement, information and communications

Public engagement, information and effective communications are central to achieving widespread behaviour change. They have a role to play upstream by increasing transparency of businesses and thereby encouraging effective market competition. But in particular, they are central to downstream intervention: supporting and encouraging citizens to make informed, greener choices where they can. Public engagement is also about listening, through citizen assemblies, polls, and social research. These activities help us understand the wide range of legitimate interests and constraints in order to ensure measures taken are fair and the co-benefits are widely understood and felt by all. This increases the mandate to act and the effectiveness of policies or interventions led by Government or businesses.

Our '4 As' model below, adapted from recent work with the CCC,[66] represents our view of the four key pillars of public engagement: building public awareness, agreement, access and adoption.

In this chapter, we focus primarily on communications given its common usage as a tool for behaviour change.

Figure 4. The '4 As' model of public engagement

Awareness ➡ **Agreement** ➡ **Access** ➡ **Adoption**

Awareness	Agreement	Access	Adoption
• Awareness of climate change, and global and UK fight to address it	• Endorsement of a narrative of green progress	• Equitable access to infrastructure, funding, and opportunities to make green choices	• Direct and voluntary citizen action towards low-carbon choices
• Acknowledgement that life will need to change towards greenner norms	• Sufficient public approval for effective policymaking	• Clear information about products in markets (labels etc) to enable green choices	• Can relate to one-time technology transitions or daily habit changes
• Specific knowledge about what individuals can do in their own lives, and what support is available to them (including accurate understanding of relative impacts)	• Participatory process (climate assemblies etc) to ensure solutions are fair and acceptable to diverse publics		• Active engagement from citizens should ideally help to accelerate the other three 'A's, by shifting norms, political capital, and markt advantage and costs for new green technologies
	• Openess to new greener technologies, practices and services to drive the transition required		

3.1 The strategic role of communications: taking people on a journey

It has become something of a cliché within the behavioural science community to point out that 'information alone is rarely sufficient to change behaviour'. This is often true, particularly in discrete, short-term settings where communications interventions are typically evaluated by researchers. For instance, meta-analyses have shown that information provision tends to cause shifts in behaviour is just 2-3%,[67] and behavioural interventions tend to increase in effectiveness as their mechanisms of impact move from information provision, through affect, through to non-conscious or more direct contextual drivers of behaviour.[68] There are also real cost and convenience barriers to many green choices, which information provision alone will rarely solve. This is an important message to convey, as we've seen countless times the opposite intuitions among business leaders, policy makers and the public:

'we just need to raise awareness and educate people…'

However a more nuanced assessment reveals that effective comms and public engagement does play a critical role. There will be some instances in which information provision can influence behaviour, particularly where there is high motivation and capability to act, but poor knowledge is a limiting factor. For example daily prime-ministerial press conferences through the Covid-19 pandemic and clear, action-oriented slogans like 'hands, face, space' undoubtedly influenced the behaviour of a population keen not to expose themselves to the virus.[69] At the time of writing, in the midst of the 2022/23 winter energy crisis, the same might be said for promoting simple but unfamiliar steps to reduce household energy usage, such as reducing boiler flow temperatures.[70]

But, more often, communications and public engagement may be one or more steps removed from substantial behaviour change. The pathway to Net Zero is long, yet must be walkable by all: welcoming, inclusive and easy to navigate. We therefore require communications which lay these stepping stones to action.

Figure 5. Four strategic functions of communication

We hace a mountain to climb, and comms can play a strategic role by...

1 Informing your audience so they know which steps they should prioritise

4 Steering people toward the big green choices when ready

3 Making small 'asks' which are psychological or practical stepping stones

HIGH IMPACT ACTIONS

LOW IMPACT ACTIONS

2 Warming then up - Build trust, familiarity, legitimacy, norms, and knowledge

All 'asks' of the public must rest on a foundation of strong support (policy,finance, infrastructure, product) which makes the ask accessible, easy and affordable

Many people are keen to be green, but don't know which steps to prioritise.

Most people (9 in 10) are willing or actively keen to live a more sustainable life. Data collected from BIT surveys across 2021 and 2022 show c.50% or majority support even for some of the least popular steps such as flying less, switching to EVs, buying a heat pump, or eating less meat and dairy.* We also find that people are far more willing to take steps they perceive as easy (correlation coefficient 0.77) and more impactful (0.81) (see Figure 6).

Figure 6. Willingness to act and perceived impact of behaviours

* Participants saw 6 of the 12 behaviours each. 'Moderately willing', 'Very willing', and 'I already do this' responses. Impact categories were determined by BIT. Data collected by BIT on 29 Apri - 5 May 2022.

% of participants who think this top 3 most impactful to reducing their environmental impact
(participants could choose up to three behaviours; n = 2,007)
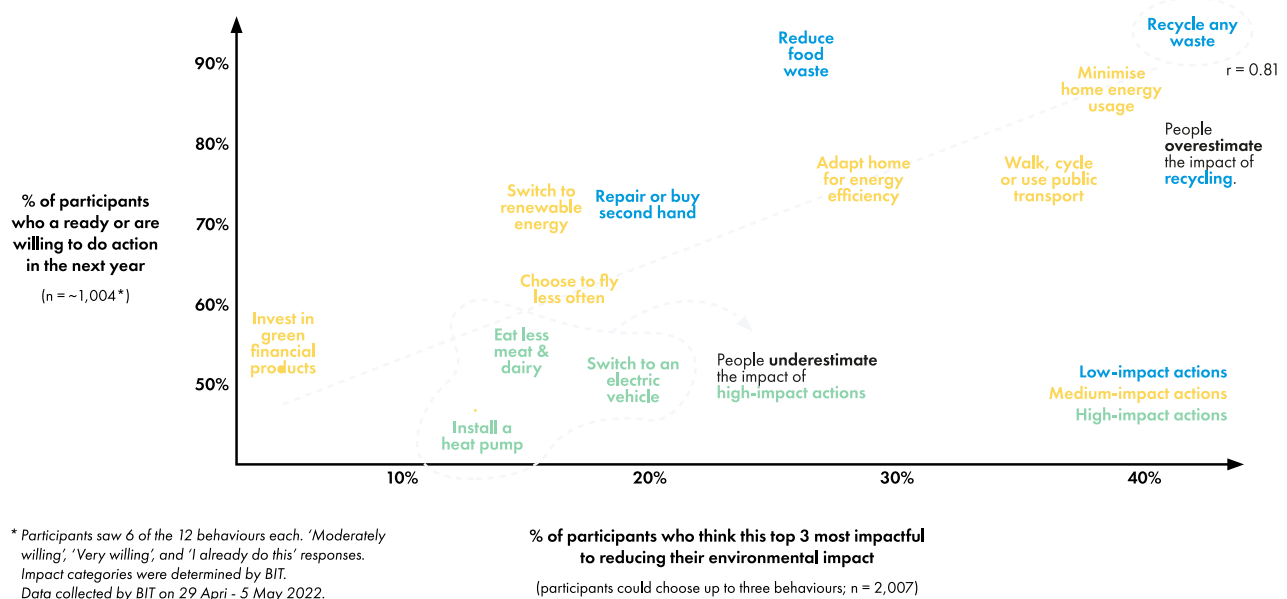
The link between willingness and ease is unsurprising. But unfortunately, most people are very wrong about the impacts: we tend to overestimate the value of small, more salient or familiar actions like turning off lights, recycling, and plastic bags, and underestimate the impact of big actions like dietary change and switching to an EV. Indeed, it's worse than random: we observe a negative correlation (-0.37) between perceived and actual impact. So, many people are left prioritising the easiest but ultimately quite insignificant actions.

This is a problem, not only because well-meaning individuals may overlook the most impactful steps, but also because this inaccurate knowledge provides an inflated ability to think "I'm doing by bit". Providing accurate information to the public is therefore critical, on both what they should prioritise, and how to do it.

* Big caveat: it is well established that there is a substantial intention-action gap with green behaviours: 'willing' in principle is not the same as 'happy to pay for it, make the effort to do it, and stick to the new habit'. That said, 'willing in principle' is still really important, and it's our job and that of policymakers to make those actions easy.

We can still make smaller 'asks' of the public, but they should act as stepping stones.

We need to strike a balance: we can't afford to be distracted by token environmentalism, but must acknowledge that many people simply are not yet willing or able to buy an EV, install a heat pump or give up their holidays abroad. 'Asks' of the public therefore need to be carefully calibrated for the audience.

This includes a role for smaller calls to action, so long as they act as effective stepping stones towards bigger changes. Good examples might include encouraging drivers to fill in an online EV cost comparison tool, take an EV for a free test drive, or opt for an EV hire car on holiday. Why? Because they directly relate to evidence on barriers and drivers of EV adoption (such as unawareness of low running costs, and the positive impacts of test driving), and therefore help take people on a psychological journey. These small steps have small or zero direct carbon savings, but they're easy, inoffensive, and might shift some from 'not interested' to 'my next car will be an EV'.
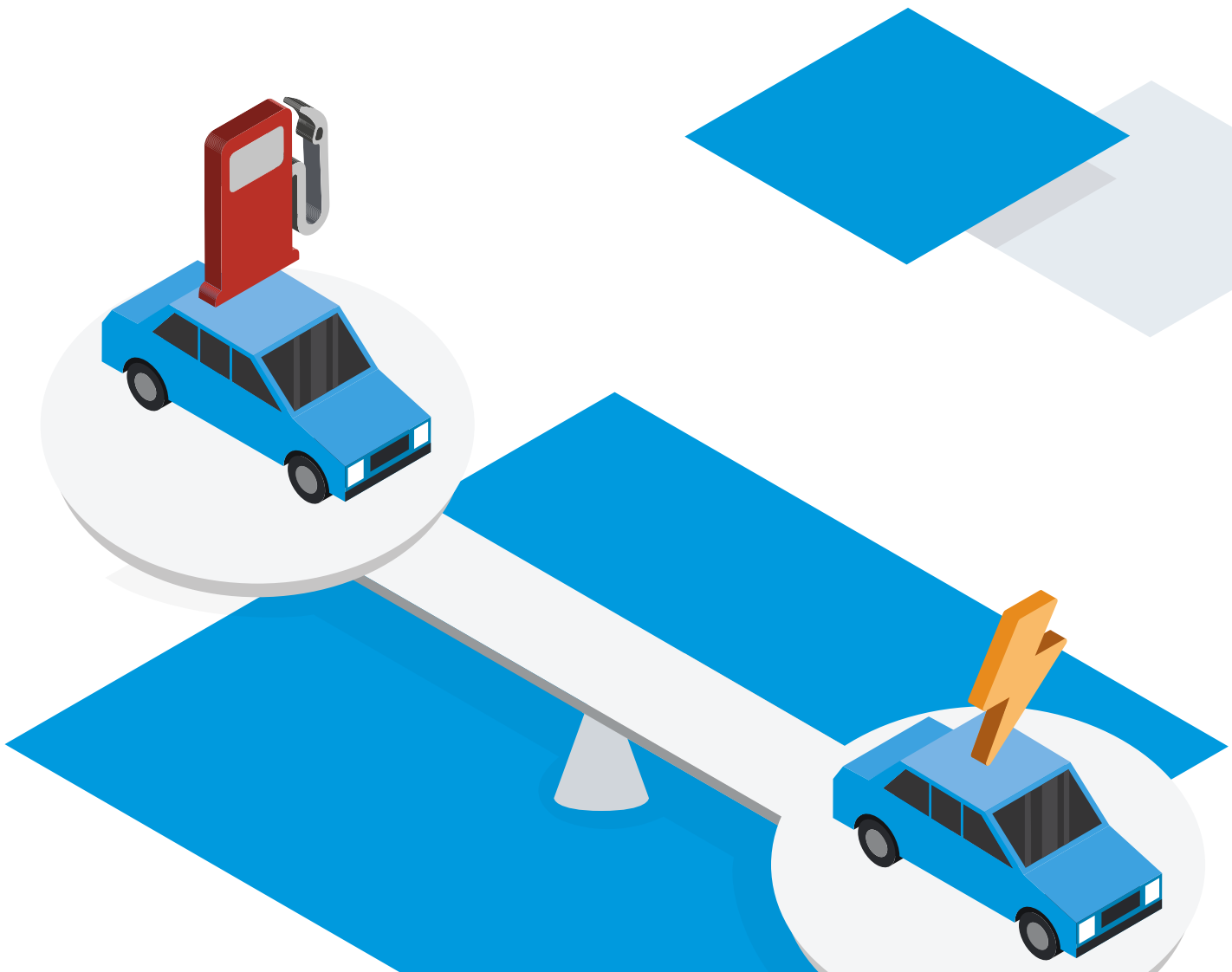
Box 6. Spillovers: can small green actions lead to bigger ones?

We've chosen the EV examples above as 'stepping stones' because they are unambiguously steps along the path to future adoption of EVs. But what about other small green actions like recycling, buying local, or selecting products with unsubstantiated 'eco' claims? They may have some instrumental psychological value too, but this is a hotly debated area of research.

The idea of 'positive spillovers' is that these small actions can help people become more familiar and comfortable with choosing green, and nurture green values, attitudes and identities.[71] This may increase the likelihood of adopting other, unrelated green actions in future. It may also lead to increased demand for environmental policy.

But it's not all good news. Positive spillovers tend to happen very rarely and under quite specific circumstances, so cannot be relied upon to occur naturally.[72] 'Negative spillover' is also a phenomenon, whereby these small green actions can licence a disregard for more worthwhile steps. There is a risk of 'moral licensing' (a 'sustainable' purchase might be the very crutch that encourages guilt-free consumption to begin with), 'ego depletion' (not another thing we need to do for the planet!), finite willpower and attention, among other issues.[73]

Promoting small green actions (that have no direct link to the bigger steps that are required) is therefore a rocky and uncertain path to Net Zero. It could go either way, so use with caution - best targeted at audiences who are very early in the journey towards greening their lifestyles (where there is still merit in encouraging people to think about 'being green', even in a superficial way). But that cohort is shrinking: 9 in 10 already recycle regularly,[74] similar numbers bring their own bags to supermarkets,[75] and 84% of Brits are concerned about climate change.[76] Moreover, issues including recycling, food miles and plastic packaging are already overestimated in their importance for the environment, and also too ripe for greenwashing firms to latch onto as bewitching but ultimately tokenistic ways to reduce their impacts. So, we do not believe these are the right issues to be pushing any more, at least not at the cost of attending to more important changes. With time being so limited, we need to gently move the public's attention towards the bigger issues, even if that means promoting smaller stepping-stone actions like EV test drives and home energy surveys for getting heat pump ready.
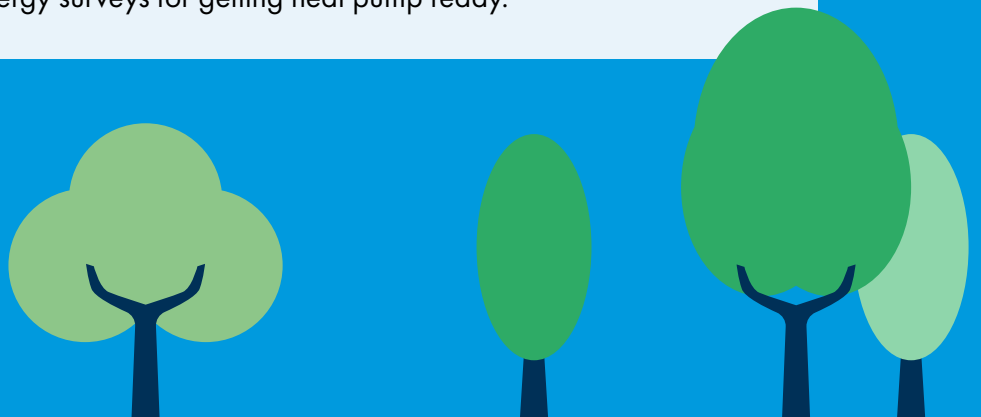
We should steer people towards the bigger green choices when they're ready.

Some people are ready to take the big steps right now, albeit this will generally depend on audience segmentation on income (e.g. ability to pay for household energy retrofits), location (e.g. access to public transport infrastructure), house type and tenure, and timeliness (targeting key moments like home and job moves).

The case study below shows our attempt to bring much of our thinking together. It's an information hub which helps people identify the steps that would be most impactful in their lives; allows them to tailor their level of ambition by selecting smaller 'stepping stone' actions while also emphasising the bigger steps they lead towards; and providing a plethora of tips and resources.

BIT case study 1. Get Greener website

The above insights motivated us to develop www.get-greener.com, a beta website designed to show you where and how you can best reduce your carbon footprint. It differs from most carbon footprint calculators in that it highlights areas for maximum reduction, not areas of maximum emissions (e.g. the highest source of emissions for an individual might be their domestic heating, but if they are renting this won't be highlighted as a priority action). By asking a handful of simple questions (postcode, car type, typical diet etc.) it scrapes publicly available datasets and generates personalised recommendations. Exploring these recommendations in more detail, it provides links to support and helpful tips, and encourages you to set your own goals.

Figure 7. Get greener beta website
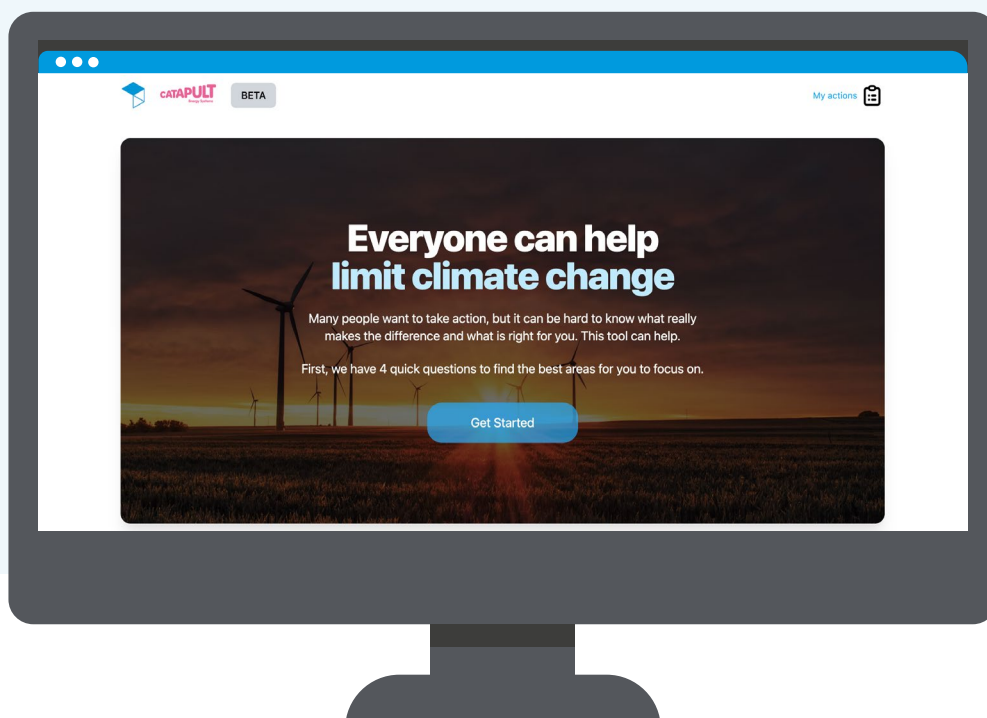
It's not all about behaviour. Building trust, familiarity, legitimacy, perceived norms and knowledge.

Whether you're in a government comms role, work for a bank, supermarket, GP practice or Scout group, your ability to encourage your audience to make green choices will depend on their familiarity and trust in new green technologies, perceived norms, confidence, sense of self-efficacy, and the credibility and legitimacy of the green vision you are trying to convey. In other words, there are a host of psychological antecedents to taking action, and if you're not yet ready to tell people to 'fly less' or 'stop eating beef', you can at least begin to lay the psychological foundations by normalising green lifestyles. Our work with Sky, below, aimed to do just this.

BIT case study 2. Exploring how TV could help us decarbonise our lifestyles

An estimated 4.3 billion people watch TV content on different devices for an average of 2 hours 54 minutes a day, across the world. Television can educate, entertain and inspire viewers of the world – and even encourage them to change how they behave. The question is, how could it be harnessed to encourage green behaviours?

What we did: We conducted a survey of 3,604 people across six countries in which Sky broadcasts their content, and an evidence review looking at what works to encourage behaviour change via TV.

What we learned: There is a clear mandate from viewers to act, with 8 in 10 people supporting the idea of broadcasters using their content and advertisements to encourage viewers to adopt pro-environmental behaviours. This could include: educating viewers through documentaries, investigative news coverage and featuring issues related to the environment more prominently in fictional content.

But where should broadcasters start? Our evidence review highlighted that, outside of purpose-made 'edutainment' content often used in international development settings on issues such as HIV risk and attitudes to domestic violence, the direct impact of TV content on behaviour was modest at best, but more likely to have indirect and long-term effects over periods of saturated exposure.
We developed a simple theory of change, identifying many of the most important psychological antecedents to behaviour change, focusing on things that TV content could plausibly impact: a TV drama won't make heat pumps any cheaper, but it can begin to shift the perceived normality of green actions, our procedural knowledge of how to do them and the extent to which green choices are aspirational.

Looking at a mix of 19 sustainable actions, 80% are concerned and 73% willing to adopt them in principle, but 66% perceive them as normal, just 44% think they're easy and 16% know what to do and how. A more detailed break-down per behaviour is shown below and this usefully reveals the gaps that TV can fill. For example just 2 in 10 know how to correctly recycle, save energy at home, or which foods are more carbon-intensive. All knowledge gaps Sky content could help to address. Likewise, content may increase the perceived normality of actions like flying abroad less, switching to an EV, or volunteering with local environmental groups.[77]

Figure 8. Willingness, perceived ease and perceived normality of behaviours

High willingness
(>70%* do it now or are willing to in coming year)

Perceived as easy
(>60%* say it would be or was easy to do)

Perceived as normal
(>50%* say most other people already do)
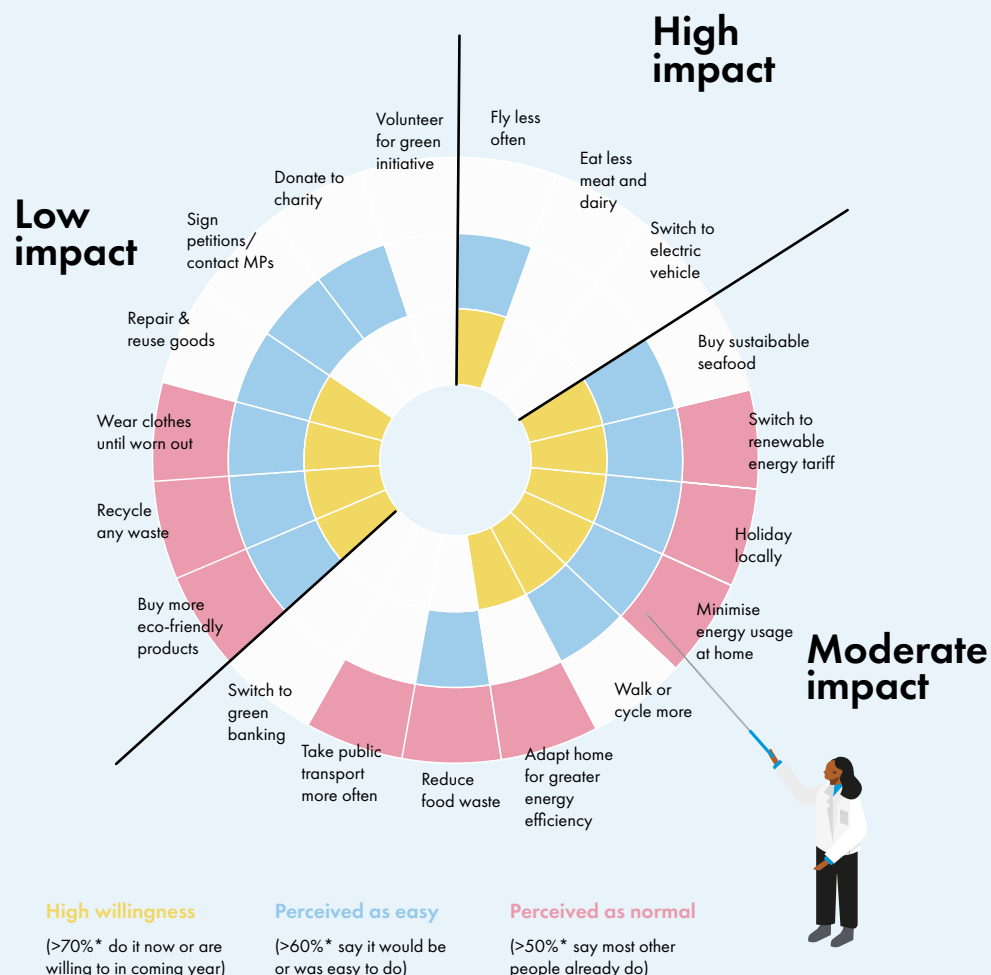
3.2 Communications design: messengers, framing, and narrative

The above sections speak to comms strategy. But what about comms design? What, specifically, should you say, and how should you say it?

It's hard to talk about climate change - but there are good ways to do it.

Climate change is a slow-burn threat, characterised by uncertainty. It's psychologically distant in time, space and against the reference point of the lived experience of most people in the UK. We tend to discount future outcomes, overly focusing on today (hyperbolic discounting);[78] have a general aversion to change (status quo bias); [79] struggle to really acknowledge the consequences (optimism bias,[80] avoidance);[81] and are adept at rationalising our own inaction (motivated reasoning,[82] moral licensing).[83] All of these psychological traits contribute to the well-evidenced gap between our vague intentions to be green and our daily actions.[84] They also make the challenge of communication more difficult - there is a real risk of either failing to resonate or triggering a reactive response that leads to further withdrawal from the issue.

The study of effective climate communications is a large area of research which we cannot do full justice here. In Figure 9 we summarise 11 tips which emerged from a recent evidence review on this topic undertaken for the Welsh Government in partnership with SBW Advertising, organised within BIT's EAST framework. Below, we expand further on narratives, framing and messengers.

Figure 9. 11 Principles of Climate Communications Campaigns

Easy

Provide clear and simple messages, with intuitive and familiar metrics

Use action oriented messages which tell people WHAT to do and HOW

Attractive

Make it salient

Emphasise co-benefits of a green choice but pick the right framing

Harness existing community values, rather than forcing ''green identities

Avoid blame or scaremongering

Social

Lead by example to build legitimacy

Harness effective messengers: different groups listen to different people.

Advertise and model social norms, showcasing individual stories

Timely

Use prompts at timely moments (e.g. point of purchase, transitions)

Make use of reminders and frequent prompts

We need a strong narrative.

Humans are story-tellers and we tend to think in terms of villains and heroes, narrative and plot. Many of the great societal mobilisations of the war and post-war years were driven by captivating narratives that inspired nations (e.g. Churchill's casting the UK as the last bastion of humanity no less, Roosevelt's 'fear of fear itself', Kennedy's 'choice to conquer the Moon', or Thatcher and Reagan's extolling of virtues of neoliberalism set against the background of a fight with the 'Empire of Evil'). More recently, the great taglines 'Make America Great Again' and 'Take Back Control' both elegantly articulate a narrative of past greatness, followed by a tragic decline, and now an opportunity for re-birth (often featuring a charismatic hero fighting against the villainous actions of China, global elites, low-wage immigrants, EU bureaucrats, etc.). This is the 'man in a hole' narrative structure: one of just a handful of plotlines that seemingly encapsulate the entirety of storytelling across human history.[85] In contrast, what's the Net Zero narrative? And has it really captured the public's imagination?

Choosing the right framing.

The need for climate action can be evoked through a wide variety of framings: protecting the environment; economic growth; public health; national security; moral obligation, and so on. There is a lot of research testing different framings on support for climate policy (much of which is from the US political context) and the broad conclusion is that it matters, but results can vary significantly by audience. We should therefore seek to understand the audiences' own values and reflect them back.[86] [87] [88] Our own case study 3 below (the biggest study of its kind that we are aware of) shows that, in the UK, a simple pro-environmental framing worked well to promote engagement with COP26, across a very wide range of audience segments and political views. This may be due to the honest simplicity of talking straight to the topic, and the fact that concern for the climate is very high in the UK, so there was little need to seek an alternative frame.

But there is a big difference between communications' impact on public support for COP26 or government climate action, vs. on our own motivation to adopt green choices. In the latter case, received wisdom is to highlight the individual benefits of these actions (i.e. the green choice is cheaper, better, more tasty, keeps you warmer, more convenient...). There is countless evidence showing that people tend to rank these attributes above environmental impact, which is often more of a 'nice to have'.* For example, in one recent study where we experimentally tested message framing on willingness to adopt a heat pump, we found that messages highlighting increased property values, UK energy security and warmth, were all more effective than pro-environmental framings.**

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* In many of the experiments and surveys we have run we routinely find that cost, convenience and 'performance' (which may mean taste, quality, warmth, safety etc. depending if we're asking about food, consumer goods, energy efficiency, transport etc.) are almost always the top three. Health and environmental impacts tend to rank lower.
** Though, as always, it's complex. Is this because those frames were more compelling? Or is it just that participants already knew heat pumps were good for the environment, meaning that message had less additive impact on attitudes?

BIT case study 3. Testing messaging to boost engagement with COP26 in a large UK Randomised Control Trial (RCT)

What we did: There is mixed and limited evidence on the impact of communications' framing of climate change in the UK context. In 2021 we ran an online RCT (n=8,007) to test 7 different ways of framing messages about COP26: public health, economic growth, environment, moral liberal (fairness, justice), moral conservative (conservation, environmental stewardship), collective momentum of action (implying social norms) and multi-framing (combining elements of several). We tested these across Britain Talks' climate segmentation of the UK public.[89]

What we learned: We found that the Environment and Moral Liberal framings performed best at boosting several metrics of engagement with COP26: e.g. intent to follow COP26 in the news (+11pp vs no framing), talking to their friends or family about it (+13-14pp), and belief that COP26 is important to tackle climate change. Interestingly, the Environment framing worked best across different Britain Talks Climate Segments, even those considered traditionally less engaged or supportive of green initiatives.

This result went against conventional wisdom at the time, which revealed a slight hesitation to talk openly about protecting the environment, instead focussing on the potential for economic growth through green investment, local jobs, or British global leadership at COP26. Our reading of this result is that it doesn't always pay to be too 'clever' about how politicians talk about issues. Being direct and honest about the importance of environmental protection is a good and strong argument for environmental policy, particularly when such a clear majority of the public are climate conscious.

"Being direct and honest about the importance of environmental protection is a good and strong argument for environmental policy."

Figure 10. The environment framing

Screen 1

So why does COP26 matter?
Hosting the COP26 climate summit will help to reduce the threat faced by countless species and natural habitats in the UK and beyond, by bringing all countries together to commit to cut carbon emissions and tackle climate change.

How can climate action at COP26 help nature and our environment?

Restoring balance to the natural world:
Climate change has put our world out of balance, with animals becoming extinct, forests disappearing and wildfires raging. Hosting COP26 allows the UK to press countries to protect and revive nature and restore this critical balance.
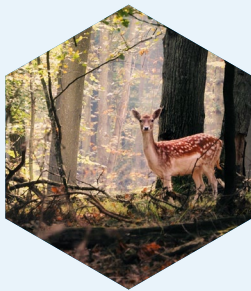
Protecting our native species:
From the bees in our gardens to the salmon in our rivers and the puffins on our coastlines, our native species are under threat from global climate change. International commitments made at COP26, will help to protect the natural world including our precious British countryside.

Screen 2

Saving the wonders of the world:
Climate change is battering our natural world, from rainforests to coral reefs and the millions of species which rely on them. As COP26's host, the UK can encourage other countries to make commitments to cut emissions and so reduce the climate threat.

Protecting our forests:
Desforestation is not only hurting nature, it is also driving climate change. We can secure agreements at COP26 to stop deforestation and protect these precious natural environments.

The messenger matters.

Messenger characteristics are also key in shaping audience perceptions, with credible subject matter authorities and our peers or loved ones typically exerting greater influence.[90] [91] For instance, BIT's own research shows that on average, climate activists and climate scientists (David Attenborough being routinely top of the list) are by far the most trusted messengers on climate change, with 69% and 73% of the public (respectively) trusting them on green issues - politicians and businesses rank far lower.[92] Some population segments (such as 'Backbone conservatives' as defined by Britain Think segments) value information coming from messengers who share their values, including the Royal Family (51%).[93] In contrast, young people on social media rank popular influencers as among the most trustworthy climate messengers (see case study 4 below).

BIT case study 4. Exploring the role of social media influencers on encouraging green behaviours

What we did: Working with Unilever, and its brands Dove and Hellman's, BIT designed and ran, to our knowledge, the largest online randomised-controlled trial of its kind with over 6,013 TikTok or Instagram users from across 3 countries (the UK, USA and Canada) to test the effect of different types of social media messaging on uptake of green behaviours. This involved working with 9 creators who developed bespoke content following BIT's guidance, and building two simulated social media platforms to mimic TikTok and Instagram. We asked creators to produce videos covering two areas: reducing food waste and plastic use. Alongside neutral content (on an entirely different topic), we looked at the effect of using 'climate emergency' (more negative, problem-focused) and 'climate optimism' (more positive, solution-focused) framings in their content. The influencers retained creative freedom and interpreted our high-level guidance in their own ways.

What we found: Social media was cited as the top source of climate information for our participants. Social media content was also cited as having the biggest influence on viewers' behaviours, over big-budget documentaries and other sources. 8 in 10 felt that TikTok and Instagram is a good place for sharing advice on how to live sustainably, and wanted to see more.

We found that both types of messaging - climate emergency and climate optimism frames - had a modest but robust effect on participants' intentions to take sustainable action.

In a follow-up survey 2 weeks later, we measured self-reported behaviour. Here, we saw no impacts on a pre-specified list of 14 sustainable actions, but did find that 10% more participants who saw the climate emergency content said they 'took up a new sustainable action' (i.e. something not on our list).

These findings, alongside responses to a wide range of supplementary survey questions, inform our tentative conclusions:

First, and as expected, brief exposure to social media content is unlikely to drive significant behaviour change. However, given we observed modest but significant impacts on a range of self-reported measures and on intentions, we remain optimistic that repeated and varied exposure could have long-term effects on behaviour.

As for the framing of the content: the 'climate emergency' content effectively raised concern and therefore motivation to act, while the 'climate optimism' content (which focussed mainly on showcasing tips) was rated as more helpful. The two could work well in tandem since they drive different psychological mechanisms. More specifically, where the behaviours being encouraged are more complex or unfamiliar, more solution-oriented content will likely be more important. For very easy or familiar actions, particularly among audiences who are already environmentally-inclined or knowledgeable as was the case in this study, it may be enough to simply draw viewers' attention to the problem.
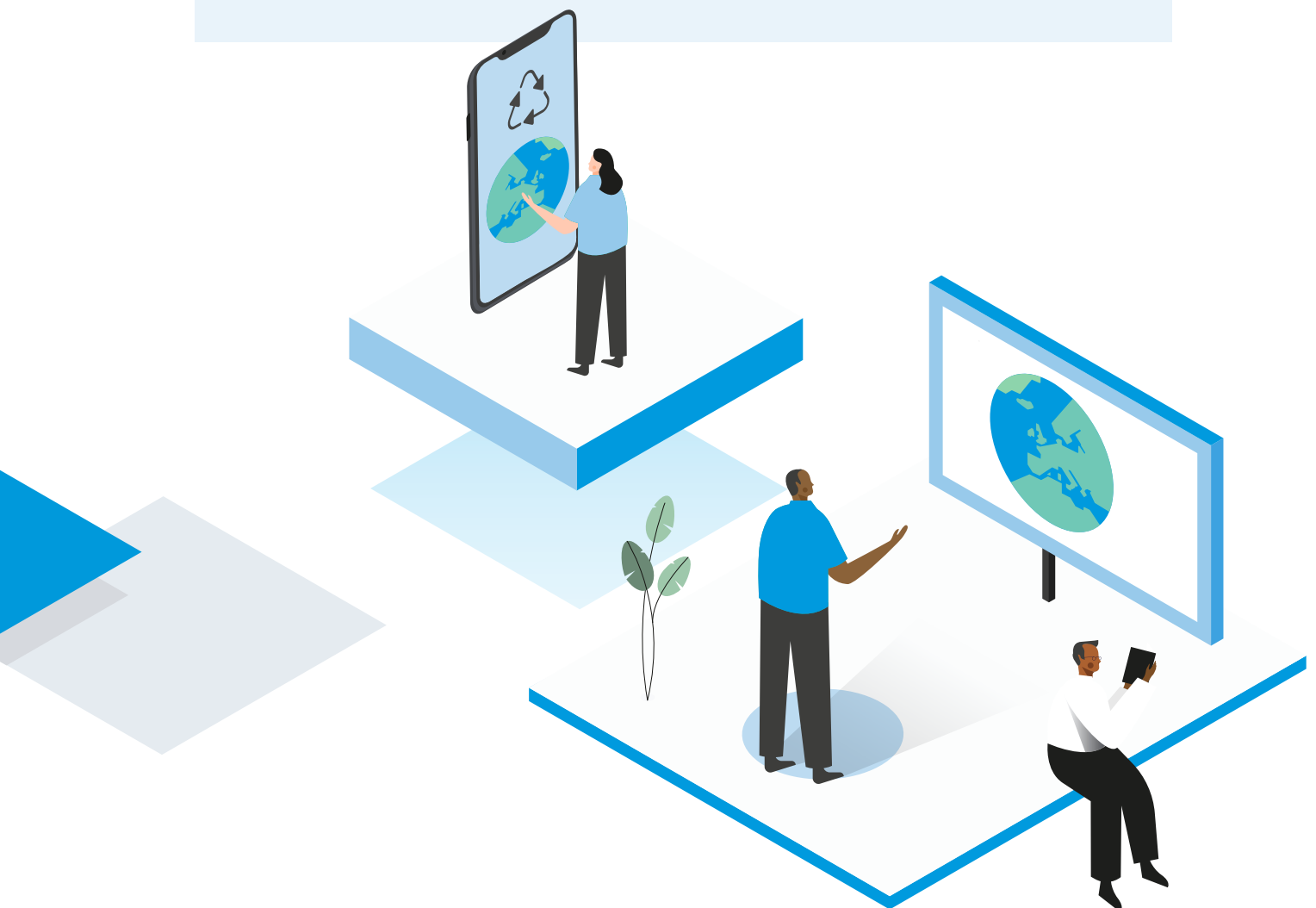
3.3 Public engagement, information and communications: recommendations

Our recommendations for public engagement and communications cut across sectors, relating to aspects of household energy, travel, food, finance, consumption and waste.

Government should:

A1. Provide simple guidance. Create a central, comprehensive information hub to inform citizens on what they can do to reduce their carbon footprints, and how. Include a clear ranking of actions, articulate government plans and signpost to all relevant support. When communicating this information, draw upon the 11 principles for effective climate comms highlighted in Figure 9 above. Our efforts with www.get-greener.com (see BIT case study 1) are a start, though can be built upon and promoted nationally.

A2. Introduce ecolabels for products and firms. Create a simple system of ecolabels across key product sectors (food, clothing, pensions) and businesses (supermarkets, banks, airlines, retail chains) to help engaged consumers choose green. By extension this incentivises businesses to become more sustainable, helping all consumers to be green. Credible labelling also reduces the need to rely on dodgy marketing claims, thus supplementing the CMA's clamp-down on greenwashing. Greater data transparency (e.g. mandated reporting of Scope 3 emissions) would also help deliver on this policy.

A3. Lead by example. Commit to a 'Net Zero Government' well ahead of 2050. This involves building on existing Net Zero procurement standards (to cover firm's actual emissions, rather than simply requiring credible plans) and rapidly decarbonising public-sector buildings, vehicle fleets, officials' travel and catering.

A4. Regulate advertising and greenwash. Follow other countries' lead by restricting advertising of high-emitting sectors: explore the benefits of banning fossil fuels ads and, in time, advertising from airlines who fail to meet decarbonisation targets compatible with UK interim carbon budgets.

A5. Target communications and support during timely moments of disruption. Provide tailored communications and signpost to relevant support at timely moments when taking action is easier for individuals. This includes when moving home (encouraging green energy upgrades and travel habits); receiving a boiler repair (getting ready for a heat pump upgrade); starting a new job (travel habits) and starting university (establishing dietary habits) among many others. These moments can be identified by leveraging data from local authorities, energy suppliers, the land registry and UCAS, for example.

Businesses, charities and other organisations additionally could:

- Support their customers to make green choices with clear labels, prompts or filters - for example allowing customers to filter by sustainable option on search results.
- Work with trusted messengers - climate scientists, respected activists and relatable peers ('people like me') regularly rank highest.
- Develop campaigns and other communications that make green actions salient, clear, easy to understand and do - rather than only talking about the climate threat.
- Build psychological stepping stones to green choices among audiences that aren't yet ready to make big changes - by building trust, familiarity, knowledge and a positive narrative of a greener future. Do this by normalising green choices within content, whether that is advertising, creative content (TV drama, social media content) or news.
- In all communications, draw upon our 11 principles of effective climate comms, summarised in Figure 9.

Public support for public engagement and information strategies

BIT's new poll shows very high levels of public support for the government leading by example, and providing citizens with better information on green products, services and businesses (Nov 2022, n≈1000, UK gen pop).

	Agree	Disagree	I don't know
Government leading by example	87%	7%	6%
Eco labels for products and services	83%	11%	6%
Green ratings for businesses	81%	11%	8%

0% 25% 50% 75% 100%

■ Agree ■ Disagree ■ I don't know
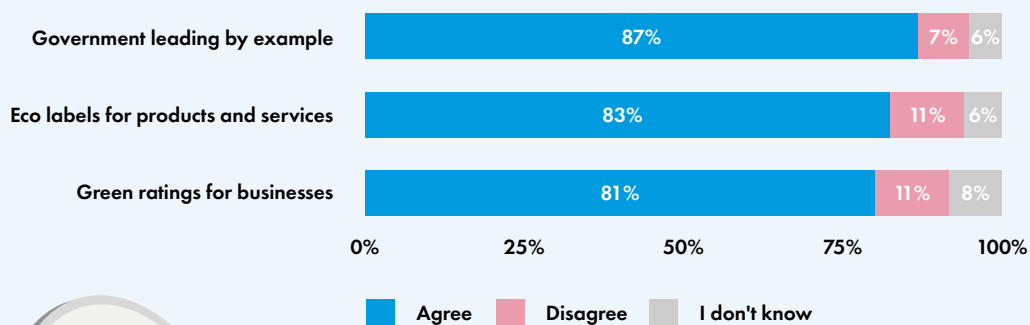
Chapter 4. Greening our homes: domestic heat and power

Household energy use is responsible for 23% of UK emissions: 5% from domestic electricity use and 17% from 'residential combustion' (using natural gas, oil, biomass, or coal in the home for heating, hot water and cooking).[94] Power generation – for houses and businesses – is the sector responsible for the greatest progress to date, but with very little behaviour change required: in 2012, 40% of our electricity was generated by burning coal. By 2020, this was down to 1.8%, and will be zero by 2024.[95] Renewables and nuclear combined now significantly exceed fossil fuels for electricity generation,[96] and 9 million Brits are now on green tariffs, with over half of new tariffs advertised as 100% renewable / green.[97] The government has stated that the UK's electricity generation will be 100% renewable by 2035.

The bigger behavioural challenge is the decarbonisation of domestic heating, a major policy focus at present. The current strategy is widespread adoption of electric heat pumps, though the potential role of hydrogen heating is also being explored, with large-scale feasibility, safety, and cost studies ongoing: key strategic decisions are to be made by 2026.[98] Current options on that front include the blending of H_2 into our natural gas (20% blend = 7% emissions reduction); and 'hydrogen-ready' boiler standards that would allow a relatively seamless switch for consumers. However, green hydrogen must be created with renewable electricity, at c. 70-80% efficiency. In contrast, heat pumps (at 300-400% efficiency) have a huge advantage in a future where demand for renewable electricity will be so much greater. So, they remain our main focus for behaviour change research.

We must also increase the efficiency of our buildings, both to ensure heat pumps can work most effectively, and to curb overall demand for clean energy to ensure renewable infrastructure can work effectively and economically. This means deep retrofits across the UK housing stock, including cavity, underfloor and in some cases solid wall insulation. And, in a future world where supply of clean power is not only precious, but more intermittent, the system needs to be smart, requiring consumers to accept smart meters, new tariffs, smart appliances and car chargers that help smooth demand to meet available supply.

Key behaviours to encourage, and known barriers

Adoption of heat pumps or other clean heating solutions	Adoption of household energy efficiency retrofits (insulation), generation (solar) and storage (batteries)	Demand-side response: Acceptance of smart meters, time-of-use tariffs, and shifts in peak energy demand
• High upfront cost • Slightly higher running costs than gas boilers • Limited grants and finance options at present • Some homes unsuitable (though perception of this is worse than reality) • Strong default to replace broken gas boiler with like-for-like • Considered ugly and noisy by some • Lack of outside space for installation • Very complex and slow installation process, which is off-putting, but particularly problematic when urgently replacing a broken boiler • Relatively unfamiliar technology to use • Some installers and heating engineers do not trust/recommend heat pumps • Common perceptions that heat pumps don't heat the home effectively	• High upfront costs loom large. Payback periods are often very long. • Installation hassle • Risk aversion and uncertainty (risk of poor quality install, wrong product, bad price) • Limited financial support • Limited awareness of range of options, and poor financial literacy to make investment decision • Shortage of skilled installers • 'Low hanging fruit' is mostly gone - remaining housing stock requires quite complex and expensive retrofitting • Retrofits are not visible = lack of social norm • Split incentives between landlords paying and tenants benefitting • Procrastination, frictions and lack of urgency	• Distrust of smart meters and other smart technology, e.g. relating to data security • Inconvenience and hassles associated with manual demand-side response • Perceived loss of autonomy • Discomfort or fear of time-of-use tariffs costing customers more if behaviour isn't responsive to the incentives
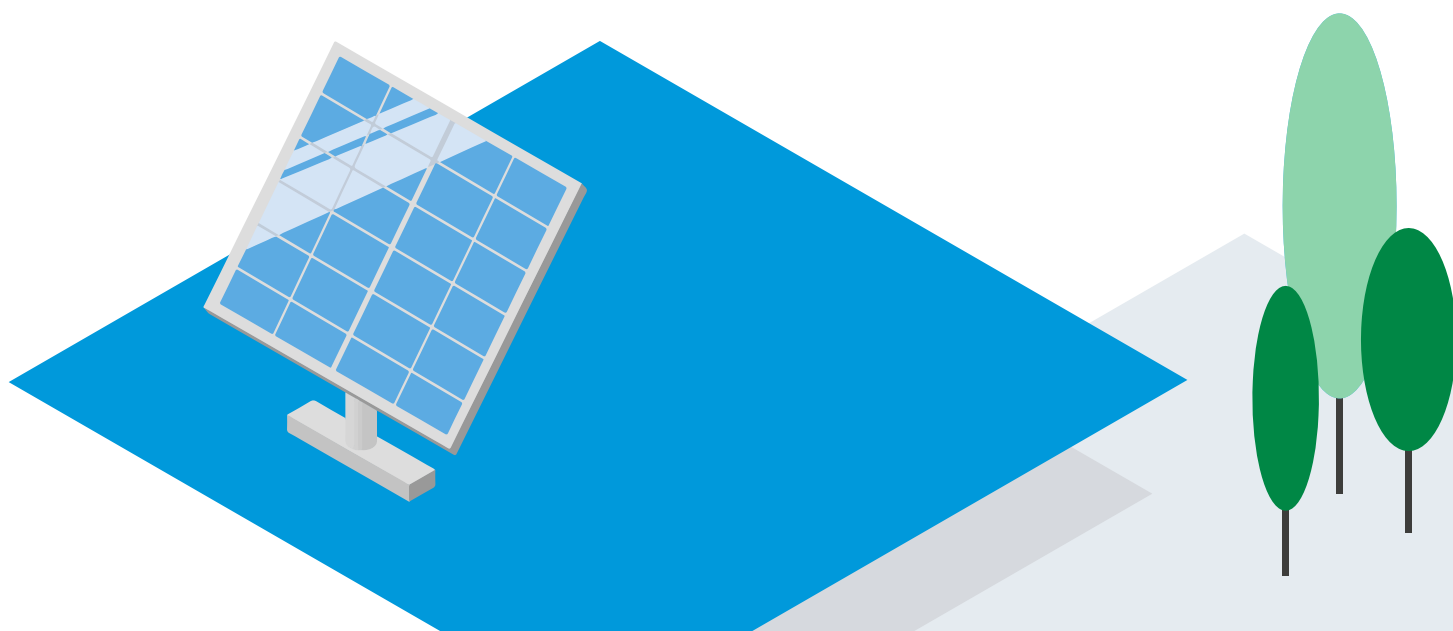
4.1 Clean heat

Current progress on clean heat: 85% of homes in the UK have mains gas central heating, while most off-grid homes have electric heaters, oil or LPG boilers.[99] The transition away from fossil fuel heating has barely begun: 27,000 heat pumps were installed in 2019, rising to around 60,000 last year (around 0.2% of the ~28 million total dwellings, or around 3% of the 1.8m heating systems installed per year).[100] Other than a few demonstration homes, no hydrogen heating is in operation, and unlike some European nations, we have very few homes on district heat networks.

Required adoption of clean heat: The current strategy to decarbonise domestic heat is widespread adoption of heat pumps, targeting 600,000 installations per year by 2028 and rising from there. Around 150,000-200,000 of those will be in new-build homes, which can be mandated, but the rest must come from voluntary adoption, at least until 2035 when all new and replacement heating systems (around 1.8m per year) must be low carbon.

Understanding the customer journey to adopting a heat pump

In 2021 we went 'mystery shopping' for a heat pump to map out, first-hand, the barriers and frictions to adoption, highlighting just how difficult the process currently is. Of particular importance among the many barriers highlighted below are (i) the high upfront costs, (ii) the high running costs which mean investing upfront doesn't even pay off, (iii) the unlikelihood of being recommended a heat pump by seemingly sceptical boiler/heating engineers who are also still new to the technology, and (iv) the huge complexity and duration of the process, which is an almost impossible task if needing to replace a gas boiler with any urgency - as most replacements occur in winter, when boilers are more likely to fail.[101] In short, we're starting from a very difficult position behaviourally, and a great deal of supporting policy and innovation in both product and adoption journey will be required to make them cheaper and more appealing.

Figure 11. Summary of barriers along the heat pump adoption journey

1. Research heat pumps
- Confusion/ overload from HP information online
- Info online presents HPs as niche products (e.g. for off-grid properties)
- Lack of emphasis around HPs being sustainable online
- Perceived effort in undertaking HP/EE admin
- Beliefs that HPs are expensive
- Gas/ oil boilers are default for online searches about home heating
- HP installation services were not always common

2. Arrange surveys with installers
- HP venders are risk averse so are reluctant to quote
- HP/ boiler venders have knowledge gaps
- HP installation companies offer confusingly different services from each other
- Companies inform consumers that HP installation is lengthy, effortful, & expensive
- General 'home improvement' barriers
- Confusmer may be unaware they need EE upgrades

3. Obtain quotes from installers
- Lack of outdoor physical space for HP
- Lack of indoor physical space for HP (e.g. water tank, larger radiators)
- Time period for competition longer than expected
- Features of a home make it unsuitable for HP
- Consumer may have aesthetic concerns about HPs
- Installers remind consumers of the downsides of HP installation during the survey

4. Address Energy Efficiency needs
- EE upgrades are an extra (sometimes unexpected) expense
- Lack of access to simple funding for EE upgrades
- Lack of information online about EE funding from council
- Lack of support or engagement from council about funding EE improvements
- Narrow eligibiulity for many funding schemes
- Long waiting time for assessment of eligibility for some EE funding options
- Perceived effort of updating an EPC

5. Address heat pump needs
- Consumer may be unaware that planning permission is necessary
- Poor access to planning permission information and services from the council
- Long waiting periods necessary to obtain planning permission

6. Apply for RHI
- Cognitive overload from RHI information online
- Confusion about certain metrics and RHI requirements
- Application feel risky because they are not guaranteed, and occur post-installation
- RHI applications feel effortful given the large administrative overhead (from supply MCS and EPC certification)
- Annual commitments to RHI feel irritating
- Providing upfront financial resources is deemed more useful than RHI

7. Install a heat pump
- LHP installation even more expensive than expected
- Skills gaps in HP installation from service providers
- THe internal footprint from HP (e.g. water tank) is aesthetically displeasing
- HP installation perceived to be more logistically difficult if homeowner wasn't working from home

Willingness to pay for a heat pump

While cost is far from being the only barrier to adoption, with prices often hitting £12,000* or more (3-5 times that of a gas boiler), it is clearly a major one. Working with Nesta, we have been exploring the public's willingness to pay for heat pumps, with a view to assessing the feasibility of government targets for 600,000 instals per year from 2028.

BIT case study 5. Understanding willingness to pay for heat pumps[102]
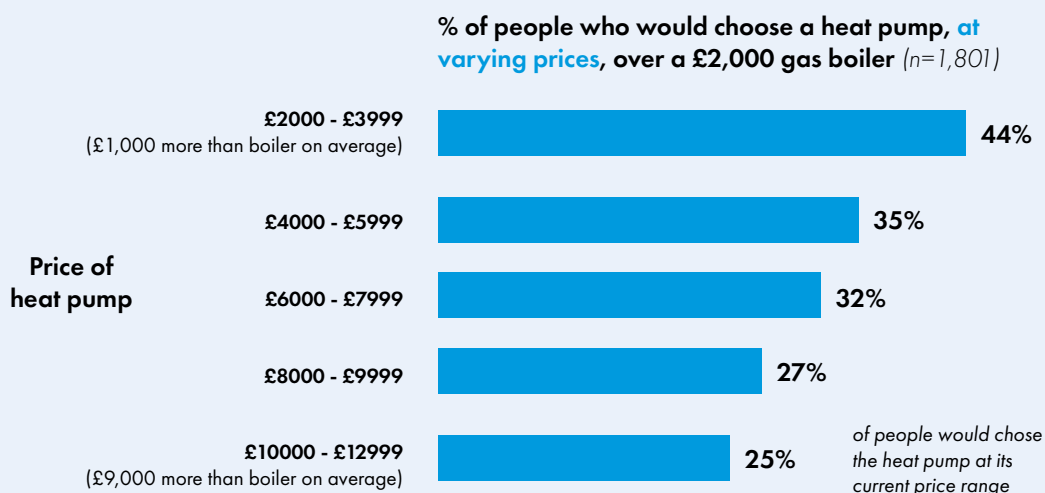
We conducted an online experiment (N=1,801, UK homeowners) to estimate willingness to pay for a heat pump over a gas boiler. Participants were presented with some basic information on heat pumps and a scenario in which their current boiler needs replacing within a year. They were then asked to choose between a replacement gas boiler for £2,000 and a heat pump which was priced randomly between £2,000 and £12,000 (inclusive of unit cost, installation and hypothetical subsidies).

What we learned:
- There is a clear early adopter group (approx. 25% of homeowners) who say they are willing to pay the full current cost of heat pumps of £10-12k (Figure 12). While we must take this 25% cohort with a large pinch of salt (not all would complete the challenging real-life installation journey), this is still a reassuringly high proportion of potential early adopters.
- There is a potentially bigger group, of roughly one in three homeowners, willing to pay a bit more for a heat pump than a boiler. If prices come down to c. £5k (which Octopus Energy predicts is possible within a few years), this cohort may be crucial, and just about sufficient to achieve government targets of 600,000 instals per year if the adoption journey is streamlined to avoid attrition.
- Though this gives cause for optimism, cost remains a major barrier to widespread adoption of heat pumps. We would soon run out of households willing to pay £5k: the majority of homeowners wouldn't choose a heat pump even if they cost the same as a boiler (£2,000). Indeed they may have to be quite a lot cheaper to persuade the majority. From our data we estimate that the average consumer is willing to pay around £500 for a heat pump, i.e., they are significantly less attractive than gas boilers, regardless of cost. This isn't actually surprising given they are i) more expensive to run, ii) much more hassle to install, and iii) there are widespread perceptions of inadequate heating performance.

* While the unit itself is considerably cheaper, many homes will need more substantial plumbing works, and potentially radiator replacements or even energy efficiency retrofits. However, this will be a one-time transition. Once you have a heat pump, future replacements will be easy and far cheaper.

Figure 12. Uptake of heat pumps at different price points in our online experiment

% of people who would choose a heat pump, at varying prices, over a £2,000 gas boiler *(n=1,801)*

Price of heat pump

£2000 - £3999 (£1,000 more than boiler on average)	44%
£4000 - £5999	35%
£6000 - £7999	32%
£8000 - £9999	27%
£10000 - £12999 (£9,000 more than boiler on average)	25%

of people would chose the heat pump at its current price range

Primary Analysis. Conditional logit model. Data collected by BIT on 9-14 December 2021.

Important note: These are likely **upper bound estimates** of heat pump adoption, given these are stated intentions in an online experiment, not fully reflecting the actual hassle of heat pump adoption.

Evaluating the 'market mechanism', subsidies, and other policy ideas to boost adoption of heat pumps

The above results show that there is some early demand for heat pumps, but in practice major barriers exist that need to be addressed: practical, cost and attitudinal. We've therefore been exploring different policy options to promote uptake. One flagship policy recently put to consultation by BEIS and now confirmed is a 'market mechanism' to mandate boiler manufacturers to match gas, oil, and other fossil fuel boiler sales with a certain volume of heat pump installations, either themselves or through a credit trading scheme.[103] We conducted a workshop with experts from the heating industry – stakeholders from boiler and heat pump manufacturers, energy suppliers, trade associations, installers, and third sector groups. We worked with these experts to conduct a 'pre-mortem': we asked participants to imagine the policy had failed to drive greater heat pump adoption and innovation in the heat pump market, then work backward to determine what might have caused the failure, and develop solutions to these issues.

Based on this exercise and our own economic and behavioural analysis of the policy, we supported the market mechanism as part of broader support for low-carbon heating ([our full response](#)).[104] It is in fact a perfect example of an 'upstream' policy intervention (see Chapter 2). It sets upstream commercial incentives to sell more heat pumps and fewer gas boilers, meaning consumers can expect to find themselves in a choice environment in which heat pumps are far more attractive in a few years' time. This may be achieved with rapid innovation in product design and installation services, reduced prices, investment in installer training, more efficient home surveys, and other innovations. This is the power of creating a market in which manufacturers want you to buy a heat pump instead of a gas boiler.

However, it may be too much to expect manufacturers to solve all of the problems identified in Figure 11 above, even when faced with a strong incentive to do so. There is also a risk that the Market Mechanism incentivises quantity of installations over quality. Poor experiences among early adopters would risk undermining the already quite fragile state of

I.   robust consumer protections, including a system of user reviews, an ombudsman service, and withheld supplier credits for poor quality installations,
II. government support for heat pump installer training, and
III. wider efforts to stimulate demand among consumers.

On this latter point, we undertook a second experiment, again with Nesta, to test a range of hypothetical policy scenarios on the uptake of heat pumps.

BIT case study 6. Testing policy options to boost the uptake of heat pumps[105]

Our willingness to pay trial identified that expensive installation, high running costs and hassle all pose major barriers to heat pump adoption. The UK Government's Boiler Upgrade Scheme (a £5,000 subsidy for heat pumps) is a good way to encourage people to make the switch. This follow-on trial aimed to identify the potential impact of this subsidy, but also other policy offers, both separately and in combination.
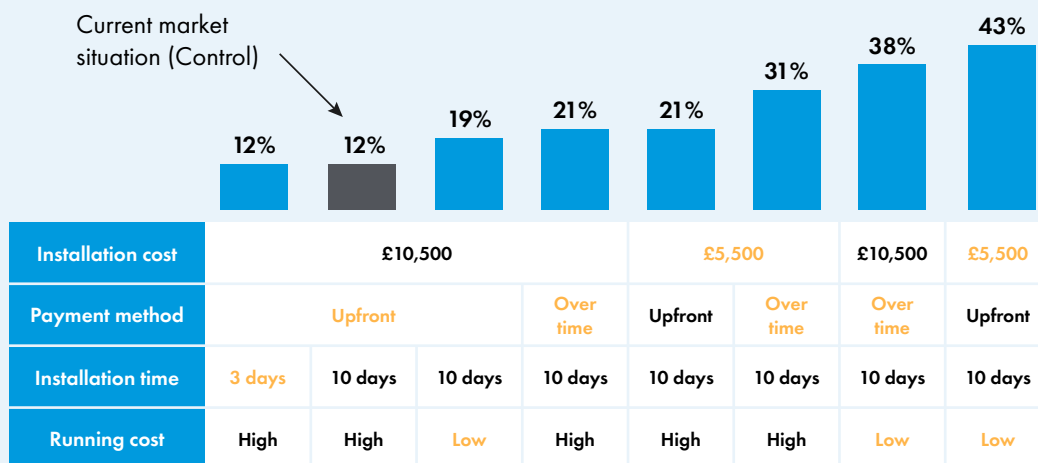
What we did:
- We conducted an online experiment (N=8,016, UK homeowners) to test i) reducing the installation cost, ii) an interest-free payment scheme, iii) cheaper running costs and iv) quicker installation time.

What we learned:
- Reducing the upfront cost is still the most impactful solution policy-makers can use to promote heat pump adoption. However lower running costs and delayed payment via interest free loans also have the potential to significantly increase uptake.

- Heat pump uptake increases further when combining incentives. Indeed, taken together, halving installation cost, reducing running costs and providing financing options could increase overall uptake of heat pumps by around 44 pp. This should be considered as an upper bound, given these estimates are from an online experiment.

Figure 13. % willing to choose a heat pump over a gas boiler

Current market
situation (Control)

	12%	12%	19%	21%	21%	31%	38%	43%
Installation cost	£10,500				£5,500		£10,500	£5,500
Payment method	Upfront			Over time	Upfront	Over time	Over time	Upfront
Installation time	3 days	10 days	10 days	10 days	10 days	10 days	10 days	10 days
Running cost	High	High	Low	High	High	High	Low	Low

N = 8,016; Choices = 24,048.
Descriptive statistics, no significance testing.
Data collected by BIT on 11 March - 5 April 2022

4.2 Energy efficiency of buildings

If electricity can be fully decarbonised at the point of generation, and heat can be fully decarbonised by encouraging adoption of electric heat pumps - job done, right? Not quite. The combined electrification of heat and transport will lead to a 3-fold increase in total demand for clean electricity, which will also be more intermittent, so there are big benefits to reducing peak demand. This requires more efficient buildings, which also have the significant benefit of allowing greater flexibility in demand since buildings will retain their heat for longer. Greater building efficiency also delivers significantly reduced energy bills, and greater domestic energy security (both of which are perhaps the primary motivators for building efficiency at the time of writing). Specifically, the most common retrofits required are attic, cavity wall, underfloor and solid wall insulation (in approximate order of cost and complexity).
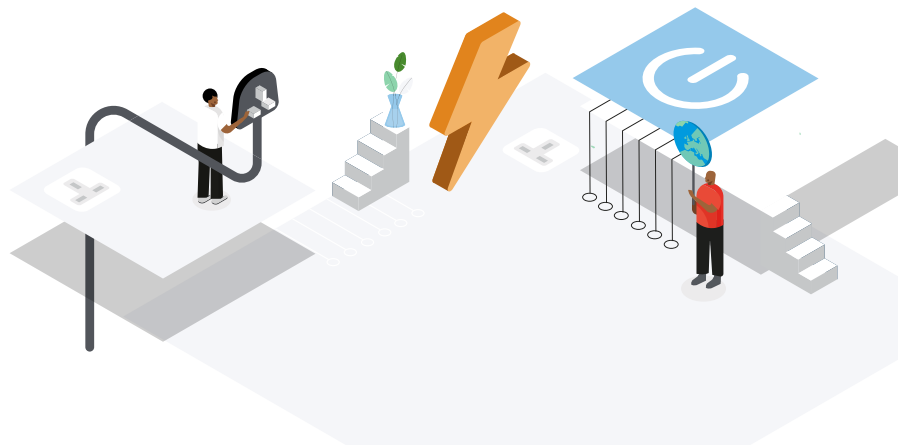
Current progress on energy efficiency: National electricity consumption has decreased by around 20% since 2005,[106] despite population growth of around 5m people in the same timeframe. The reduction has mainly been due to phasing-in LED lighting (mandated) and improved appliance efficiency (a combination of regulations and labelling standards).

Only 44% of homes in England have an EPC rating of C or above (38% in Wales).[107] Various policies over the last decade have sought to encourage retrofitting, most notably the Energy Company Obligation (ECO), and its predecessor schemes CERT and CESP. However, as low-cost measures within easy to treat homes have been largely installed, leaving harder to treat homes needing more expensive improvements, the rate of retrofitting has slowed significantly.[108] Coupled with inadequate retrofitting strategies (with the UK's Green Deal and Warm Homes Grant both being heavily criticised and ultimately abandoned) the UK, like many G20 countries, is failing to retrofit in line with Net Zero targets.[109] Additionally, only 26% of adults in Britain report to be considering making changes in their home to improve energy efficiency, most commonly improving insulation (May 2022 data, noting the situation may have changed through the winter). Of the almost three-quarters of adults (74%) not considering making energy efficiency improvements, the most common reasons were high upfront cost (36%), not owning their home (29%), and feeling that their home was already efficient enough (26%).[110]

Required progress on energy efficiency: It is widely agreed that the UK's housing stock is woefully inefficient and widespread adoption of 'deep' retrofits (cavity wall, underfloor and solid wall insulation) is called for. The CCC estimate that over 60% of households can make their building sufficiently efficient to be compatible with Net Zero targets for £1,100 (no small sum for many, but a fraction of the costs attached to things like solid wall insulation).[111] But for a significant minority of homes, costs could be very high. Existing policy also requires that all rental properties must be EPC ≥ C by 2028, which will require substantial renovation for many landlords.[112]

The customer journey to energy efficiency retrofits

In our recent work for the Sustainable Energy Authority of Ireland, we systematically mapped the customer journey to retrofit adoption, identifying key behavioural barriers along the way, before developing policy options to address them. Like heat pump adoption, there are a range of frictions, cost barriers, and obstacles to making decisions on home energy efficiency, and successfully navigating the installation process. The typical customer journey, and some of the most common barriers, are summarised in Figure 14 below. Note that there are a mix of practical and cost barriers, but also uniquely psychological ones relating to the decision to proceed - including risk aversion (is the quote fair? Is the installer legit? Is this the right thing for my home or will it cause damp?), procrastination (it's never that urgent to get it done, so the hassle stalls us), and present bias (upfront costs really sting, while savings come slowly). Several of the policy and intervention ideas in this chapter are designed to directly address the myriad barriers to retrofit adoption.

*Figure 14. Home retrofitting customer journey*
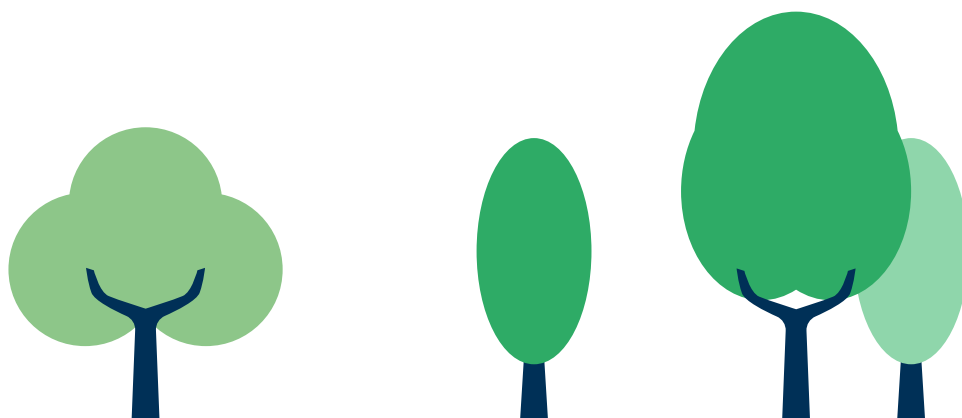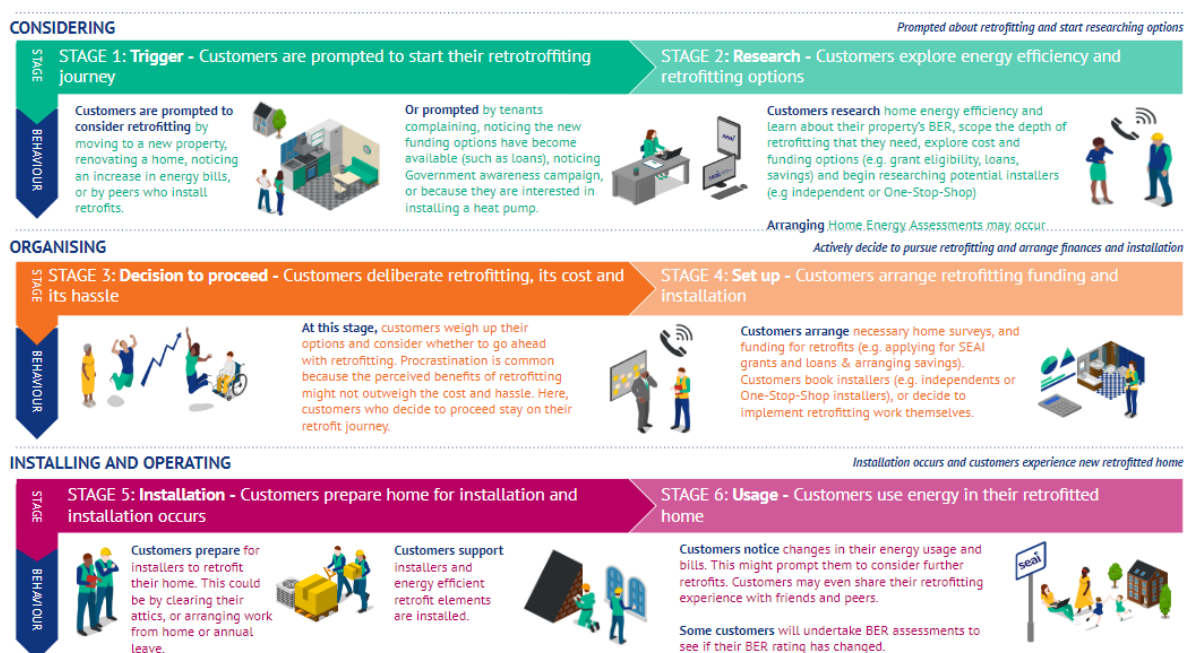
Energy-saving habits: public understanding and action

Energy savings need not only come from the building fabric but also potentially a host of one-off actions and habit changes such as reduced thermostat temperatures, shorter showers, and use of appliances' eco settings.* All of this will depend on a fair degree of energy literacy among consumers.

We've generally put less emphasis on habit changes as a strategy for delivering Net Zero, in part because counting on such changes sustaining indefinitely is a very fragile basis on which to run a Net Zero society! However, energy saving habits that do persist are a human form of energy efficiency that both reduce emissions and enable a more resilient energy system by reducing the baseload and/or peak demand.

Moreover, with the winter 2022/23 energy crisis hitting both consumers and the treasury hard at the time of writing, such actions have the potential to bring significant cost savings, and reduce the risk of black-outs. We have therefore been researching the public's energy literacy - in particular, how much they know about how to save energy in the home, as well as the benefits of efficiency retrofits. As noted earlier, we have a tendency to overweigh the value of more salient actions (like turning off lights, despite modern LEDs using very little energy), while some other effective steps are less familiar (like turning down boiler flow temperatures and hot water temperatures). Moreover, investments in the home are often complex financial decisions: they require an understanding of the return on investment, which in turn requires prescience on future energy prices, impacts on property values, and interest rates if finance is required. Given financial literacy is quite low, (33% of UK adults are assessed as being financially illiterate),[113] this is not at all trivial.
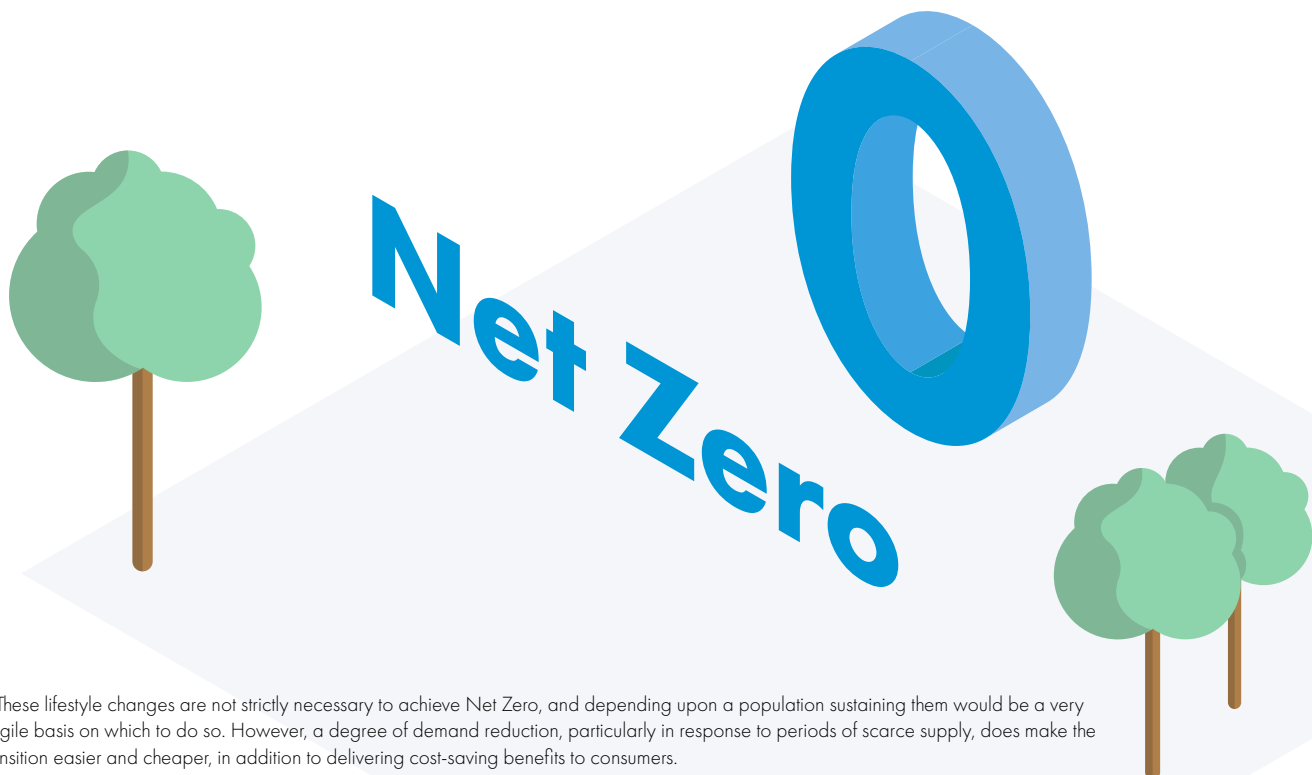
* These lifestyle changes are not strictly necessary to achieve Net Zero, and depending upon a population sustaining them would be a very fragile basis on which to do so. However, a degree of demand reduction, particularly in response to periods of scarce supply, does make the transition easier and cheaper, in addition to delivering cost-saving benefits to consumers.

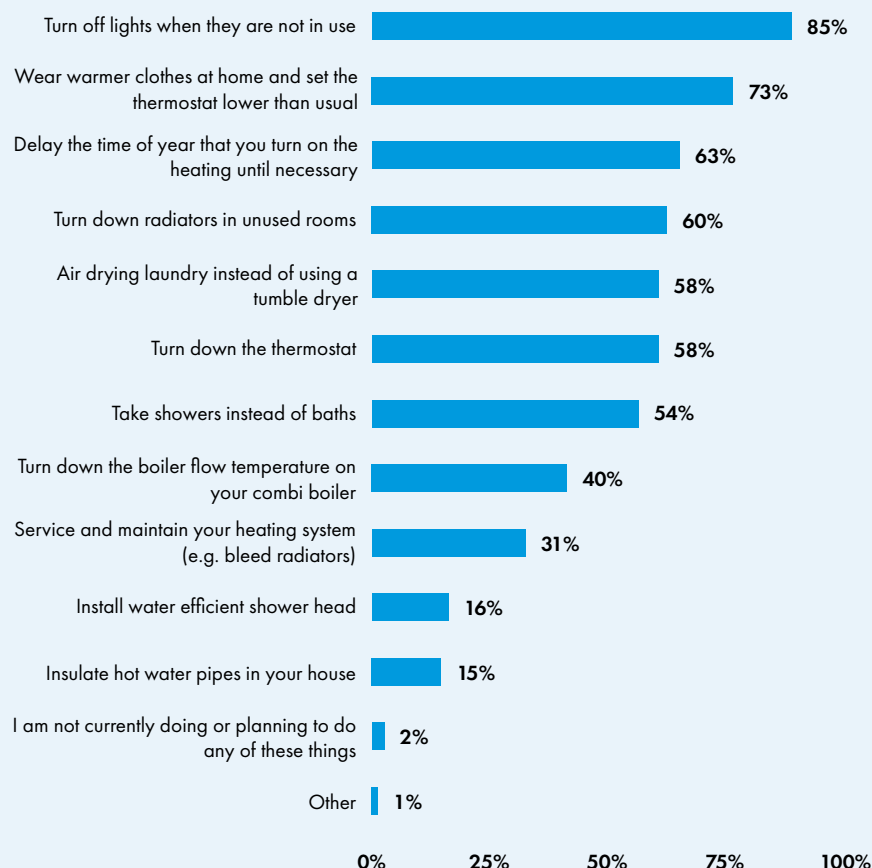## BIT case study 7. Surveying the UK public's energy literacy

Our recent survey (November 2022, n=2,022 of UK adults, owner-occupiers and renters) found that 9 in 10 were concerned about the energy crisis (and over half very concerned), and looking for ways to reduce their bills.

When asked which actions they plan to take, we find the most common is to turn off lights. This is a very salient action, very easy to do, and brings no loss of comfort (unlike turning your heating down), but it also saves very little energy thanks to the efficiency of modern LEDs.

More encouragingly we see people also prioritising turning their thermostat down (and wearing warm clothes to compensate), delaying use of their heating, and turning off radiators in empty rooms - all big energy savers.

But many also overlook a range of other easy, very effective, set-and-forget steps like adjusting boiler flow temperature, bleeding radiators or buying a water efficient shower head. These are also pretty big energy savers, take very little time, and shouldn't reduce comfort at all.

Figure 15. Actions people are taking or planning to take to reduce energy usage

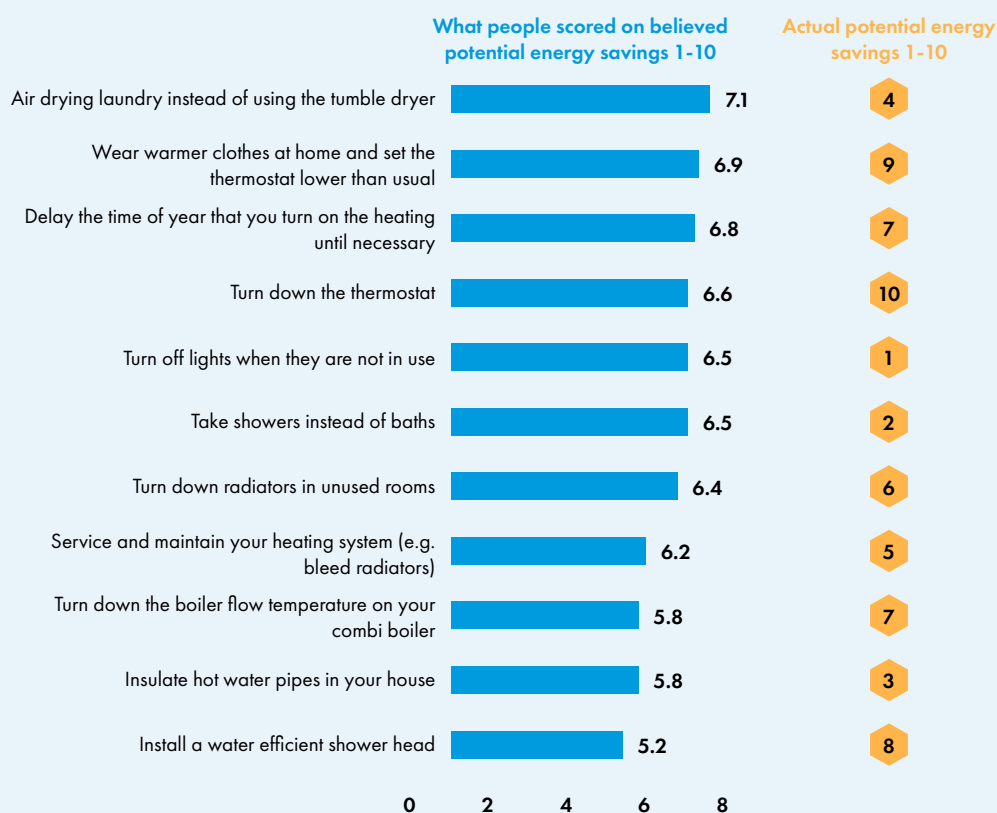| Action	%
Turn off lights when they are not in use	85%
Wear warmer clothes at home and set the thermostat lower than usual	73%
Delay the time of year that you turn on the heating until necessary	63%
Turn down radiators in unused rooms	60%
Air drying laundry instead of using a tumble dryer	58%
Turn down the thermostat	58%
Take showers instead of baths	54%
Turn down the boiler flow temperature on your combi boiler	40%
Service and maintain your heating system (e.g. bleed radiators)	31%
Install water efficient shower head	16%
Insulate hot water pipes in your house	15%
I am not currently doing or planning to do any of these things	2%
Other	1%

N = 2,2022. Data collected by BIT Nov 2022.

One factor likely to influence whether or not people adopt these measures, and which they prioritise, is their knowledge of how much energy they save. Do people know that turning off lights saves very little (but do it anyway as it's so easy and still worthwhile?), or are they actually over-estimating the savings potential compared to other actions?

To explore this we asked people how much energy they think these actions would save on a 1-10 scale, ranging from low energy savings to high energy savings (1= lowest; 10= highest). We find that on average, people have zero sense of magnitude - estimating all actions save moderate amounts of energy. The highest average score is only 1.4 times that of the lowest, while in reality the highest potential energy saving (for turning down the thermostat; No.10) saves over 20 times the energy than the lowest in this list (turning off lights; No.1).

Participants thought air drying laundry was the most effective action, even though it's closer to the bottom of the real ranking. Again, several very effective measures - like installing water efficient shower head (No.8) or turning down the boiler flow rate (No. 7) - fly under people's radar.

Figure 16. Energy saving measures: Perceived efficiency vs Actual efficiency

	What people scored on believed potential energy savings 1-10	Actual potential energy savings 1-10
Air drying laundry instead of using the tumble dryer	7.1	4
Wear warmer clothes at home and set the thermostat lower than usual	6.9	9
Delay the time of year that you turn on the heating until necessary	6.8	7
Turn down the thermostat	6.6	10
Turn off lights when they are not in use	6.5	1
Take showers instead of baths	6.5	2
Turn down radiators in unused rooms	6.4	6
Service and maintain your heating system (e.g. bleed radiators)	6.2	5
Turn down the boiler flow temperature on your combi boiler	5.8	7
Insulate hot water pipes in your house	5.8	3
Install a water efficient shower head	5.2	8

N = 2,2022. Data collected by BIT 4-17th of Nov 2022.
Saving per household, modelled by Cambridge Architectural Research for the Department for Energy and Climate Change in 2012 and updated for Nesta in 2022.
Perceived efficiency score ranges from 1 (lowest energy saving) to 10 (highest energy savings)

Helping households use less energy - optimising boiler settings

Some of our earliest energy projects at BIT focussed on helping households use less energy, for example by offering free loft clearance to promote uptake of insulation (yielding promising results, but ultimately inconclusive due to extremely low uptake in general);[114] highlighting running costs on John Lewis labels to encourage purchase of more energy-efficient appliances (a small but robust impact for the most energy-intensive appliances);[115] and testing the impact of face-to-face advice given by boiler engineers, on households' ability to optimise the use of their heating controls and thermostats (no impact on energy use).[116] Technology has moved on a lot in the decade since, though the same issues persist and are starkly important in the current climate. A recent focus of ours has been to encourage people to set the right flow temperature on their boilers. It's attractive from a behavioural perspective, because it really is a simple 2 minute set-and-forget job, yet the savings are substantial.

BIT case study 8. Helping homeowners optimise their boiler flow temperatures

One strategy for reducing household bills and carbon emissions is to reduce the flow temperature setting on gas condensing boilers. Recent research commissioned by Nesta (BIT's parent organisation) finds that reducing a combi boiler's flow temperature from 80°C to 60°C can save approximately 9% of household gas use.

However, awareness of this efficiency gain is limited. Office for National Statistics research found that 10% of survey respondents had lowered boiler flow temperatures in the past 12 months.[117] Moreover, we saw potential to develop user-focussed information to help a range of individuals to benefit from this advice. Our previous research had found that a barrier to reducing boiler flow temperatures was a lack of information on how to correctly do this.

What we did: To solve this problem, BIT and Nesta developed an online tool that provided boiler optimisation advice based on user-centred design,[118] including interviews with householders about how they interacted with their boilers. The tool included a step-by-step guide with relevant sections tailored to a user's boiler control configuration and their specific heating system.

To assess the impact of our tool we collaborated with Loop. We launched a pilot with Loop on 9th April 2022 – a treatment group received an email from Loop with a link to our online tool (3,502 customers), and a control group (3,500 customers) did not.

Figure 17. Our intervention, an email from Loop with a link to our online tool
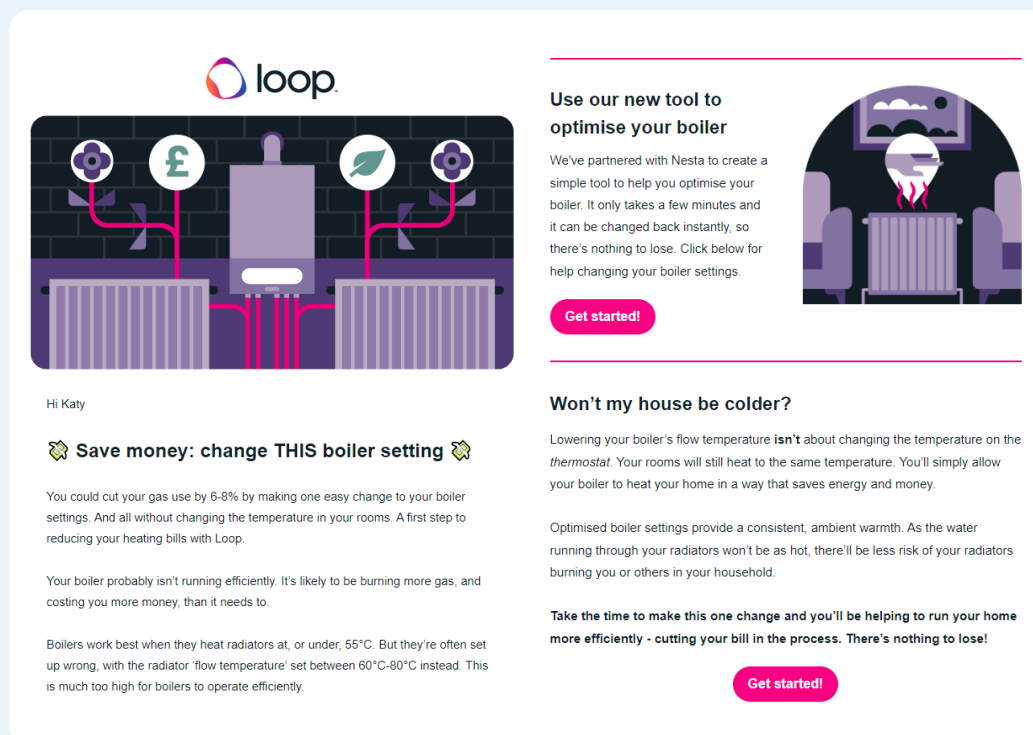
What we learned: As we detailed in a published report on our findings,[119] we found that our intervention resulted in more people turning their boiler flow temperatures down. The majority of participants in the treatment group who turned their boiler flow temperature down reported that they had heard the advice from Loop. And, we found weak evidence of a reduction in daily gas consumption in the treatment group compared to the control group. We will be following up on this indicative evidence with Loop via a full trial this winter.

4.3 Smart meters, smart controls and demand-side response

Though the government's current strategy includes a significant expansion of nuclear, the use of more renewables will still result in increasingly intermittent electricity supply, and therefore a need for more flexibility in demand. For households, in the near-term, this could be delivered manually, i.e. consumers proactively use, or avoid using, appliances during certain energy events in response to notifications and price incentives from their energy supplier. We are working with the Centre for Net Zero, Octopus Energy, National Grid ESO, and other members of the CrowdFlex consortium to design and run flexibility events involving both manual and automated 'dispatch' of flexibility. Keep an eye on our website for the findings of this work in due course.

In time, however, it seems unlikely that many people will be manually arbitraging energy prices by turning their washing machine on and off – our assumption is that flexibility will become increasingly automated. For example: your EV charger will take and give power from/to the grid to optimise the cost of charging over a given time window, typically overnight, while also helping to balance the grid; or your smart heating controls will work with your heat pump to ramp up when power is cheap and ramp down when it is more expensive, while maintaining a comfortable temperature range in the home.*

Current progress on smart energy solutions: Approximately half of meters in the UK are now smart, which encourage savings of around 2-3%.[120] However we've only just begun the journey to smart home energy use. Smart heating controls are becoming increasingly common, though other smart appliances are still rare. This is partly because the incentives to get these technologies are themselves not yet in place: 'dynamic' time of use tariffs will offer consumers the opportunity to save money by using electricity when it's cheap, but only one such tariff (Octopus Agile) is currently available.

Required progress on smart energy solutions: In addition to more exhaustive coverage of smart meters, consumers are anticipated to start adopting smart appliances and car chargers to make use of increasingly available time of use tariffs. The greatest savings will be made by EV owners (since they draw so much power), and so the increasing prevalence of EVs will also be a strong motivator to move towards smarter home energy.

Smart meters - do they work?

The first step in the smart energy transition is the adoption of smart meters, since they are what enable time-of-use tariffs and all manner of smart appliances which respond to fluctuating energy prices hour by hour. They're a necessary infrastructure upgrade to enable a more flexible and efficient energy system. But, part of their justification is also that they deliver immediate energy saving benefits to the user. Over the last several years, we've been working with BEIS to understand the impacts of smart meters and in-home displays, having recently completed the largest evidence review to date.

* This is also why building fabric efficiency is so important: poorly insulated homes will not retain their heat for long enough to allow this 'smoothing out' of energy use from heating systems.

BIT case study 9. Evaluating the impact of smart meters and in-home-displays

The behavioural mechanisms through which smart meters might influence customers to reduce their consumption are varied and multiple, as is the 'intervention' of receiving one: the receipt of a smart meter, and an in-home display (IHD), but also the experience of having an installation, face-to-face advice from the installer, and greater accuracy in your bills. All of this can raise awareness, understanding, and motivation to reduce energy.

From 2015 through 2022, BIT has been advising and undertaking research for BEIS to evaluate the impacts of smart meters and in-home-displays (IHDs). This started with a derogation allowing energy suppliers to forgo the provision of a physical IHD in favour of an app, subject to robust evaluation to compare the energy-saving impacts. Our role was to develop the research protocols and assess the evidence from suppliers, and provide policy guidance. This culminated in a policy decision to maintain the mandate to provide a physical IHD, given lack of robust evidence that apps could achieve the same savings. Though apps have the potential to have more sophisticated features and be continually updated, it seemed that (i) the physical salience of the IHD, (ii) it's 'always on, ambient feedback' (as compared to needing to proactively use an app), (iii) its accessibility to all members of the household (including children), and (iv) the initial novelty which encouraged a period of exploration and learning, all contributed to modest energy savings that, at the time, suppliers' apps could not quite match.[121]

More recently we have continued to support BEIS' research on the impact of smart meters and IHDs, by creating evaluation guidance for the industry to allow suppliers to run their own trials to high standards of rigour.[122] We have also evaluated several energy suppliers' own research through a formal meta analysis to ensure that BEIS' evidence remains up to date and as precise as possible. While this work has highlighted real challenges in undertaking this kind of research, and not all suppliers' trials have met the threshold of rigour stipulated, it nonetheless has provided the most comprehensive dataset available to date. BEIS will publish our findings early this year.
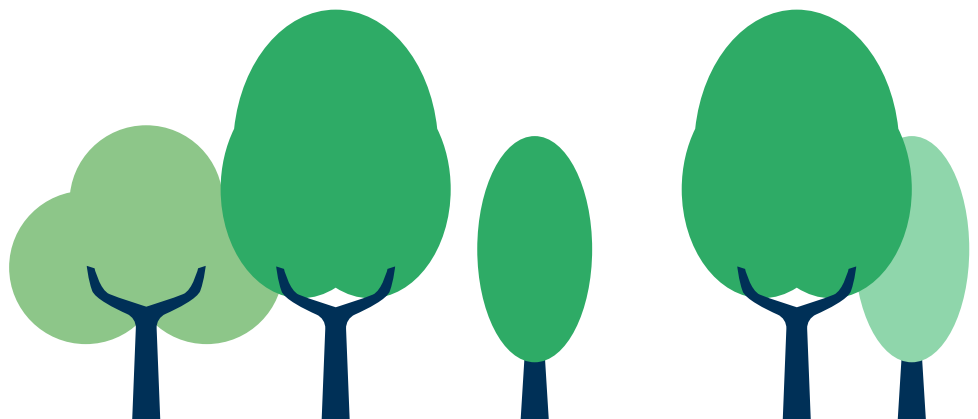
Early steps towards smart automation: Nest heating controls

It was our aforementioned 2014 study on boiler engineers' advice to consumers (which had no effect on energy consumption) that reinforced the evidence that heating controls are often too complicated, and it needs to be far easier for consumers to use them optimally. Automation is the ultimate low-effort solution. Our work evaluating the Nest Smart Learning Thermostat (below), has validated this. Not only do the results show that this technology can provide immediate value to consumers (indeed, they offer among the shortest return on investment of any energy efficiency purchase, if transitioning from a more rudimentary heating control), but this technology will become increasingly important as our heating systems change. Heat pumps are inherently a little different to use, giving less 'instant' heat, demanding instead a more gradual ramp-up of warmth in a home. This may be a less intuitive prospect to occupants who want heat on demand, and when we combine this complexity with the opportunity to time one's use of heating to coincide with dynamic energy prices, it's clear that smart automated heating controls will become an important feature of our homes in the next decade. Our parent company Nesta is working with the Centre for Net Zero to explore an early prototype of an automated heat flexibility service.

### BIT case study 10. Evaluating the Nest Smart Learning Thermostat

The evidence on the impact of smart thermostats on energy usage is mixed,[123] and one of the big reasons for that is that there is great variety in the use of the 'smart' moniker among the products available. Our hypothesis was that merely linking heating controls to an app (which keeps the human in the equation) was unlikely to save much energy, if any. However the Nest utilises occupancy sensors, weather compensation, and learning algorithms to automatically optimise heating use, turning it down when it can - all plausible routes to saving energy given the difficulties that many people have with optimising their manual controls or forgetting to turn them down when they are out of the home.

We undertook 4 independent evaluations of the Nest thermostat over two years, increasing in sophistication as the roll-out of smart meters over this time period permitted access to higher-resolution and more reliable energy consumption data.

We found that the basic functionality of the Nest saves 6-7% of annual heating-system gas use, compared to a control group who had a mix of typical controls in UK households (basic programmable controls and thermostatic radiator valves being the most common). This saving is likely to be achieved by a combination of weather compensation (which alters the boiler flow temperature), and the smart learning features. Nests' opt-in 'seasonal savings' algorithm, which aims to nudge consumers towards incrementally lower temperatures, saves around 3.8% of heating system gas use.

Figure 18. The effect of the Nest thermostat on energy consumption
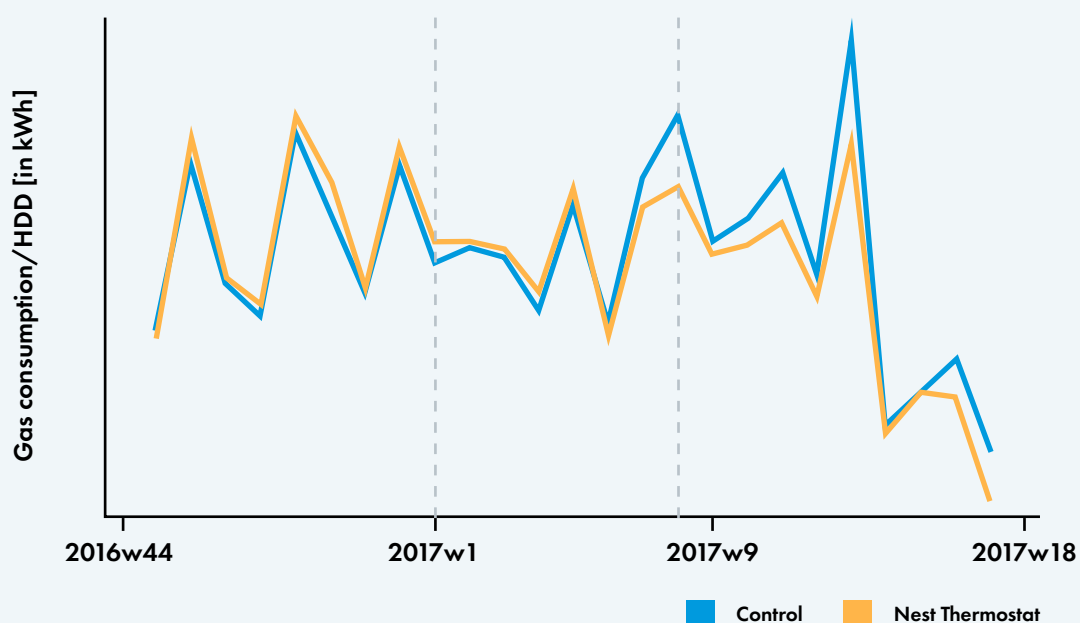
Note: The first vertical line denotes the week of the first and the second vertical line denotes the day of the last Nest installation.

4.4 Greening our homes: recommendations

Governments should:

E1. Reduce electricity prices relative to gas. Consumers respond to price signals, but despite heat pumps having a 300%+ efficiency benefit over gas boilers, this doesn't equate into cost savings so long as electricity is 3-4 times the price of gas. A range of measures to bring down the cost of electricity relative to gas are therefore needed to make electric heat pumps a more favourable prospect than gas boilers (note that this also brings benefits to electric vehicle adoption). Specifically:
  a. Explore options to more permanently decouple renewable electricity prices from gas prices, building on the recent Energy Prices Bill.
  b. Switch environmental levies from electricity to gas tariffs.
  c. In the short term, consider offering a stronger price cap on electricity than on gas (which also maintains slightly sharper incentives to reduce gas usage or adopt retrofits).[124]

E2. Introduce a 'Green Homes One Stop Shop' (OSS). This should provide access to home surveys, a network of approved suppliers, guarantees of fair pricing, high quality installations and consumer protections, and extensive advice and support to get the right measures for your home. The service should cover heat pumps, efficiency retrofits, solar and battery storage. Not only is a OSS valuable in itself to reduce hassle and uncertainty, but also creates an important platform through which a range of secondary behavioural interventions could be attached, including several from the list of additional ideas below (such as mandating large OSS suppliers meet minimum apprenticeship quotas; making retrofits provided through the OSS more visible with clear property signage during installation; and organising collective purchase agreements, or show home networks).

E3. Create financial and market incentives for retrofits among owner-occupiers and landlords. Support this with access to finance, particularly at timely moments when retrofits are easy to adopt such as home moves. Specifically:
  a. Link stamp duty to property EPC rating, with a rebate if property standard improved within 18 months of sale. Provide interest free bridging loans to buyers or sellers to support the works. While EPC already influences property value, it is arguably under-valued, so the incentive ought to be sharpened at this timely moment.
  b. Mandate rental property listings to be advertised as 'warm rent': inclusive of estimated energy bills (tenant remains the bill payer, to avoid risk of moral hazard). This gives efficient properties a more salient market advantage, incentivising landlord retrofitting.
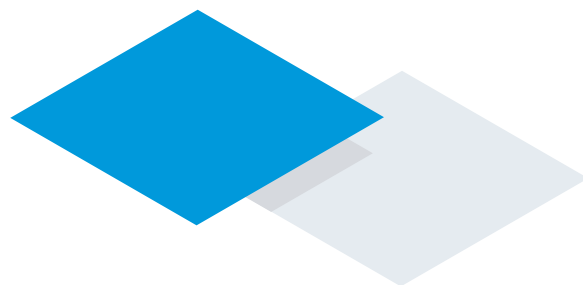
E4. Permit and encourage recipients of the Winter Fuel Payment to opt for retrofits instead. £2.2bn per year (£150-300 per eligible household) could instead be used for low cost energy efficiency improvements (such as a smart thermostat, of similar value). Also allow more substantial upgrades (e.g. cavity wall insulation) paid for by bundling the next 5 years of payments.

E5. Address market failures in the supply of trusted skills and services. For example:
a. Subsidise plumbers to put in their first heat pump to more rapidly transition existing skills in the labour market, and to bring these trusted gatekeepers onboard with the new technology.
b. Consider training or apprentice quotas for large suppliers and developers to ensure a greater flow of skills into the energy efficiency, solar and heat pump sector.
c. Elicit greater volumes of independent consumer feedback on providers and contractors to help 'de-shroud' the market and incentivise quality (particularly given diffuse responsibility for heat pump installation between parties responsible for the heat pump vs. home survey vs. fabric upgrades).
d. Ensure that trustworthy 'whole of market' consumer guides are available, not behind a paywall.

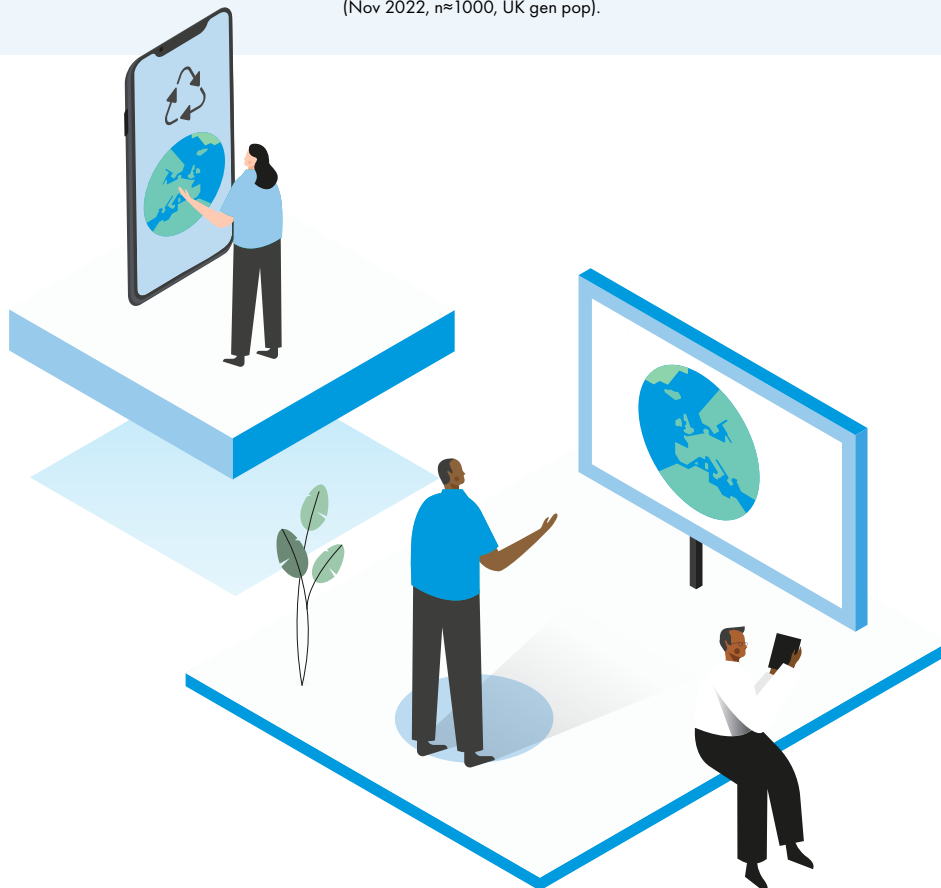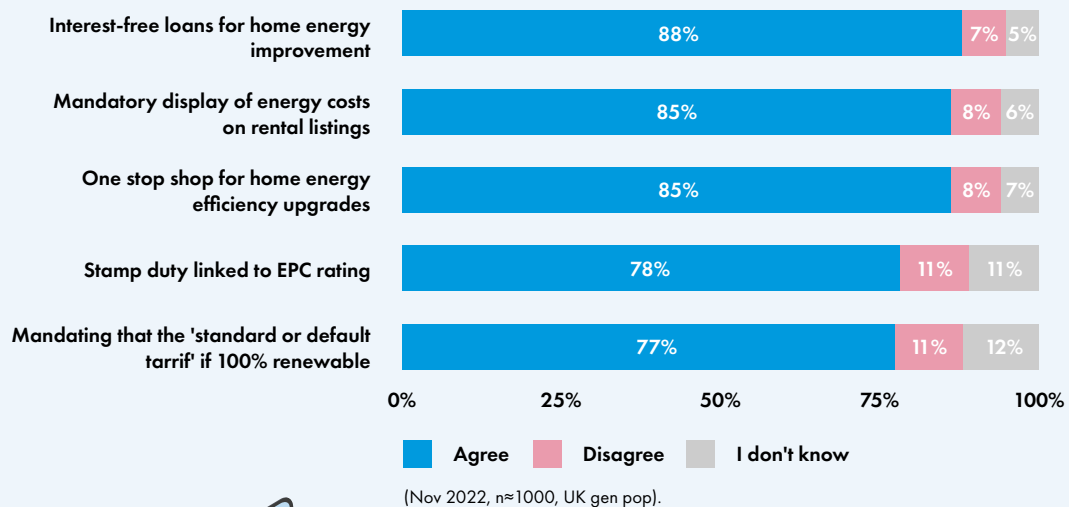**Businesses, local authorities and other organisations additionally could:**

- Default energy customers into renewable tariffs, or ensure existing default standard variable tariffs have a high renewable blend.
- Coordinate collective purchase agreements to enable households within a postcode to achieve bulk discounts and streamlined installation on heat pumps, solar and energy efficiency.
- Make heat pump adoption and deep energy efficiency retrofits more visible and normal, e.g. with house signage during installation ('I'm being insulated through the One Stop Shop') and 'heat pump ready' or 'low energy bills' tags on property listings - made more salient that the obligatory provision of an EPC.
- Organise informal showhome networks so interested homeowners can see heat pumps, solar systems and smart energy technologies in action.
- Offer 'bridging boilers' (short-term, quick-fix boiler leases) to those whose boiler breaks down, while providing support through the heat pump adoption process to avoid fossil-fuel lock-in for another 15 years.

See also recommendations A1-A5 in Chapter 3: public engagement and communications, as all of the ideas therein relate to heat and power, as well as other sectors. The provision of reliable and trusted advice is particularly critical.

Public support for greening heat and energy

BIT's new poll shows very high levels of public support for many of these recommendations. 8 in 10 would welcome a 'Green Homes Ones Stop Shop' (E2), and linking stamp duty to EPC ratings alongside short-term interest-free loans for home energy improvement (E3a). More than 8 in 10 want to see mandatory disclosure of monthly energy costs on rental listings, and 7 in 10 support mandating that the standard default energy tariff should come from renewables.

	Agree	Disagree	I don't know
Interest-free loans for home energy improvement	88%	7%	5%
Mandatory display of energy costs on rental listings	85%	8%	6%
One stop shop for home energy efficiency upgrades	85%	8%	7%
Stamp duty linked to EPC rating	78%	11%	11%
Mandating that the 'standard or default tarrif' if 100% renewable	77%	11%	12%

(Nov 2022, n≈1000, UK gen pop).

Chapter 5. Greening transport: electrification, public and active travel, and aviation

Whilst UK emissions have decreased over recent years, transport emissions have remained relatively static. This meant that in 2016 transport overtook energy to become the largest emitting sector in the UK,[125] accounting for 24% of UK emissions.[126] The majority of this (54%) comes from cars and taxis, and a further 32% from HGVs and vans.[127] This is why the central pillar of the UK Government's transport decarbonisation plan relies on the adoption of electric vehicles (EVs), as well as modest reductions in car use (in favour of both public transport and - especially - active travel, which should be the first choice for short journeys). Domestic and international aviation accounts for around 8% of UK emissions.*

Key behaviours to encourage, and known barriers		
Adoption of electric vehicles	Reduced vehicle use in favour of public and active travel	Reduced aviation demand, & choosing greener flights
• Upfront cost • Real and perceived limited public charging infrastructure • Real and perceived range anxiety and charging time • Lack of established second-hand market • Consumer knowledge, awareness and attitudes • Especially poor charging options for those without off-street parking • Delaying purchase because tech is still improving rapidly	• Ingrained habits • Frictions and hassle factors, especially the 'first mile' decision which dictates the whole journey mode • Limited infrastructure, accessibility, and functionality • Desirability and identity • Affordability and perceptions of value • Skills, safety and confidence	• Lack of affordable, convenient, or quick alternatives for long-distance travel • Reluctance to sacrifice overseas vacations • Lack of transparency about the carbon impacts of flights for consumers • Lack of regulation or strong incentives for more efficient flights among airlines

* While international aviation emissions are not formally included in UK carbon budgets, the CCC have accounted for this by allowing for some headroom in budgets, and recommend that international aviation is formally included going forward.

5.1 Adoption of electric vehicles

Current progress on EVs: Electric and plug-in hybrid car sales are increasing rapidly year-on-year, having already surpassed diesel sales. Petrol sales are down from 1.276m in 2015 to 891,000 in 2021; Diesel sales down from 1.25m to just 189,000; battery electric vehicles up from 9,800 to 188,000; and plug-in hybrids up from 17,000 to 112,000.[129] This means battery electric and plug-in hybrid are close to 20% of new sales, and this fraction has been close to doubling each year for the last several years. However we still have a long way to go. This data is just for new car sales, yet over 80% of purchases are second-hand. This is why there are only around 477,000 battery electric vehicles and 790,000 plug-in hybrids on UK roads,[130] among the 39.2 million registered vehicles.[131]

Required adoption of EVs: According to the CCC, surface transport emissions need to fall by 90% by 2050 to meet the Net Zero target.[132] This requires that all new cars and vans must be pure battery electric by 2035 at the latest, ideally 2030. Government has committed to the earlier date for petrol and diesel cars and vans and the later date for hybrids. Once sales of new petrol and diesel cars are phased out, it will take another c. 15 years for petrol and diesel cars to be a rarity on UK roads. HGVs need to be close behind and will likely depend on a combination of electrification and hydrogen.
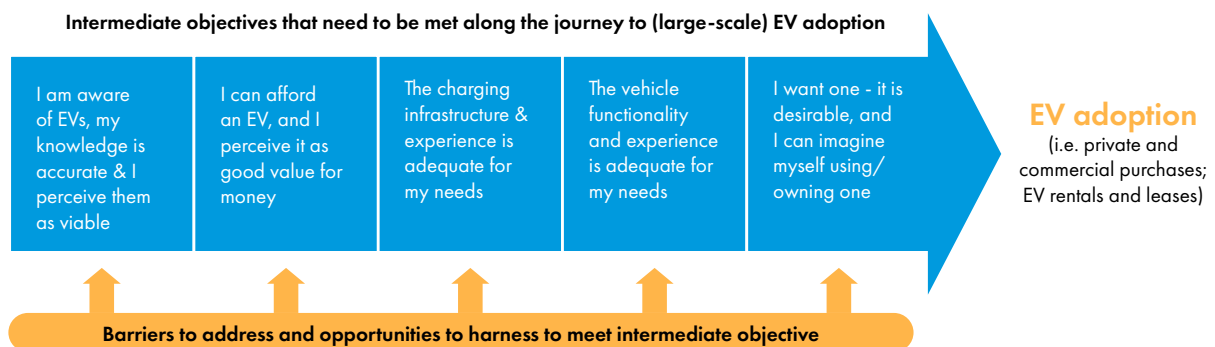
Understanding the barriers to EV adoption

The continued near-exponential increase in EV adoption is in large part due to strong early commitments from the government (phasing out petrol and diesel cars and vans from 2030) and 'market mechanisms' which penalise manufacturers if their sales figures do not bias sufficiently towards EVs. These are perfect examples of upstream policy interventions, which place massive incentives on automotive manufacturers who in turn create the choice environment required for consumers to transition to electric (more innovation, better vehicles, pricing, marketing etc.).

However, barriers to EV adoption still exist: cost, range and charging convenience remain the most commonly cited concerns.

In 2020, we co-produced a report with Transport Research Laboratory for DfT on EV adoption, highlighting the intermediate psychological and behavioural steps that need to be satisfied for someone to switch to an EV (Figure 19 below), culminating in over 60 policy ideas to address the main barriers to each of these steps (full report).[133]

Figure 19. Intermediate psychological and behavioural steps that need to be satisfied for someone to switch to an EV

Intermediate objectives that need to be met along the journey to (large-scale) EV adoption

I am aware of EVs, my knowledge is accurate & I perceive them as viable	I can afford an EV, and I perceive it as good value for money	The charging infrastructure & experience is adequate for my needs	The vehicle functionality and experience is adequate for my needs	I want one - it is desirable, and I can imagine myself using/ owning one

EV adoption
(i.e. private and commercial purchases; EV rentals and leases)

Barriers to address and opportunities to harness to meet intermediate objective

Addressing the real and perceived barriers of EV use

Barriers of high upfront cost, inadequate charging infrastructure and limited range are real issues for many, more so in some parts of the country than others. However, in many cases, the perception of these barriers tends to be slightly worse than the reality: an interesting behavioural issue, given it is ultimately people's perceptions which influence their decisions. For example, the total cost of ownership of EVs can be quite attractive given their far lower running costs (particularly if your annual mileage is high), yet our attention is often biased towards the high upfront cost. Similarly, most EV owners have very positive attitudes towards the vehicles' performance, yet, if someone has never tried one, preconceptions will tend to prevail. This is why getting people to take test drives or choose an EV when hiring a car could be really helpful.

The psychological dimensions to charging infrastructure and experiences are particularly important. People generally do not worry about running out of petrol because we can drive into any town or village and expect to find a petrol forecourt - it's part of the expected built environment. In contrast, charge-points are not always salient to non-EV drivers. They're small and easy to overlook, they often lack clear and standardised signage, and they tend to be installed wherever convenient (for the installer, not the user), often at the far end of car parks or in dead spaces. Many of us therefore simply won't appreciate how many there really are (now over 59,000 in the UK, and more being installed every week, compared to just 8,300 petrol stations). These issues are exacerbated by non-standardised networks, meaning not all charge-points are usable by all vehicles. There are also regular issues of charge points being faulty, or in use, or unavailable at certain times of day if they are on the premises of a private business. While apps like zap-map can help EV users navigate some of these issues, it's easy to see why a non-EV owner could be very wary, particularly as we tend to be averse to risk and uncertainty. If you've heard about some of these risks, but not looked into an EV seriously, why bother when petrol works fine?

Until we've used an EV, it's also easy to maintain an outdated mental model of the charging experience itself - visions of doing so just like we fill the tank at a public station, albeit taking hours instead of minutes. An unappealing prospect. In practice, most new EV owners report

being pleasantly surprised at the convenience of their new routine: barely if ever needing to use a public charger at all, instead plugging it in every night at home for a modest top-up, just as you would your mobile phone.

This is why many of our recommendations and ideas aim to tackle real, structural and financial barriers, but in smarter ways which maximise the salience of these benefits to the wider public, to help address negative preconceptions which can be some way behind the realities of the latest tech.

Later adopters may face more barriers

We should not presume that current adoption trends will necessarily continue: many of these barriers to adoption will be felt much more keenly by later adopters. These households may be lower-income, potentially doing lower-mileage (meaning EVs are not quite so cost favourable), more likely to own just one car (meaning range is even more important since they can't just take the other (petrol) car for the occasional long trip), and less likely to have an off-street spot to install a charger (meaning the hassle of using public charging all the time is a major issue). There is therefore a real risk that once the early-adopter market is saturated, we find the adoption curve dips. Eventually, these households might simply be forced into buying an EV due to the future ban on combustion vehicle sales: but we consider this a bad outcome if it fails to deliver a fair and just Net Zero transition. As noted in our introduction, where bans are used, it is important that there is ample time and investment for the greener technology to become the better option for all, before the ban really bites.

We must therefore put a lot of emphasis on the needs of later adopters, and many of the ideas offered in this chapter aim to do just this.

We continue to work on this topic, most recently working with an automotive insurer to explore options to promote EV adoption among those making a write-off claim on their petrol or diesel vehicle (an unfortunate but very timely moment to prompt EV adoption), and exploring the use of social norms messaging on willingness to choose an EV (case study 11, below).
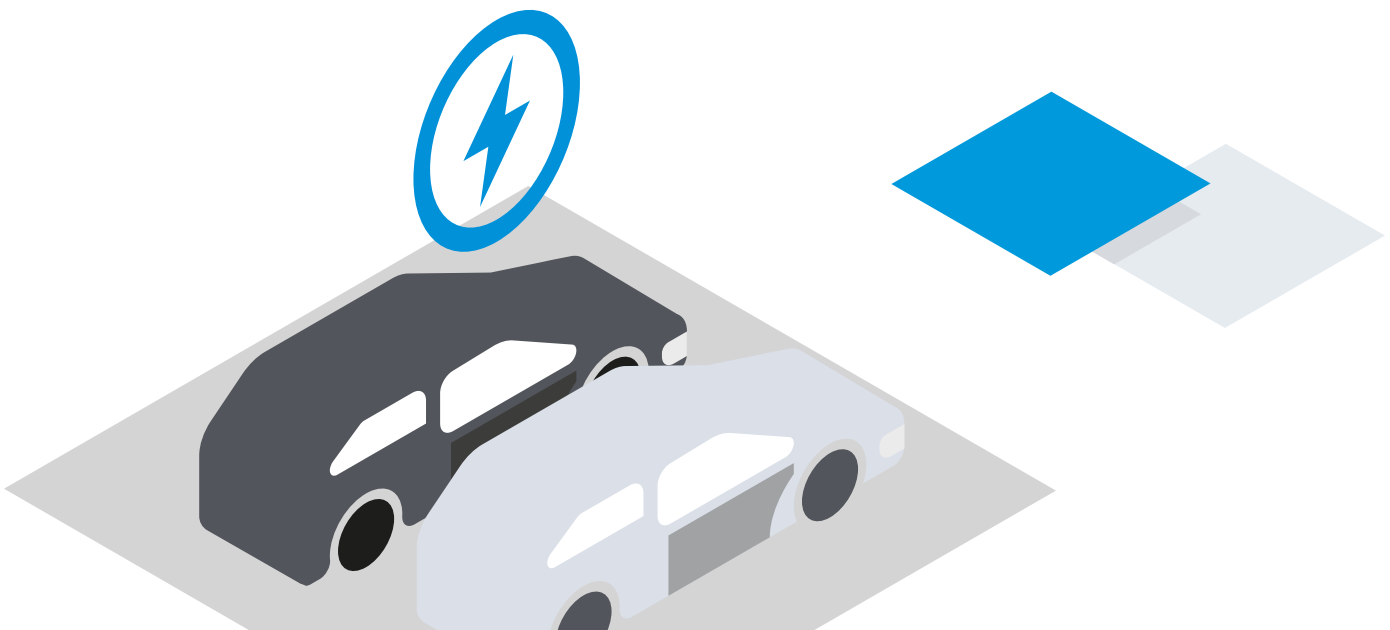
BIT case study 11. Encouraging EV adoption using a social norms messaging

We ran an online experiment with adults in the West Midlands to test willingness to adopt an electric vehicle after reading a social norms message detailing the increase in EV sales in the local area. We also tested 3 policies to further encourage electric vehicle adoption: a referral bonus, increased EV charging availability and a group purchase scheme.

What we learned: Showing people a social norm message describing the growing popularity of electric vehicles in their area increased the proportion of participants saying they would (hypothetically) buy an electric vehicle by 5 percentage points (43% vs 38% of those who saw no message). This builds on the large body of evidence showing the effectiveness of social norms: our tendency to use others' behaviour as an influential guide to our own. If so many people are buying EVs, they must be alright?

As with many other studies on EV attitudes, the main stated barriers to adoption were price, limited availability of chargers and limited range. All 3 policies (a referral bonus, EV charging and group purchase scheme) increased hypothetical EV take up and persuaded ~1 in 7 people who previously had not selected the EV to change their mind.

Figure 20. % of participants (hypothetically) choosing the electric car

% of participants choosing the electric car
(rather than the hybrid or petrol car)
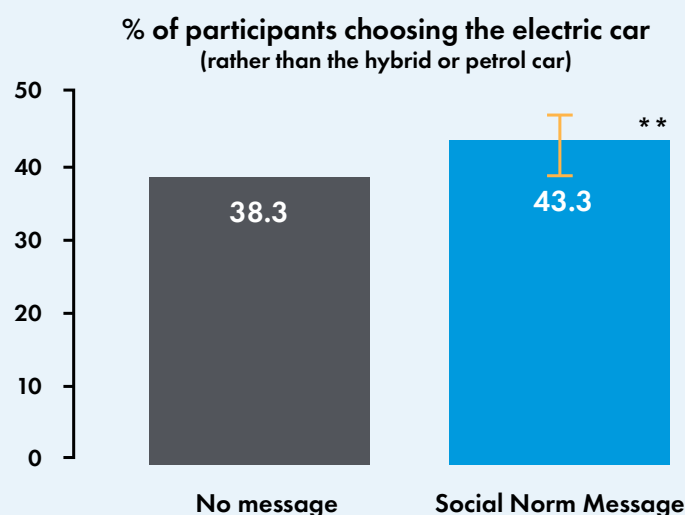
5.2 Encouraging modal shift: public and active travel

Current progress on active and public transport: In 2021, the average person in England made 31% of all their trips by walking, 2% by cycling,[134] and 7% by public transport,[135] though this varies considerably depending on region.[136] There has been a general upward trend in miles cycled over the past 20 years, with a massive boost during Covid-19.[137] Public transport saw a sharp decline in trip rates in 2020 due to Covid-19. 2021 trip rates have increased slightly, but still remain below pre-pandemic (2019) levels.[138]

Required adoption of active and public transport: The CCC calls for a further reduction in car use of 9% by 2035 and 17% by 2050 (relative to baseline growth). This pathway includes a presumed switch to some working from home, but also significant modal shift. The Government has committed to half of journeys in towns and cities to be walked or cycled by 2030, particularly targeting the 43% of all urban journeys which are under two miles.

Understanding barriers to public and active travel

Transitioning away from single-occupancy vehicles towards more active and public travel brings many co-benefits, including reducing congestion, improving air quality and physical and mental health. However, there are some major barriers to address: not only inconveniences associated with public and active travel, but also the comparative uber-convenience of driving.

Mobility is highly routinised and our mode of travel is heavily influenced by which choice is easier for the first mile (the 'first mile problem'). If a car is on your driveway, picking up your keys is easy. Walking to the bus stop or taking the bike out of the shed takes more effort, and behavioural science shows that even the smallest of these frictions matter a great deal. Given our tendency to steeply bias towards immediate convenience over future benefits (present bias), this initial friction might be enough to nudge us towards the car, even if we suspect we'll hit traffic in 20 minutes' time or risk struggling to find a parking space. It's therefore important to emphasise convenience throughout all the steps of a journey, but particularly those at the beginning. This includes a focus on bike storage solutions, convenient access to public transport links, seamless ticketing, and frequent, reliable and predictable schedules.

More and more cities are aiming to do just this with the introduction of Mobility as a Service (MaaS), offering end-to-end, multi-modal journey planning and booking, combining buses, trains, ferries, bike-shares, e-scooters and more into apps which provide seamless route planning and digital ticketing (see case study 12).

BIT case study 12. Helping Solent Transport deliver an effective 'Mobility as a Service' app

As part of DfT's Future Transport Zones, Solent Transport have commissioned Trafi to build 'Breeze': a regional mobility app through which users can seamlessly plan and book all their travel needs across south Hampshire and the Isle of Wight, including a focus on public, active and e-mobility despite the region's strong current bias towards car use. Alongside the Universities of Southampton and Portsmouth, we are helping to develop behavioural nudges, communications or app-features to maximise uptake, retention and modal shift. Our current focus is on a range of prompts and incentives, delivered to audiences at a range of timely moments: be that new staff at local businesses, recent home movers, new students or people travelling to the football. We'll be trialling ideas in 2023 - watch our website for results!

Encouraging people out of cars

Once on the road, infrastructure is heavily geared towards vehicle use, with many would-be-cyclists reporting feeling unsafe if there aren't well connected, segregated lanes.[139] We also tend to underestimate the true cost of driving per mile or per trip as we tend not to fully apportion the cost of insurance, vehicle depreciation and maintenance. In comparison, the one-off cost of public transport is more salient. And, put simply, public transport costs are far too high. The UK is a long way off Germany's recent offer of unlimited national train travel for €9 per month! (A temporary offer to help with the cost of living).[140] The consequential modal shift saved 1.8 million tonnes of carbon emissions,[141] and even encouraged some people to take more domestic holidays over flying abroad. However, the cost of such subsidies is vast, and in a sense highlights just how hard it is to get people out of their cars, which are, fundamentally, an incredibly convenient, comfortable, relatively affordable (once you've bought one) and normalised option.

As such, there is little escaping the fact that significant modal shift will require substantial intervention through infrastructure and incentives. The 'carrot': providing cheaper, better, joined-up public transport systems, improved walking and cycling infrastructure including safe cycle lanes, bicycle storage, showers at workplaces, etc. But all the evidence suggests a 'stick' will also be necessary to significantly shift behaviours:[142] more low-traffic neighbourhoods and clean air or congestion zones to make driving less appealing. Such interventions typically require strong action from national government, local government or city authorities, though the evidence also shows that businesses have a strong lever they can pull too: parking. The evidence shows that lack of parking at work is an effective deterrent to drive, yet many workplaces provide free parking to staff. Land isn't free, so they could instead put that significant investment towards public transport subsidies for their staff, and it is worth considering how the Government might incentivise businesses to consider this.

Do any softer interventions work?

There is a large body of research testing softer interventions, including provision of personalised travel plans, information campaigns and smaller incentives such as short periods of free bus use. Our own evidence review of this literature, undertaken in 2020, highlighted the quite varied quality and rigour of research in this field, given the great difficulties of running large-sample RCTs on public and active transport. But, nonetheless, our review broadly led to the conclusion that the barriers to modal shift really are more structural, with little reliable benefit coming from smaller nudges. We summarise the state of this evidence below. This echoes our own past work with DfT and Heathrow Airport.[143] Here, we trialled several interventions that were shown as promising within the academic literature (such as free travel cards, and support in finding potential matches to ride-share with). However, we found, upon testing these interventions with a large sample of employees through a series of gold-standard RCTs, that these nudges had no significant effects on behaviour.

Figure 21. Summary of evidence on modal shift to public and active travel

| Intervention	Target behaviours	Quality of evidence	Evidence impacts on behaviour
INFORMATION PROVISION			
Campaigns & marketing	Active travel, public transport	Moderate	Mixed
Cycle training & safety	Active travel	Moderate	Mixed
Events e.g. community bike rides	Active travel, public transit	Limited	Mixed
INFRASTRUCTURE			
Built environment e.g. cycle lanes	Active travel, route choice	Moderate	Yes
Improved public transport network	Active travel, public transit	Moderate	Yes
INCENTIVES			
Pricing	Route, vehicle choice, public transit	Strong	Mixed
Alternative incentives, e.g. rewards & perks	Active travel, public transit	Moderate	Yes
TOOLS & PRACTICES			
Planning tools	Route, vehicle, mode choice	Strong	Mixed
Car clubs & organisational practices, e.g. reduced parking	Car sharing	Moderate	Yes

Perhaps the most promising approach when leveraging a softer intervention design is to deliver that intervention at a timely moment of change.[144] When someone retires, moves home [145] or job, their travel patterns are momentarily disrupted, providing a narrow window of opportunity. The intervention itself still needs to be compelling, of course, but its timely delivery has the potential to amplify its impact. Even tube strikes can lead to permanent shifts as people are forced to find alternative routes, which they then stick with.[146] We used this to good effect to promote a Portland cycle share scheme, and have continued to explore opportunities for timely interventions with DfT (see case study 13, below).

BIT case study 13. Leveraging timely moments of disruption

Promoting bike sharing among home-movers. We conducted an RCT to encourage people to sign up to a bike sharing scheme in Portland - testing leaflets and a promotion code. While the overall uptake of the offer was low (which is common for direct mail marketing), we found that home movers were almost four times as likely to redeem the offer than those who already lived in the area. This shows the value of encouraging habit change at moments of disruption.[147]

Figure 22. Signups in those who lived near a new station compare to recent home movers

Signups by Recipient Type

N=10,500
*** p ≤ 0.001, ** p ≤0.05, + p ≤ 0.1
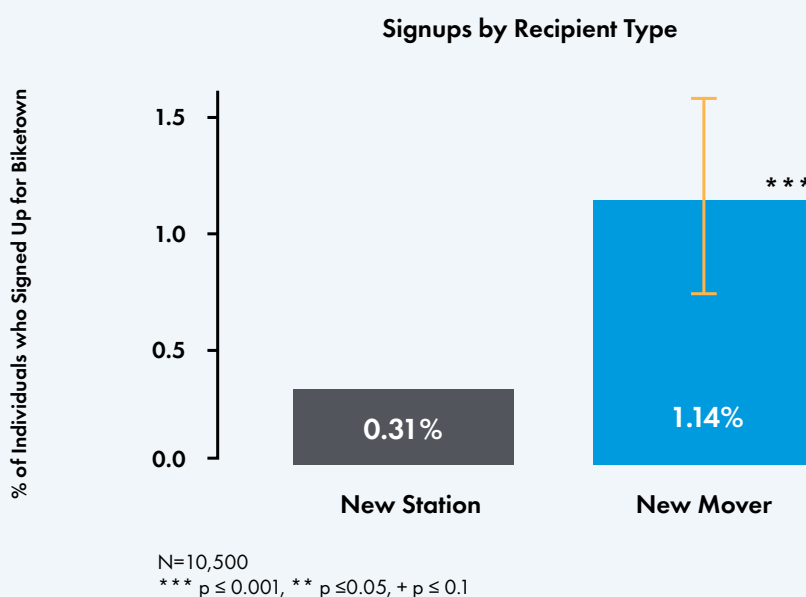
Covid-19 as a moment of change. Over the summer of 2020, levels of cycling soared: compared to pre Covid-19 levels, cycling was up 100% on weekdays and almost 200% on weekends. It was a rare moment that sparked renewed interest in the power of disruption to promote habit change.

5.3 Aviation

Current progress on aviation: A 2014 Department for Transport survey found that 70% of all flights in Great Britain were taken by 15% of adults.[149] However, distribution over the population more recently is less clear. Covid-19 caused a sharp, short-term reduction in demand for flights, for both business and leisure travel. Whilst there are uncertainties, many within the aviation industry expect demand to recover to 2019 levels by 2023-24,[150] and to continue to grow significantly thereafter.[151]

Required reductions in aviation: Aviation demand is permitted to grow by 25% by 2050 under the CCC's balanced pathway to Net Zero, but this is significantly below expected growth, so equates to significant demand reduction in real-terms.[152] This could come from business or leisure travel. In contrast, the government is betting more heavily on unproven technological innovation to decarbonise flights through its 'Jet Zero' strategy. This in itself is not entirely free from behavioural dimensions, as upstream innovation would be accelerated if consumers expressed more demand for cleaner flights.
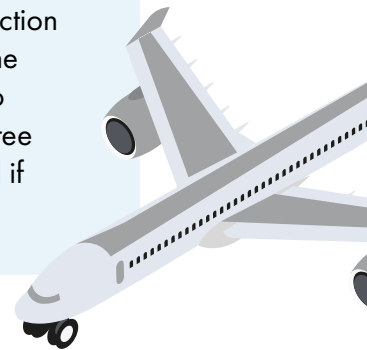
Aviation demand reduction

For the typical holidaymaker, cutting back on flights is neither easy nor appealing. Though our survey shows over 60% are willing to cut back on flights in theory (see section 3.1) this is quite a big ask in practice. Long-distance ferries and trains could be deserving of a romanticised 'slow travel' renaissance, and do bring some hidden benefits such as reduced airport time, but for many, the hugely greater time and cost of overland travel makes it a very poor substitute. As such, 'flying less' often means 'going abroad less'. This suggests there may be merit in promoting more domestic tourism, bringing local economic benefits too.

However, we would not focus on this (at least not strongly) as the first port of call for reducing aviation demand, as it is simply likely to be too politically challenging. Far better targets for demand reduction are i) short-haul domestic flights where overland options are readily available, and ii) frequent business travel abroad.

With 70% of flights taken by 15% of people (pending more recent data, post-Covid) there is ample scope to focus initially on frequent business travel, given the opportunity to communicate remotely instead. Any policies designed to target frequent flyers would naturally hit these business travellers more, as well as the very small minority who take several leisure flights each year. The most commonly cited approach would be a frequent flyer levy (something we include in our policy recommendations), which, though instinctively a contentious idea, does in fact attract quite high levels of public support, with about 6 in 10 in favour. [153] This support is perhaps not surprising, given many people's focus on fairness, and the fact that such a policy would not impact the majority of occasional holidaymakers.

There is also a distinction to be made between short-haul domestic flights, where reasonably convenient overland options often exist (and where per-mile emissions are higher, and all on the UK's carbon books) vs. long-haul international flights for which fewer alternatives are available. France has taken the move to ban short-haul flights where a train or bus alternative of 2.5 hours or less exists.[154] If mirrored in the UK, this policy would be less draconian than it sounds, given it wouldn't affect that many routes or passengers. For example, the fastest train from London to Edinburgh is 4.5 hours. The fastest train from London to Manchester is less than 2.5 hours, but the proportion of people flying this route, compared to taking the train, is very low anyway. Such a policy may therefore in fact be relatively popular, would send a clear message, and provide a starting point which could be ratcheted over time to include longer journeys. A softer measure would be to significantly hike passenger duty on short-haul domestic flights rather than impose a ban.

'Jet Zero' innovation

If consumer demand proves difficult to shift, practically or politically, we can also look upstream to reduce the carbon intensity of flights. Big wins may yet come from major technological developments in clean fuel or even low-weight battery technology. But even in the short term, there is a lot that operators can do, such as stopping practices of over-fueling planes (commonly done to save time during transits, but increasing weight and therefore reducing fuel efficiency); ensuring flights are at full capacity; and adopting best practice maintenance, newer fleets, and more efficient routes. The role of consumers in helping to accelerate these upstream changes is to express demand. This can be done by choosing the greener flights on booking sites like SkyScanner, which has recently introduced a 'greener choice' label taking into account aircraft type, capacity, and route/distance. More research is needed both to optimise the design and impact of such labels, but also to determine if this intervention materially influences booking decisions. This is not assured, in a sector where price and the convenience of routes and timings tend to dominate passenger choices.

As we explained in Chapter 3 - Public engagement, information and communications, this type of labelling intervention may often deliver only very modest impacts on consumer choice, but can have bigger impacts on operators because even losing 5% of market share can be enough to incentivise green innovation. However, it's not a given that enough consumers would switch airline to create a strong enough incentive for this to occur, particularly if the changes needed (e.g. upgraded aircraft fleets, or increasing seating density) are expensive, or themselves unappealing to consumers. More research is needed, and if the approach proves ineffective, a more direct approach may be needed to incentivise airlines. For example, one recommendation in our list is to consider banning advertising of airlines that fail to meet more stretching carbon reduction targets inline with national interim carbon budgets. At the moment there is too much reliance on long-term pledges and technological hopes, without short-term action on the things that can easily be done now.
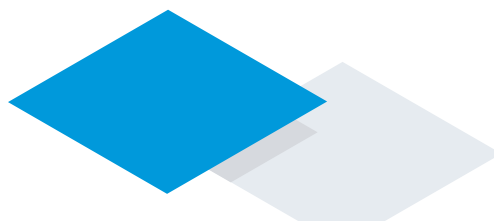
Offsetting

Finally, there is an option to encourage customers to offset the emissions from their flights. Indeed, most pathways to Net Zero assume at least some offsetting will be required, with aviation still carbon-emitting by 2050. The most obvious behavioural intervention here would be to default inclusion of offsets into the ticket booking process. Automatically opting customers into options can be incredibly powerful - e.g. leading to huge increases in private pension holders in the UK, and used in many countries to recruit organ donors (typically boosting donors from around 10-20% to 80% or more).[155] However we would not expect quite such impressive results here, because customers may be accustomed to un-checking the various add-ons such as travel insurance and car hire when booking. Mandating its inclusion would be a stronger solution.*

* When pursuing offsets, whether voluntary, defaulted, or mandated, it is vital to measure the impacts to ensure it does not lead to moral licensing: a justification to take more flights. Offsets in general are also subject to widespread criticism and the voluntary offsets market should be subject to much stricter regulation before they are relied upon for substantive components of a net-zero strategy.

5.4 Greening transport: recommendations

Government should:

T1. Reduce the cost of EVs relative to ICEVs. With electric vehicle grants now largely withdrawn, accelerate EV adoption by reducing VAT on new EVs to 10%, more than paid for by increasing VAT on new combustion vehicles to 25% (0% on EVs, 27.5% on ICEVs, would be a more aggressive option).

T2. Normalise and address uncertainty across the public charging network. Though there are now 60k public charge points (cf 8k petrol stations) issues remain with unreliability, potential unavailability, unawareness of their volume and locations, and non-compatibility. It is critical public chargers become a reliable part of the expected built environment:
a. Greater standardisation for vehicle-to-charger compatibility.
b. Provide greater certainty on functionality (e.g. penalties to operators for out of order units, and universal real-time data via app).
c. Prioritise charge points in more predictable locations (e.g. all petrol forecourts, all public car parks) and make them far more salient (e.g. standardised signage and green asphalt for all public charging points).
d. Support and encourage businesses to install public charge points, including technical support, removal of planning barriers for larger installations, incentives for SMEs and rural / dead spots (e.g. a feed-in-tariff), and guaranteed infrastructure support (e.g. substation upgrades where necessary).

T3. Focus on measures to support later-adopters of EVs. Range, cost, long-term battery use and charging convenience are all bigger barriers for later adopters. In addition to the above improvements to public charging, this should include:
a. Convenient and low-cost overnight charging solutions for those without off-street parking (public charging is currently far more expensive than at-home charging).
b. Prioritisation of policies which accelerate penetration into the used market, such as rapid commercial fleet adoption (who tend to sell after 3 years).
c. Standardised battery tests to give confidence to second-hand buyers.
d. Greater accessibility of charge points, which are often currently atop of curbs and have heavy connection cables and so less suited to elderly or those with physical disabilities.

T4. Adopt and expand low-traffic neighbourhoods and low-emission zones, while improving access to and affordability of public and active transport.

T5. Consider heavily subsidising public transport, even if that means more low-emission zones, road tax, or fuel duty to pay for it. For example, following Germany's trial of €9-euro national public transport, they have now scaled €49 monthly unlimited national train travel.[156]

T6. Introduce a frequent flyer levy. Use the revenue to support domestic tourism initiatives, bringing local economic growth benefits. Consider also following France's lead by banning (or, more modestly, greatly increasing passenger duty on) short-haul domestic flights where a reasonable bus or train option is available. If increasing passenger duty, use the revenue to directly subsidise or invest in overland public transport routes.
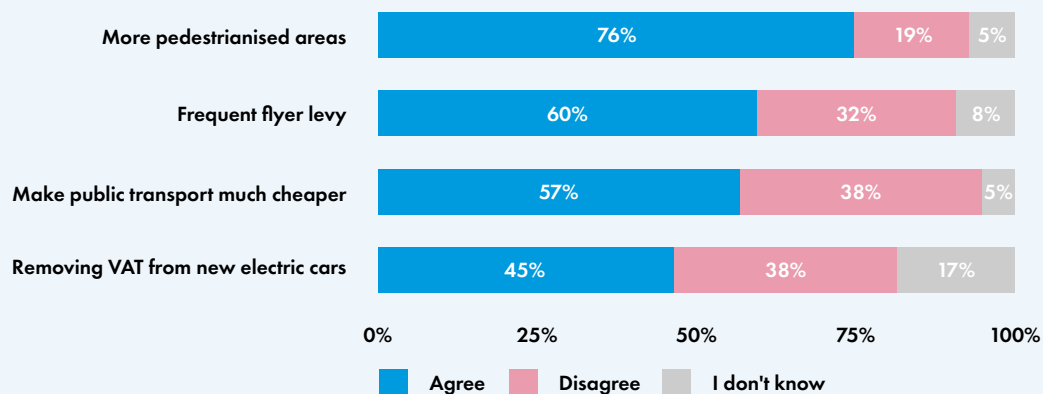
Businesses, local authorities, industry regulators, campaigners and other organisations additionally could:

- Default airline customers into carbon offsets (though watch out for moral licensing leading to increased demand, and ensure high quality offsets).
- Provide more salient CO_2 comparisons on all airline bookings, to encourage greener choices and discourage inefficiencies such as over-fuelling, under-seating or inefficient routing.
- Local authorities can offer collective purchasing for EVs or EV home chargers for residents to achieve discounts on purchase cost and installation, as well as normalising the purchases within the community.
- Explore new vehicle price labelling standards, for purchase or lease, which communicate the total cost of ownership (capital repayment + running costs). This will highlight how EVs are relatively more affordable than combustion vehicles for many drivers, but also highlight the true cost of driving compared to active and public transport.
- Local authorities and businesses can use the green number plate system to more widely offer small recurring incentives, such as free parking.
- Local authorities and businesses can reduce availability of parking and use variable parking charges (e.g. differentiated by income, disability or shift work) to discourage driving to work, and use revenues to incentivise use of public/active travel (e.g. showering facilities, e-bike discounts).
- Extend the Cycle to Work scheme, improving eligibility for gig-economy, self-employed and short-tenure workers, and allow similar tax breaks on pension incomes, particularly for e-bikes.
- Target home-movers and job-movers with timely prompts and support to adopt public or active travel - e.g. information on local bus routes and cycle networks, signposting to cycle confidence training, or free social bike tours for new residents.
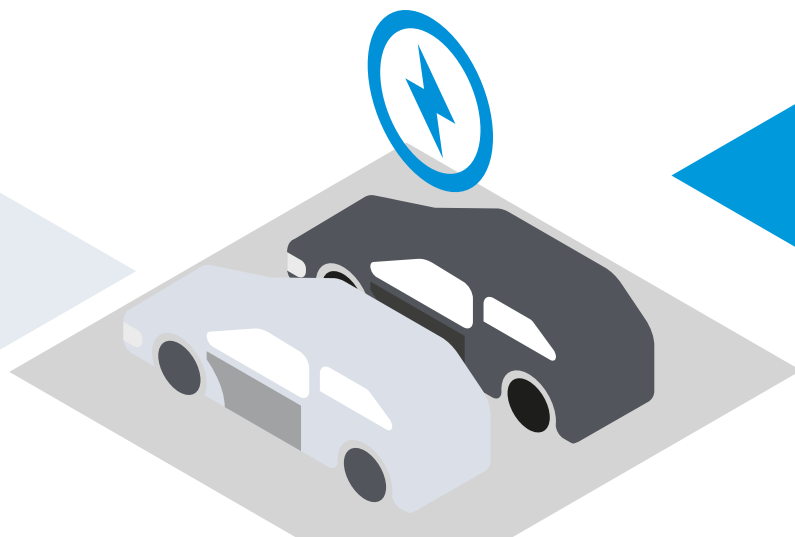
Public support for greening transport

We tested several of these ideas with UK adults and found strong support. By far the most popular is the expansion of pedestrianised areas (T4), supported by 8 in 10. The majority also supports making public transport cheaper (T5 - 6 in 10), as implemented in Germany recently, as well as introducing a frequent flyer levy (T5). Incentivising EV adoption, for instance by VAT removal, was surprisingly more polarising (T1), with just less than half of respondents supporting it.

	Agree	Disagree	I don't know
More pedestrianised areas	76%	19%	5%
Frequent flyer levy	60%	32%	8%
Make public transport much cheaper	57%	38%	5%
Removing VAT from new electric cars	45%	38%	17%

(Nov 2022, n≈1000, UK gen pop).

Chapter 5. Greening transport: electrification, public and active travel, and aviation
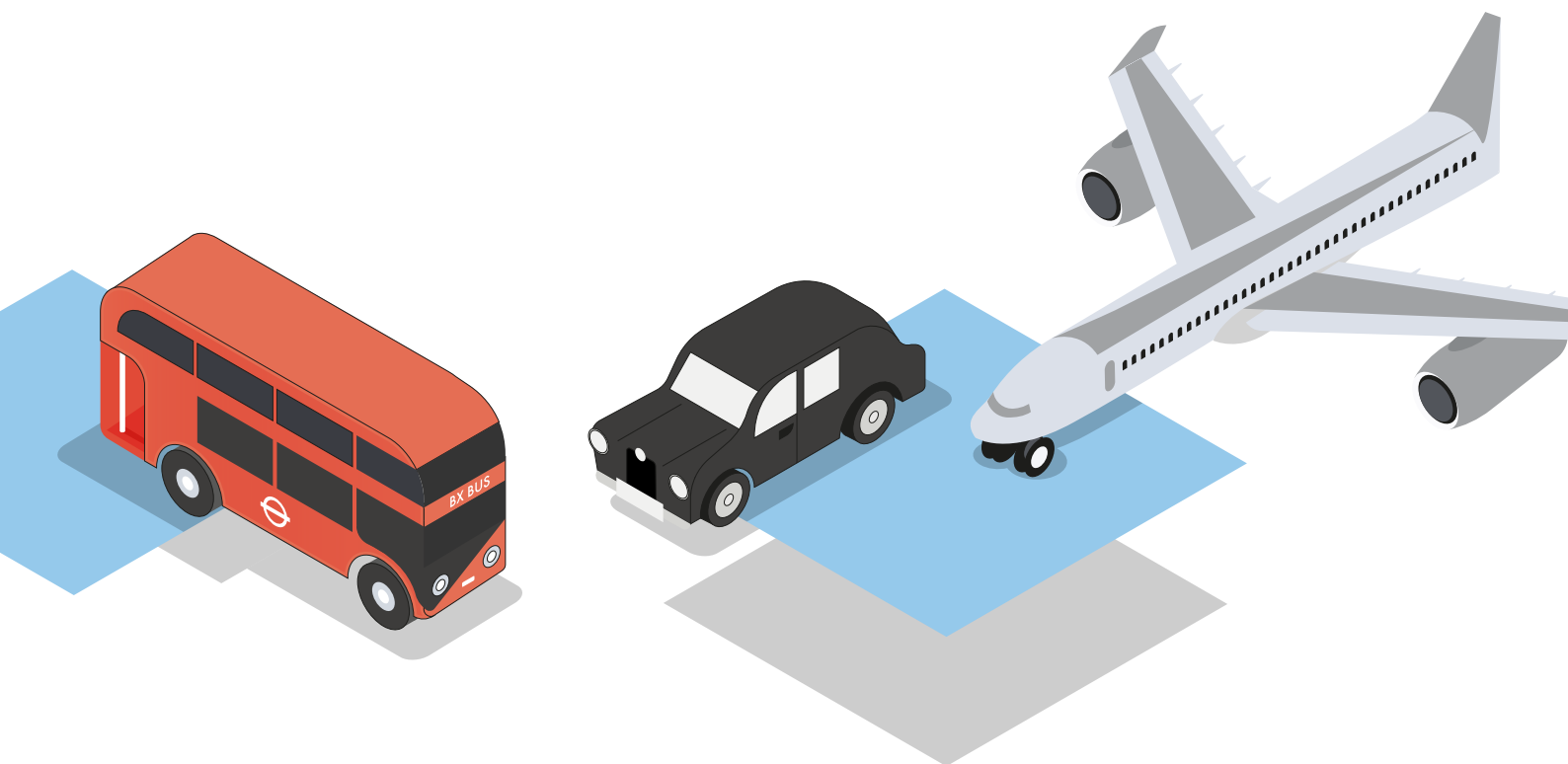
Chapter 6. Greening food: diets and waste

UK agriculture is responsible for around 11% of emissions,[157] though the food system as a whole is closer to one fifth - or as much as 35% when including imported food.[158] [159] Livestock (and particularly ruminant products) are a disproportionate driver of emissions, land-use change, freshwater use, and a major source of other pollutants.[160] [161] Moreover, up to 40% of food in the UK is wasted,[162] with much of it going to landfill. Current diets are not only unsustainable [163] but also unhealthy with around two thirds of adults overweight or obese in England [164] - obesity now being a leading cause of death.[165] In addition to slashing the huge quantities of food we waste, shifting dietary habits towards more sustainable and healthy options (e.g. greater share of plant-based and local) and enabling sustainable agriculture (it's not just the 'cow' but also the 'how') is fundamental to achieving Net Zero.

Key behaviours to encourage and known barriers	
Reducing beef, lamb and dairy consumption in favour of more plants	**Reducing household food waste**
• Social norms around eating meat, and cultural identity • Low availability and access to appealing plant-based dishes, particularly when eating out • Most people have small repertoire of recipes; (knowledge and time/effort barriers) • Low awareness of environmental impacts of food, relative to other impacts • Most people prioritise cost, taste and convenience over health and environmental concerns • Cost is often perceived as higher - this can be true for processed plant-based meat alternatives, though not for fresh veg and legumes • Consumption is deeply habit-based	• Lack of knowledge of how to use leftovers; lack of knowledge of how to tell if something is still edible • Sub-optimal food shop planning (planning for leftovers), home storage (freezing), and meal planning (using up) • 'Disgust factor' for handling leftover food • Tendency to buy bulk rather than lose out on savings • Habits and frictions associated with using up leftovers
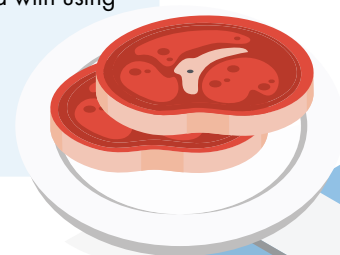
6.1 Greening diets

Current progress on diet change: The issue of sustainable food is continuing to become more mainstream, and supermarkets have reported increasing sales of plant-based meat substitutes over the last few years, but from a very low baseline - still just a fraction of meat sales.[166] Studies relying on self-reported food diaries suggest a modest reduction in meat consumption over the last decade.[167] But, there are known biases with these methods and UK production data for meat sold in the UK (which will include that eaten or wasted but is ultimately more relevant for carbon accounting) shows the amount of meat in the UK has actually increased slightly. More reliably, the data show a modest shift away from red meat towards pork and chicken,[168] bringing some carbon benefits.

Required shifts in diet: The CCC call for a 20% reduction in beef, lamb and dairy consumption by 2030, rising to 35% in beef and lamb by 2050.[169] This directly reduces carbon emissions, but also frees up critical land for tree planting to achieve necessary offsetting for sectors hardest to decarbonise (including agriculture itself). Upstream innovation among farmers, processors and producers is also critical: farmer and land manager behaviours include tree planting, planting cover crops, shifting to high starch cattle diets, improved fertiliser use, slurry management, and changes in machinery. Care will also be needed to ensure imports are held to equivalent environmental standards. Note that the Government has not endorsed calls to reduce demand for meat and dairy.

Diet change or agricultural innovation? What's possible, necessary, and politically feasible?

Discussion of changing diets can get heated. So, it's worth acknowledging upfront the complexity of this agenda. None of the common retorts against the plant-based movement * negate the environmental necessity of producing and eating food which is less carbon intensive. Whether this is achieved primarily through diet change (which the climate science community is calling for)[170] or agricultural innovation (which the UK government and the National Farmers Union are betting on, albeit without any substantive policy, plan, or proven solutions yet) is more open to debate.

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* We'll acknowledge at least four common points: i) there is huge variance in the carbon impacts of cattle and lamb farming, and UK farmers heavily drawing upon long-established pasture are among the most sustainable, so reduction of less sustainable imports should be a first port of call (though this still requires demand reduction). ii) there is still some debate about the carbon-sequestration benefits of having livestock graze on grasslands, and in any case, using grasslands unsuited to arable production to create meat protein for human consumption is sensible and efficient (though with increasing competition for land, partly for reforestation for offsetting the agriculture sectors' own emissions, there are fewer 'ecological leftovers' for which meat production is truly the best use case, so this argument is far weaker when looking at the whole land-use system), iii) plant-based food isn't always healthy, particularly some of the more processed products (this is true, but there is no shortage of products which are healthy and sustainable), and iv) whatever is done in the UK needs to be reflected also on imports to avoid offshoring the emissions and penalising domestic producers (we agree).

We actually think agricultural innovation would be the preferable solution, if possible: it's inline with our upstream principles and thus reduces the burden of behaviour change among the population. And in truth, we don't know what level of innovation might be possible over the next couple of decades. However, we can be fairly sure of the following: i) such innovation is unlikely to occur without the right policy incentives, ii) changing what we eat is among the easiest, most impactful and quickest ways to reduce emissions, which really matters if we keep in mind that emissions are cumulative - it's not just 2050 that matters, and iii) diet change isn't just about direct emissions reduction, but also the need to release grazing land for reforestation to offset other parts of the economy.[171] We therefore view diet change *and* agricultural innovation as both necessary to decarbonise our food.

However, we also acknowledge the political challenges involved in 'telling people what to eat'.

We want to see bolder action on this issue from the Government, and believe there is a politically safe operating space that involves two strands. First, when policies or interventions are consumer facing, there is scope to level-up sustainable options (e.g. making them more available, easier to access) and provide neutral information and guidance (e.g. labels, recipes, tips). Our data later in this chapter (Figure 27) show that these steps are really popular among consumers, and don't require penalising or restricting meat and dairy consumption. Moreover, much of this can be delivered by the private sector, though this doesn't mean the Government should do nothing - the right policies should incentivise this to happen. This covers the 'diet change' half of the equation, and there is ample evidence of effective interventions, often using 'midstream' principles to change the choice environments of food, to meet the 20-35% reductions in beef, lamb and dairy called for by the CC (see Figure 26 later in this chapter).

The 'agricultural innovation' half of the equation can be the target for more punchy policies such as carbon levies and agricultural subsidies, which should be designed to encourage producers to create more sustainable choices for consumers. We expand on our approach to a carbon levy on meat and dairy as one of our main recommendations at the end of this chapter.
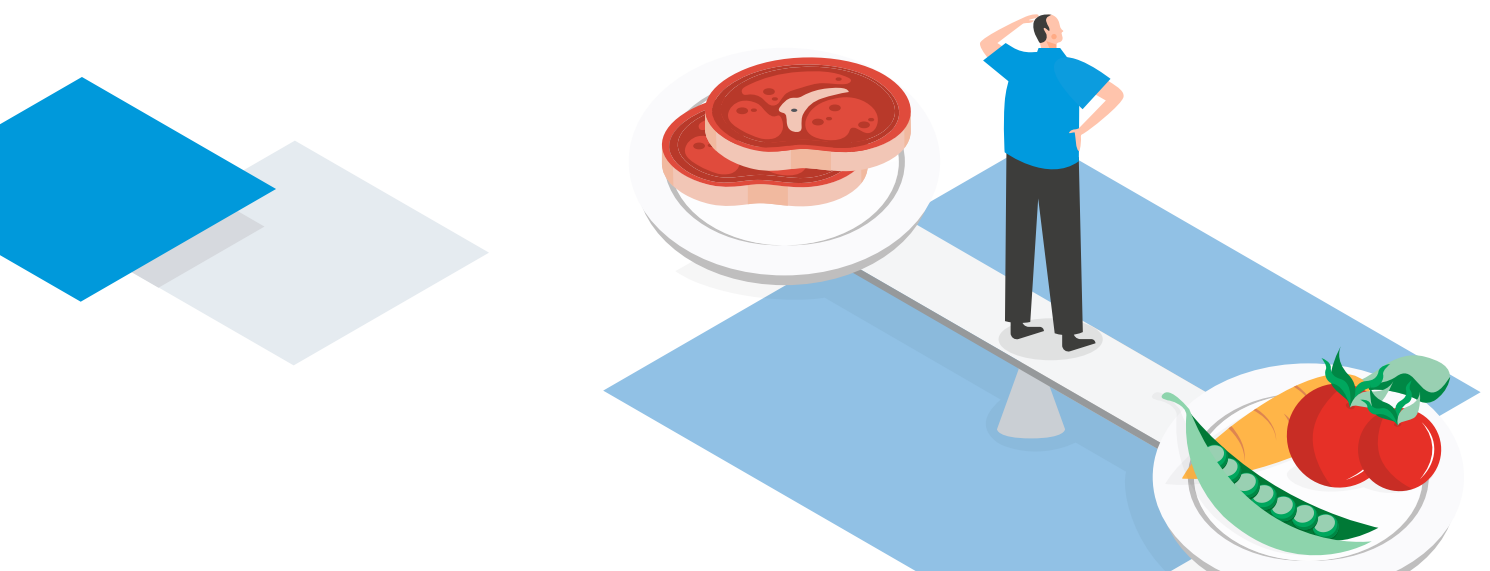
Understanding the drivers of dietary choices

Dietary trends are a product of consumer 'choice', rooted in individual tastes, preferences and habits. Countless surveys reveal that consumers tend to prioritise taste, cost, and convenience above concern for healthiness, which in turn tends to be slightly above concern for the environment, on average.[172] There are also issues of low awareness of the environmental impacts of food (see Figure 23 below), and even biological imperatives towards certain foodstuffs, such as salt, fat and sugar.

However, it would be wrong to frame dietary habits as unfettered or truly sovereign to individuals. Yes, we all choose what we put in our mouths, but there is a large evidence base and broad consensus within the fields of both sustainability and health food psychology that the reason we have such an unsustainable and unhealthy food system is just that - the system. Commercial incentives don't align with good health and environmental outcomes and, consequently, consumers are saturated with products with huge negative impacts on society.[173] More specifically, we face a food 'micro-environment' [174] in shops, cafes and restaurants in which the relative availability and salience of options, their positioning on menus and in canteens, their marketing, and their pricing all consciously and unconsciously nudge us towards unsustainable diets.[175] Cultural norms also have a big impact, and in the UK most 'traditional' dishes are centred around meat. Individual choices can only be made in the context of these strong defaults and norms.

In short, we cannot reasonably expect people to make healthy and sustainable food choices when the food environment is so heavily geared around tasty, convenient, cheap, plentiful and culturally normative produce which is unhealthy and unsustainable. This is why the solutions need to be both upstream (incentivising the 'reformulation', i.e. decarbonisation of products) and midstream (altering the physical, social or economic micro-environments in which we choose food). We provide a much more detailed account of diets and diet change in our [Menu for Change](#) report.[176]

Current attitudes and knowledge of sustainable food in the UK

Encouragingly, nearly 6 in 10 say they have either already started or are willing to reduce their meat and dairy consumption, whilst 8 in 10 want to reduce their food waste.[177] However, respondents also report a range of barriers discouraging them from adopting more sustainable diets, including perceptions of cost, knowledge, time pressure and familiarity. Our recent work also shows consumers' attention is not naturally drawn towards diet change, as concerns about food waste, plastic packaging, palm oil or food miles top their ranking of the biggest issues. Though these issues are worthy too, just as we've seen in Chapter 3, and again in Chapter 4, this shows that the public's perceptions of which actions matter most is skewed.

Figure 24. Lack of knowledge on the environmental impact of diets (Survey responses to the question: 'What do you think is the most important thing you can do to reduce the environmental impact of food? (N=5,500 UK households).

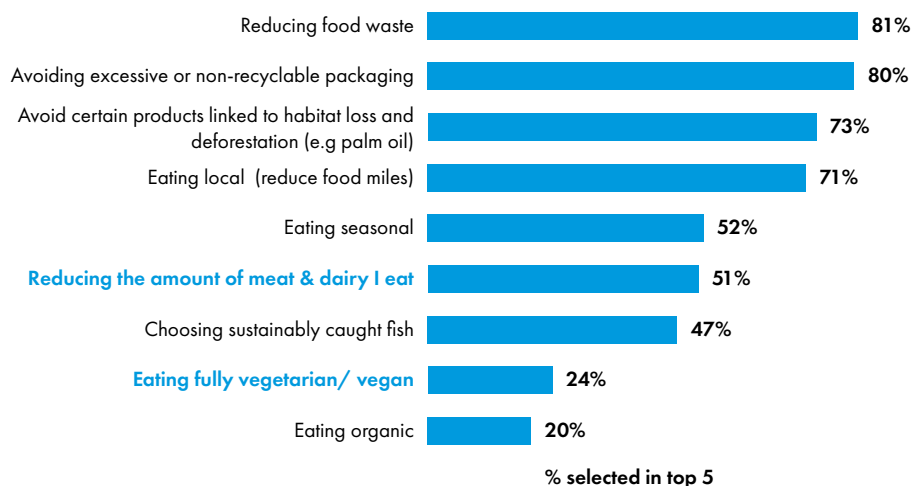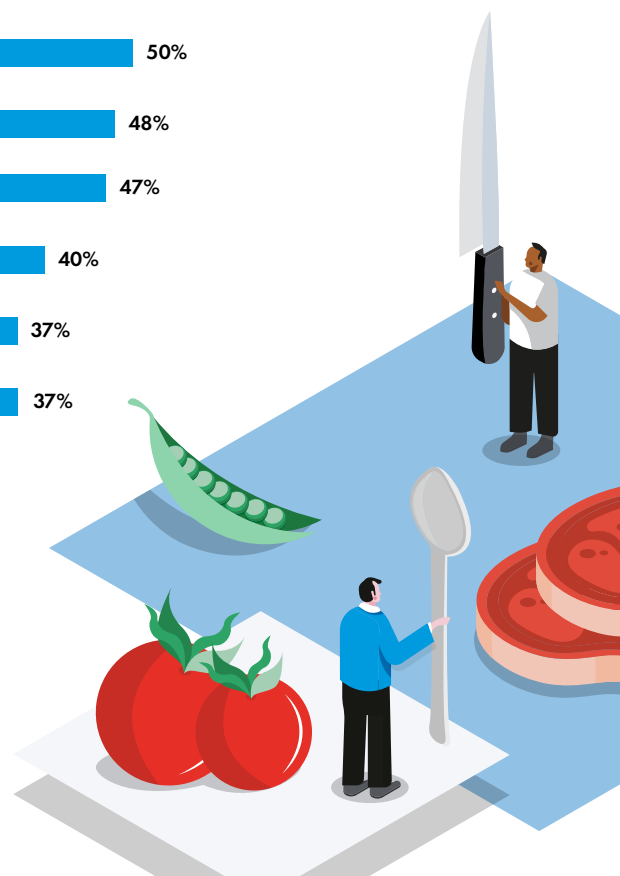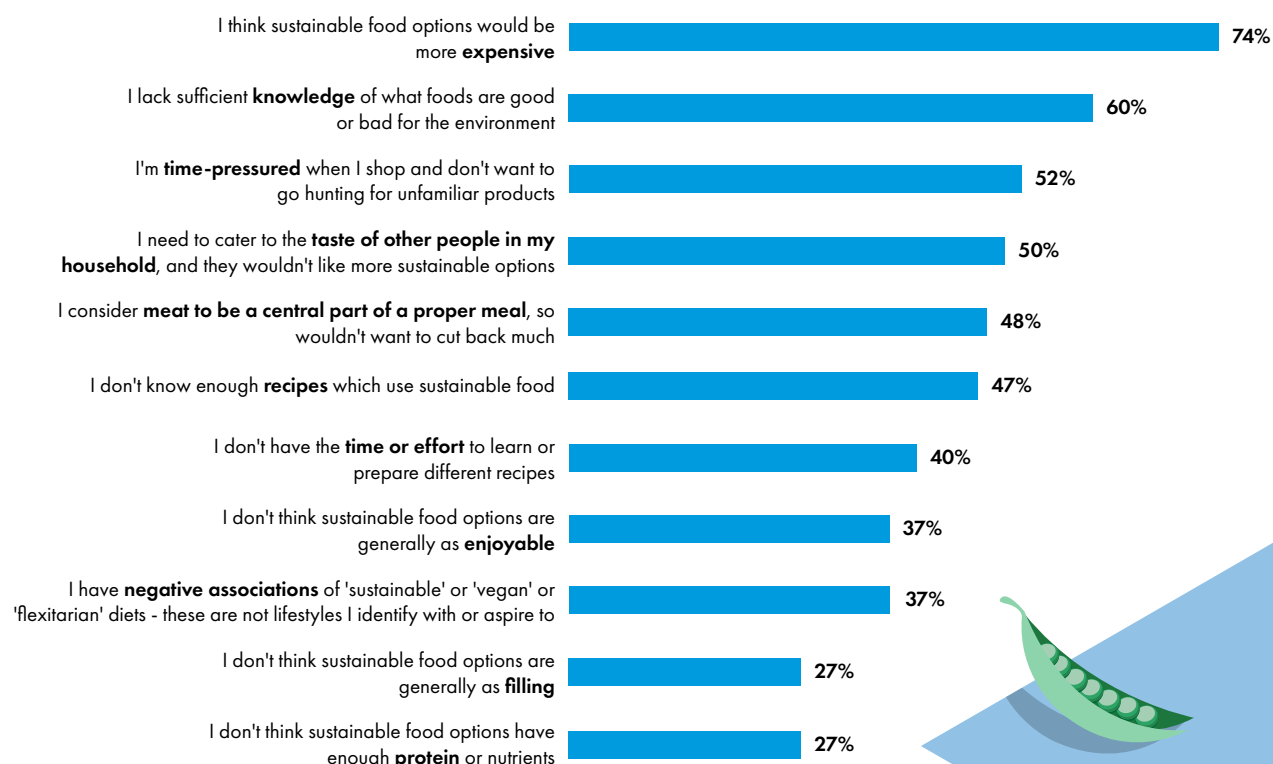| Response	%
Reducing food waste	81%
Avoiding excessive or non-recyclable packaging	80%
Avoid certain products linked to habitat loss and deforestation (e.g palm oil)	73%
Eating local (reduce food miles)	71%
Eating seasonal	52%
Reducing the amount of meat & dairy I eat	51%
Choosing sustainably caught fish	47%
Eating fully vegetarian/ vegan	24%
Eating organic	20%

% selected in top 5

Figure 25. Barriers for adopting more sustainable diets (N=5,500 UK households).

Response	%
I think sustainable food options would be more **expensive**	74%
I lack sufficient **knowledge** of what foods are good or bad for the environment	60%
I'm **time-pressured** when I shop and don't want to go hunting for unfamiliar products	52%
I need to cater to the **taste of other people in my household**, and they wouldn't like more sustainable options	50%
I consider **meat to be a central part of a proper meal**, so wouldn't want to cut back much	48%
I don't know enough **recipes** which use sustainable food	47%
I don't have the **time or effort** to learn or prepare different recipes	40%
I don't think sustainable food options are generally as **enjoyable**	37%
I have **negative associations** of 'sustainable' or 'vegan' or 'flexitarian' diets - these are not lifestyles I identify with or aspire to	37%
I don't think sustainable food options are generally as **filling**	27%
I don't think sustainable food options have enough **protein** or nutrients	27%

What works to promote diet change?

There is now a large literature on effective or promising interventions, many of which seek to alter the choice architecture within shops, canteens and restaurants. There is therefore a critical role for the private sector to take a lead in helping their customers eat more sustainably, though as discussed in Chapter 2, we shouldn't expect this to happen at scale unless the commercial incentives encourage it - requiring upstream policy. Below we summarise some of the most promising interventions based on our own trials and the extensive and growing academic literature.

What works to shift diets?

There is now a large body of evidence of both effective and promising interventions to encourage dietary change, in both the public health and sustainability literature.

Figure 26. Evidence-based principles for encouraging sustainable diets

Make sustainable food appealing

- Pricing matters, and a wide range of incentives (e.g. clubcard points, promotions, meal deals) have potential

- It needs to be delicious - use indulgent framing, and encourage innovation for new products for example with carbon levies

- Some dishes are naturally veg-heavy (curry? chilli?) some are not (roast dinner?) Consider promoting the right dishes, rather than awkward plant-based ingredients substitutions where they don't fit well.
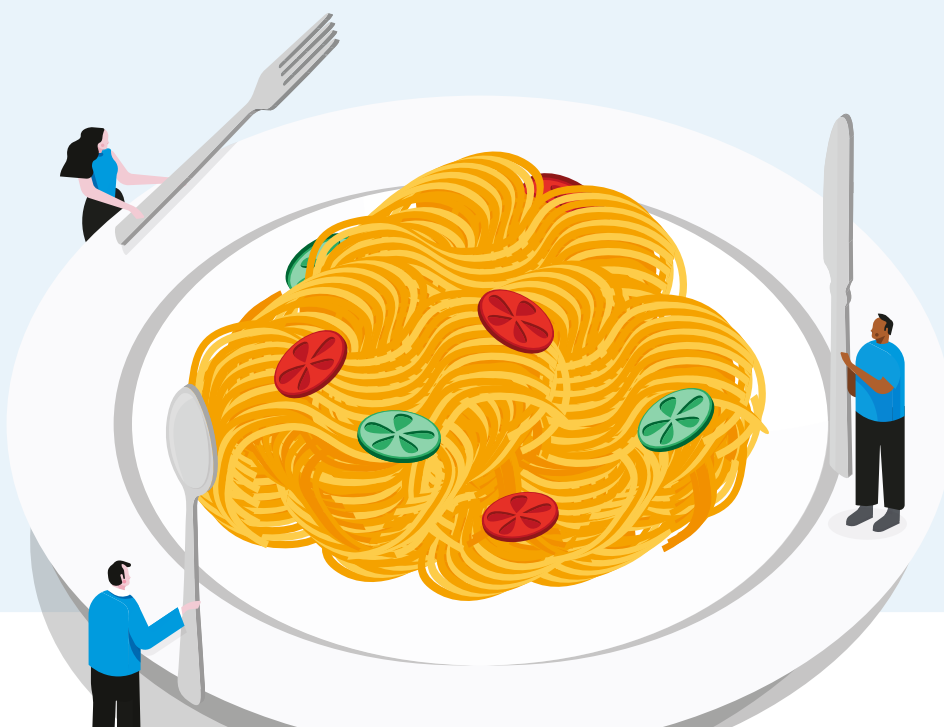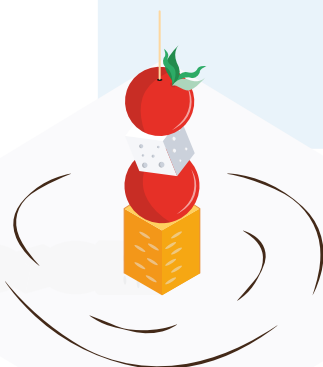
Make sustainable food easy

- Making plant-based food relatively more available has big impacts - more options on menus and in canteens

- Putting sustainable options in more prominent and salient positions (first in canteens, top of menus and front/ eye height in stores) delivers small reliable effects

- Meal kits, recipes, seasoning packs, and tips can all help make experimentation easy, and are popular

- Simple guidance can increase knowledge of what's sustainable and what's not - either labels, or rules of thumb a la '5 a day'

- Consider timely moments - might new students (learning to cook for the first time) or someone buying a new kitchen be more open to cooking something new?

- Online shopping gives many opportunities to provide timely substitution prompts, or encourage personalised goals and tips linked to product filters and ranking

- Can you default the veggie option? On airlines, at your wedding, at a conference...

Make sustainable food normal

- Be careful not to segregate plant-based food into dedicated sections of menus and stores, as it can make them seem niche

- Highlighting that more and more people are trying plant-based (a 'dynamic social norm') can have modest but significant effects

- Consider who your best messenger is: different groups listen to different people.

A Menu for Change

Using behavioural science to promote sustainable diets around the world

THE BEHAVIOURAL INSIGHTS TEAM

See our report
Menu for Change
for more

Are consumers up for being nudged?

In our most recent work with the food industry, we've often found a cautious approach to adopting these kinds of interventions. There may be commercial trade-offs that need to be managed (e.g. low-cost meat is often a leading product used by supermarkets to attract and retain customers). There are also understandable concerns about customers' acceptance of having their diets nudged. In practice, evidence from large-scale surveying across 20 countries, including the UK, shows very high support for environmental nudges. Moreover, food businesses should always remind themselves that doing so is not optional, as pointed out by Nobel Laureate Richard Thaler: "The first misconception is that it is possible to avoid influencing people's choices". There is no such thing as a neutral choice environment, and you are influencing dietary choices one way or another, so why not do so in a way which builds a more sustainable and healthy society?

Nonetheless, exploring customer sentiment is an important area of research in its own right if we are to accelerate the decarbonisation of food. In the survey cited above, we find that the majority of customers (2 in 3) side with positive rather than restrictive options, such as: improving the availability of sustainable food in supermarkets and restaurants, clear communication on environmental impacts of food, and timely prompts to consider more sustainable choices. The data cited in the executive summary and at the end of this chapter also show strong support for 'pricing which reflects the environmental impact of products' and majority support for a supplier-facing carbon tax on meat.

In a separate study conducted in collaboration with Tesco and WWF, we asked 4,000 respondents (in this case, lower income families) whether or not they supported the introduction of a wide range of interventions that Tesco could implement to help or encourage them to eat less meat and more veg and legumes. The level of support across the ideas was very high - between 70% and 90% say they would welcome these types of initiatives. This in no way implies the interventions would have a significant impact on food choices - indeed, wider evidence suggests these approaches would have impacts that ranged between modest but worthwhile, to very small, while several remain untested. So the takeaway is not that supermarkets should necessarily adopt all of these ideas - more research is needed. But certainly, this shows a license to operate. Supermarkets should not feel that negative customer reactions are a barrier to leading on this issue and building a more sustainable food environment. Instead, the data shows that when interventions are geared towards positively helping us eat sustainably, rather than penalising us for not, customers are open to it.
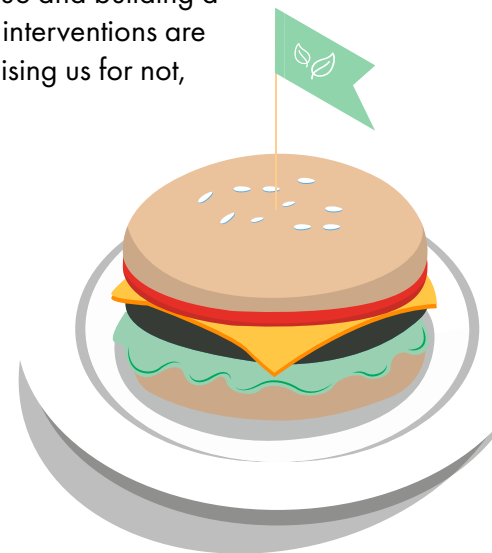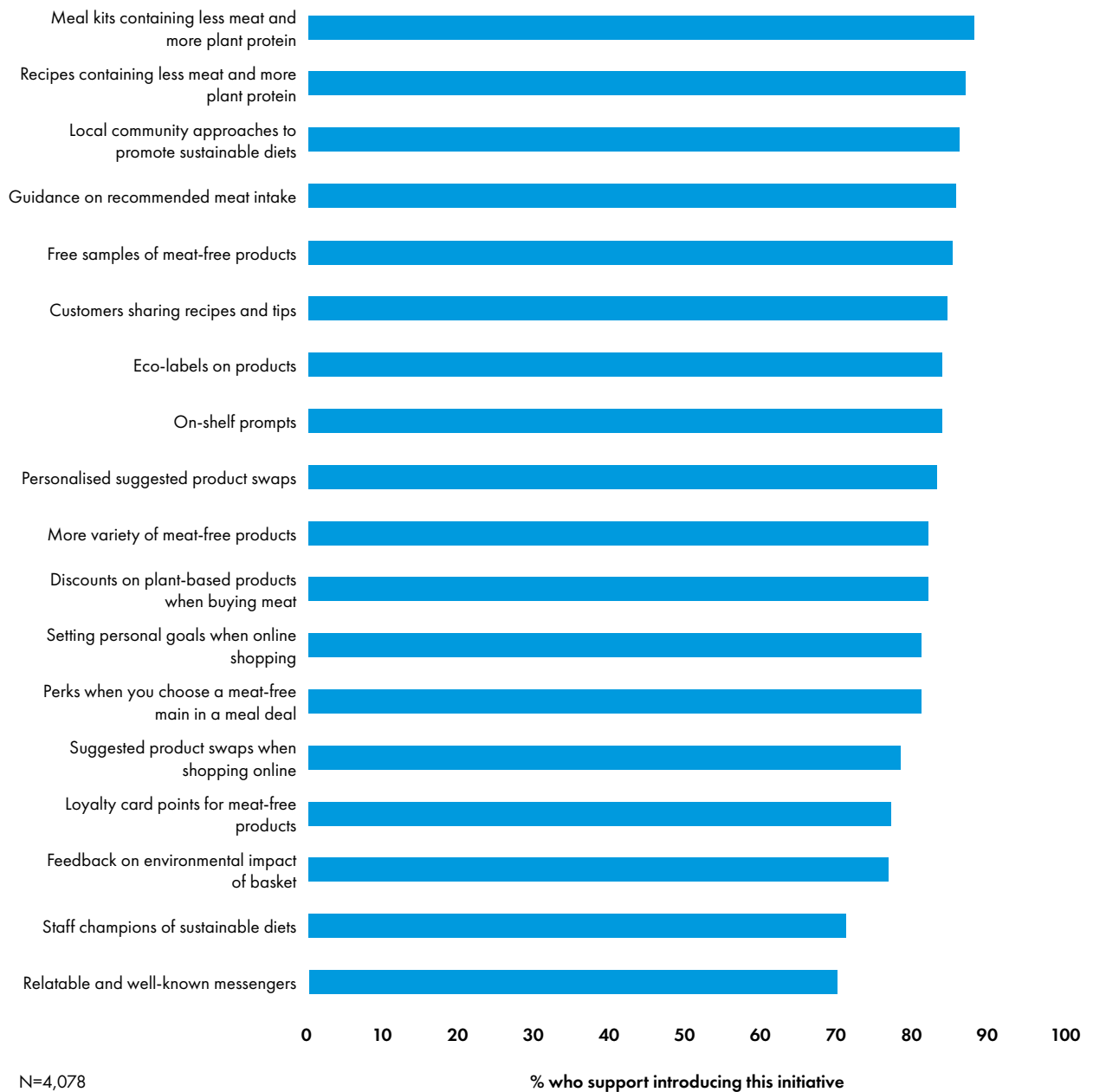
Figure 27. Stated support for supermarket initiatives to encourage adoption of more sustainable diets (N=4,078 UK households)

N=4,078
Data collected by BIT on 23 Sept 2022 - 6 Oct 2022

**% who support introducing this initiative**

BIT case study 14. Testing more attractive food names

Plant-based options don't always sound attractive. There is existing evidence that overtly health-based framings can discourage consumers,[178] and common terms like 'vegan' and 'meat free' can, to many, imply inferior taste or incompleteness in the meal. Newer terms like 'plant-based' are also confusing to many people (in the survey above, only 2 in 3 identified 'vegetables' as 'plant-based food', and lower still for legumes, soy products and vegan meat alternatives, while 13% thought dairy was plant-based). The industry is yet to land on a single term that resonates with consumers. But there is plenty of room for restaurants and cafes to use language in a way which highlights taste or other appealing elements.

What we did: In partnership with the World Resource Institute and Sainsbury's cafes, we tested several alternative names across 6 different dishes, in an online randomised controlled experiment. The language was intended to emphasise indulgence and provenance. Given the option between plant-based and meat based dishes, we measured the proportion who chose plant-based under each of the different naming scenarios.

Figure 28. Percentage choosing plant-based dishes across different naming scenarios
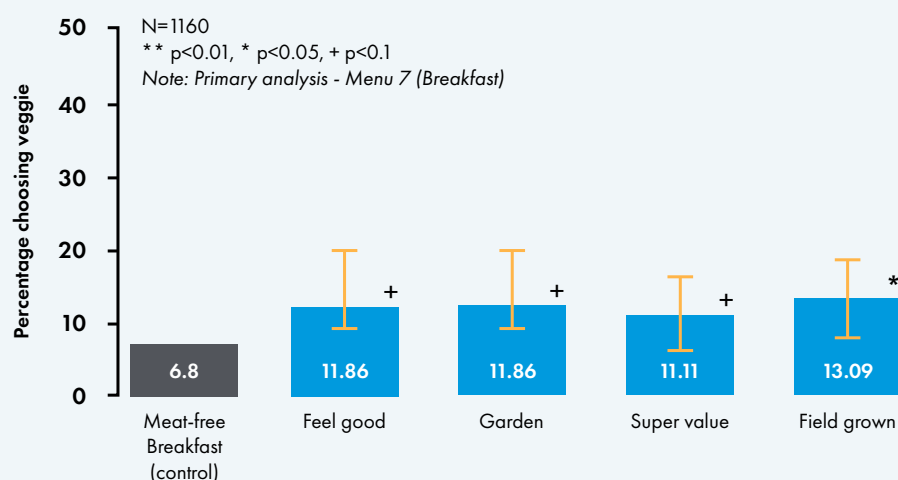
What we learned: In several cases the use of more indulgent or provenance-based language led to higher numbers of consumers choosing the plant-based dish. This figure shows one such example for a meat-free breakfast, where 'field grown' led to roughly double the number of selections over 'meat free' (a term which consistently performed poorly across other dishes too, and which only emphasises what is lost, not what is gained).

These online experiments were subsequently replicated in real-world Sainsbury's cafes, showing smaller but directionally comparable and statistically significant effects.

BIT case study 15. Encouraging customers to eat smaller portions on takeaway platforms

Online platforms such as Deliveroo, JustEat and UberEats have made ordering takeaway meals easier than ever, with their popularity skyrocketing in the last few years. Unfortunately, ordering from takeaway platforms is rarely the healthy choice – as these meals are estimated to be 21% more calorie dense than those cooked at home [179] and exposure to takeaways is associated with higher obesity prevalence.[180] Furthermore, the higher density of takeaways in areas of greater deprivation[181] suggests that consumption of takeaway fast-food may contribute to health inequalities.

What we did: We developed a simulated online delivery platform and used it to test nudges aiming to encourage sales of smaller portion sizes, both to reduce calorie intake and potential food waste. We randomly allocated users (N=6,000) to complete their food order on one of four different versions of our platform: 1) Business as usual (control condition), 2) Default - where the small option was pre-selected; 3) Default + normalisation - where on top of defaulting to the small option, we also changed portion names (called the small portion 'regular, the medium portion 'large', and the large portion 'extra large'); 4) Default + normalisation + availability - also adding a new 'extra small' portion (labelled small) to skew the distribution of available portion sizes.

Figure 29. Simulated online delivery platform
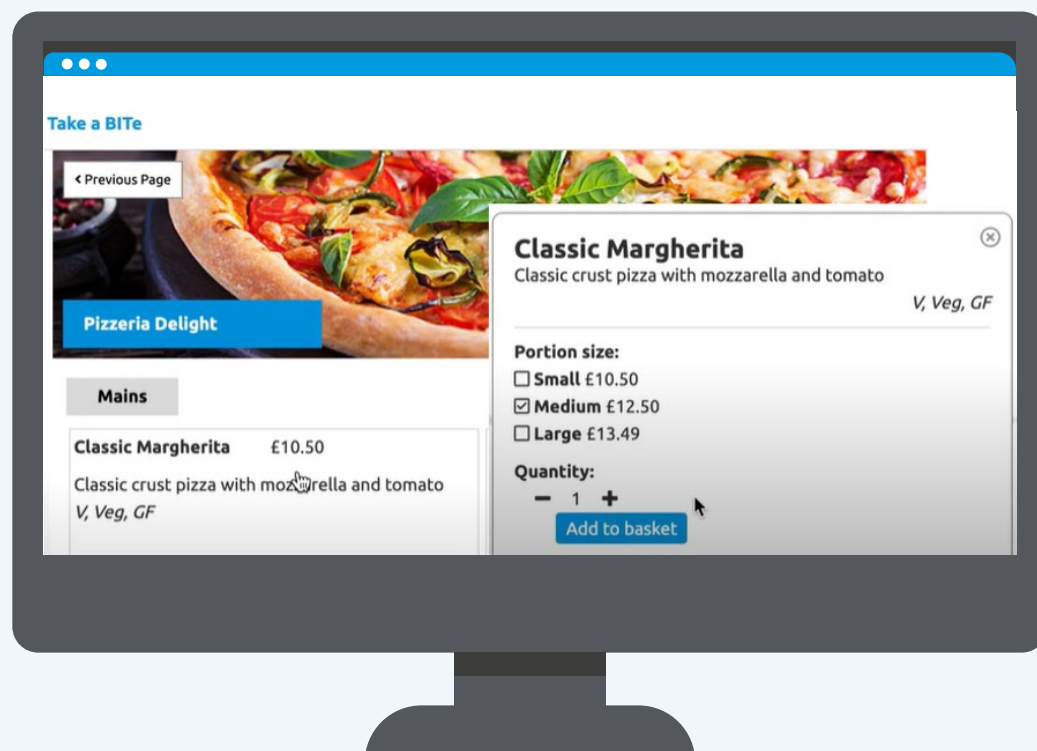
What we learned: We found that all three interventions significantly reduced the calorie content of participants' shopping baskets, by between 78 and 177 kcal/order, equivalent to 13%, for the most successful intervention (Default + normalisation + availability).

Whilst this trial's aim was primarily to help address obesity, it's a good example of how small changes to the choice architecture can shift consumer choices, with lessons equally applicable to nudging sustainable diets. Would the impacts be quite so large in the real world? Likely not - but we think they're directionally robust and we'd be keen to work with a delivery platform to find out.

6.2 Reducing food waste

Current progress on food waste: The UK wastes around 9.5 million tonnes of food each year, around 70% of this coming from households (2018 data).[182] This is estimated to have a value of around £19bn per year. The amount of food wasted has dropped by 15% since 2007, including an 18% reduction in household food waste.[183]

Required reductions in food waste: The CCC calls for a 50% cut in food waste by 2030 (already a Government commitment in line with the UN's Sustainable Development Goals), and 60% by 2050. This is important to both reduce wasted production, which emits carbon, but also to reduce the amount of food entering landfill where it emits methane.

Food waste is an issue across the industry from farm to fork. There is substantial 'food loss' before it reaches the consumer, due to crop damage, inappropriate storage during transportation or deselection of misshapen produce in processing. Similarly, retailers and restaurants generate food waste if they overstock (catering to customer expectations that there will always be fresh produce available all day), store inappropriately, or fail to reuse or donate leftover food.
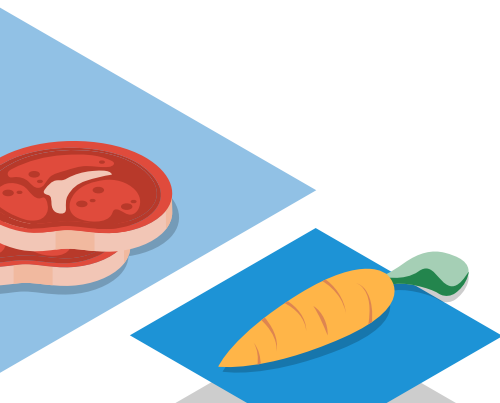
Figure 30. Behaviours behind food waste, from field to fork

Actors	Behaviours
Farmers	**Planting:** Efficient crop planting **Crop protection:** Use pesticides (within sustainability guidelines) **Harvesting:** Harvest all; with care to avoid crop damage **Selection:** Select misshapen vegetables **Transport:** Store appropriately (e.g. temperature); Avoid damage during transportation **Disposal:** Compost harvest waste
Processors	**Selection:** Select ingredients from farmers who engage in food waste avoidance practices; Select misshapen products too **Processing:** Adopt less wasteful trimming techniques; Adopt agile processing machines; Produce appealing non-perishable product options; Avoid excessive packaging **Storage:** Store food appropriately; Manage inventory well (ie. expiration dates) **Transport** **Disposal:** Donate damage package/ perishing food; Segregate & compost waste
Importers/ Distributors	**Selection:** Import from manufacturers and food processors with good quality standards **Transport:** Store appropriately (e.g. temperature); Avoid damage during transportation **Disposal:** Donate damaged package/ perishing food; Segregate & compost waste
Retailers	**Stocking:** Ordering appropriate amounts of food; Stocking non-perishables; Stocking products that meet quality standards; Stocking wonky-looking products **Storage:** Store food appropriately; Rotating stock well **Sales:** Make expiration information salient; Discount perishables close to expiry; Attract consumers to non-perishables **Disposal:** Donate damaged package/ perishing food; segregate & compost waste
Hospitality	**Stocking:** Ordering appropriate amounts of food; Stocking non-perishables; Stocking products that meet quality standards; Stocking wonky-looking products **Storage:** Store food appropriately; Rotating stock well **Production:** Avoid overproduction **Sales:** Price and portion food to avoid food waste **Disposal:** Re-use leftovers where possible; Segregate and compost waste, Donate unused food
Consumers	**Shopping:** Purchasing appropriate amounts of food; non-perishables; not good-looking food; food with appropriate expiration dates **Storage:** Storing appropriately (e.g. fruit in fridge; freezing bread or leftovers) **Production:** Cook and serve right amounts of food; Cook food closer to expiration date **Eating out:** Order the right amount of food; Takeaway leftovers **Disposal:** Re-use leftovers where possible; Segregate and compost waste, Donate unused food

Zooming in on consumers, households are by far the biggest source of food waste, with the average household wasting around 70 kg of food per year in the UK.[184] Tracing the customer journey through planning, shopping, storage, cooking, eating in and out, use of leftovers and disposal, there are a host of behaviours driving consumer food waste. From overbuying (especially perishables), avoiding wonky looking produce or products close to expiration, through incorrect storage, cooking without finishing products close to expiration first, as well as throwing out extra food, rather than freezing and reusing, all the way to lack of food waste segregation and compositing.

The figure below highlights a wide range of behaviours we might consider encouraging, to address waste at each stage in the UK. Case study 16 shows our effort to increase food waste collection in Wigan, while Case study 17 shows a very different setting, where we trialled interventions in hotel staff cafeterias to cut food waste in the UAE.

Figure 31. Consumer food waste-reduction behaviours at each stage

Planning	Checks current stores and correctly assesses meal needs that week			
Shopping	Purchases correct amount	Purchases non-perishables	Purchases close to expiration & damaged	Purchases ugly fruits & vegetables
Storing	Store fresh food and leftovers in the most preserving places		Has fridge at the correct temperature	
Cooking	Uses near-dated produce first/ plans meals around UB dates	Uses borderline produce/ produce beyond BB date	Cooks & serves the right amount	Eat everything on the plate / Freezes/ re-seals uncooked leftovers
Eating out	Orders/ self-serves right amount		Eats everything on the plate	
Disposing	Keeps & eats cooked leftovers	Donates unused food to needy	Segregates & composts	

BIT case study 16. Increasing food waste collection in Wigan

What we did: While the great majority of people in the UK recycle some dry waste, many households don't recycle their food waste. Working with Wigan council we developed a multi-stage intervention which included:

- Tagging general waste bins with a paper 'hanger' prompting people to order a free food waste kitchen caddy. Three messages were randomised: (i) an 'every little helps' message to encourage those who may feel it's not worthwhile if they don't waste much food, (ii) a social norms message highlighting thousands in Wigan are already recycling their food waste, and (iii) a message emphasising how easy it is to get started.
- If people order a caddy, they also receive a leaflet with tips and prompts.
- They were also invited to sign up to email reminders to recycle their food waste.

What we learned: The paper hangers had a large and significant effect on food waste caddy ordering rates: 1,500%, albeit from a very low baseline. 47% of these people also signed up to reminder emails. This equated to 4.7% of households given a tag, for the most successful tag (the social norms message).

The impact on food waste collected was harder to detect given loads were weighed at the round level - we detected a 4.6% increase in weight of food waste collected compared to a synthetic control group, and this was increasing in magnitude towards the end of the trial (to be expected as it took some time for households to order, receive, and being to use their caddies). However this was not statistically significant.

Figure 32: prompts on bins to encourage people to order a free food waste caddy

BIT case study 17. Reducing food waste in UAE's hotel staff cafeterias

Eating out-of-home is a major source of food waste, especially so in the UAE context where strong cultural norms of hospitality are behind buffets with big portions. Together with a widespread lack of awareness about the extent, severity and consequences of food waste, this makes for a dangerous combination, fueling consumer waste. For many restaurants, perverse incentives come into play, as waiters push consumers to order more than they can consume. The UAE is committed to reducing food waste by 50% by 2030.
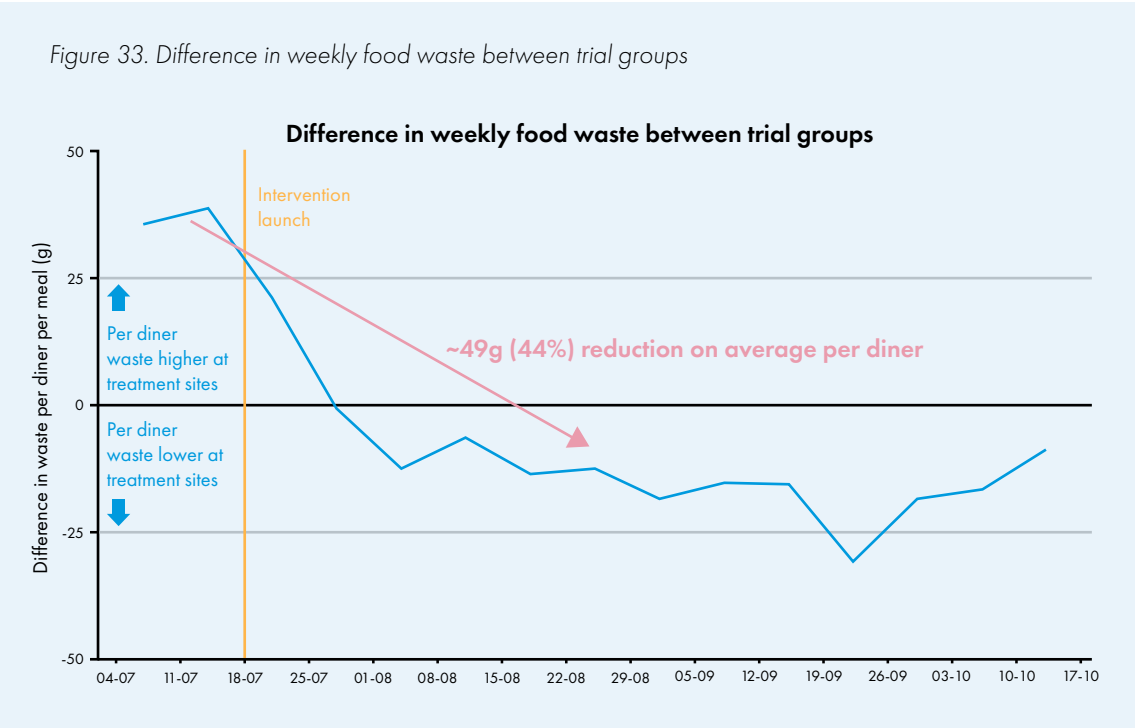
What we did: Working with the Emirates Foundation and Accuro, we developed a multi-component behavioural intervention aimed to reduce food waste in hotel staff cafeterias. This included: i) reducing the default size of portions (while permitting seconds); ii) a series of behavioural prompts (i.e. posters and on-table messages leveraging a wide range of behavioural techniques, such as those summarised in Figure 9) encouraging customers to waste less food; iii) salient feedback provision using a food waste tracker (a poster tracking daily and weekly food waste, with a normative element comparing to other chains) and iv) a clear food waste bin, to highlight the sense of individuals visibly contributing to the problem as they dispose of their leftovers. We ran a 12-week difference-in-difference evaluation of this intervention across 7 Accuro cafeterias, comparing the amount of food waste in the control and treatment cafeterias over time.

What we learned: We found a directionally positive and sizeable effect of our intervention on food waste reduction. We estimated a large reduction of between 29-44%, with a degree of uncertainty about the exact magnitude due to the small sample size of 7 cafes, and volatility of daily waste. The effect seemed to persist throughout the entire duration of the trial, and is consistent with the effect sizes in the literature. The intervention was positively received by customers, with no drop in satisfaction compared to the control sites (as measured by questionnaire).

Around 1.7 tonnes of food waste was prevented during the duration of this trial alone, and if scaled across the 7 cafeterias, it would save around 17 tonnes per year. If scaled across hospitality in the UAE, it would save around 144,000 tonnes of food every year, equivalent to around $200 million in cost savings.

Figure 33. Difference in weekly food waste between trial groups

Difference in weekly food waste between trial groups

Intervention launch

~49g (44%) reduction on average per diner

Per diner waste higher at treatment sites

Per diner waste lower at treatment sites

Difference in waste per diner per meal (g)

50 · 25 · 0 · -25 · -50

04-07 11-07 18-07 25-07 01-08 08-08 15-08 22-08 29-08 05-09 12-09 19-09 26-09 03-10 10-10 17-10

Chapter 6. Greening food: diets and waste

6.3 Greening food: recommendations

Government should:

F1. Introduce a supplier-facing carbon levy to incentivise 'reformulation' of high-carbon foods. Mirroring the UK's sugar levy which successfully led to the widespread reformulation of sugary drinks, a supplier-facing levy based on the carbon intensity per portion of meat and dairy (initially), can be used to incentivise a range of more sustainable production methods and product innovation. Our survey data shows public support for a 'supplier-facing carbon tax on meat' is 23% higher than a 'consumer-facing tax', and framed as a 'carbon levy on food' rather than a 'meat tax' increases support further. This isn't just about clever framing: the design really should seek to incentivise suppliers to decarbonise, rather than to penalise consumers with higher prices (as articulated in detail in section 2.4).

Moreover, this doesn't have to be all 'stick' - agricultural subsidies should simultaneously be directed towards relevant support for livestock farmers. Furthermore, impose the same standards on imports to ensure a level playing field, thus giving significant commercial advantage to British farmers who are often already more sustainable than many imports.*

F2. Update existing national dietary guidelines to promote healthy and sustainable diets (like recently in Spain), and impose those guidelines where appropriate through public sector catering.

F3. Incentivise supermarkets and restaurants to eliminate food waste, by:
a. Targeting incentives upstream at the hospitality or retail level to shape the customer food environment. This could include introducing tax incentives for businesses donating food (e.g. as in Italy)[185] or adding extra charges and fines for businesses wasting food (e.g. as in France),[186] as well as adopting best practices with respect to use-by labelling.
b. Mandating food waste disclosures for large businesses. This year, Defra has put out a consultation to improve voluntary food waste disclosure in the UK.[187] Mandating disclosure for large businesses is the next step in enabling transparency and market pressure.

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* **A few important points about the design of such a levy.** First, the important detail driving success of the sugar levy was its stepped tax design, imposed at specific sugar thresholds, which created a sharper incentive for suppliers to reformulate to fall below said threshold, than would a standard (linear) approach. The carbon levy should mimic this with stretching, but achievable reformulation targets that mirror the 'best in industry' carbon intensity of beef, lamb and dairy, ratcheting down over time as the industry improves. This is very different (politically and practically), than a standard 'sin tax' imposed on meat which would penalise consumers who wish to eat the affected products.
Second, we note that this will require significant improvements in data collection and carbon accounting, since at present the lifecycle carbon analysis of many foodstuffs is based on typical figures for ingredients (e.g. beef), and is therefore not able to reliably differentiate between lower-carbon and higher-carbon British beef, which is critical for this policy design to work. (In comparison, it was trivial to measure the sugar content of different drinks). Advances in satellite tracking of emissions, and improved reporting standards should therefore be prioritised: this and other sophisticated policy measures are impossible without it. If real emissions data is not available at such precise granularity, a 'check-box' approach may be required instead, i.e. getting credits for best-practice methods known to reduce carbon emissions. Otherwise, we will be left reliant on far more blunt approaches, such as a blanket levy on beef and dairy: less fair on farmers, and less popular among consumers.
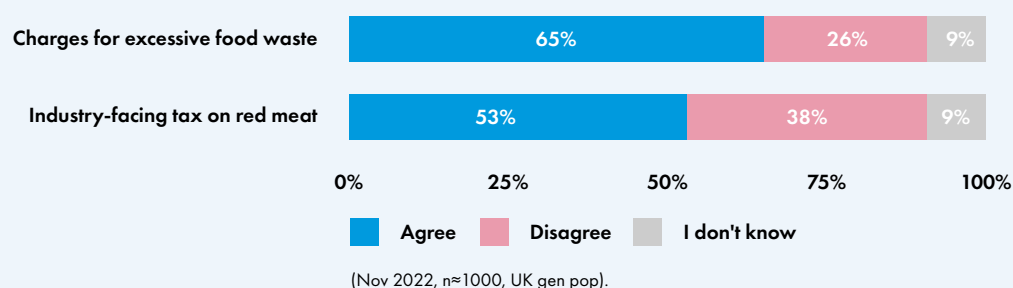
Note also, from [Chapter 3](#), recommendation **A2**, which would particularly apply to the food sector (traffic-light ecolabels for food, and green ratings for supermarkets) and well as **A3** (Government leading by example through public procurement of food, which totals c. £2.4bn per year across schools, hospitals, prisons, government agencies and care homes).[188]

Businesses, local authorities, industry bodies and other organisations additionally could:

- Reduce portion sizes in restaurants, canteens and supermarkets, which reduce waste even if permitting second portions.
- Increase the availability of sustainable food options. Do this by dedicating more shelf space, and having more options on menus and in canteens.
- Increase the prominence or salience of sustainable options. Do this by utilising end-of aisle, eye-height, or front-of-fridge locations.
- Normalise plant-based food by integrating it into restaurant menus and 'normal' shop aisles. Displaying side-by-side more traditional choices increases its perceived normalcy - and the likelihood new customers may try it. But also test and measure these interventions, as the evidence is nuanced, and mixed.
- Provide low-carbon defaults across different public and private catering settings such as on aircraft, conferences, weddings, school canteens
- Local authorities could consider charging households for extra food waste: In Seoul, automated bins weigh food waste and charge residents.[189] This has reduced food waste in the city by 47,000 tonnes in six years, according to city officials.

Public support for greening food

In addition to the above evidence of strong support for supermarkets nudging and supporting sustainable diets, we included two food policies in our recent survey. Even though a carbon levy on meat is amongst the more divisive policy ideas, a majority (53%) still support the idea - and that's in a context when public understanding of the environmental impacts of meat is still relatively low compared to other environmental issues. 2 in 3 support the introduction of charges for excessive food waste (F3), targeted at consumers and businesses.

	Agree	Disagree	I don't know
Charges for excessive food waste	65%	26%	9%
Industry-facing tax on red meat	53%	38%	9%

(Nov 2022, n≈1000, UK gen pop).

Chapter 7. Greening consumption: waste and circular economy

Consumption of material goods and products has a profound impact on both natural resources and emissions. Globally, material consumption far exceeds the planet's current capacity to produce resources and accommodate their waste.[190] In the UK alone, households generate 27 million tonnes of waste annually [191] and throw away nearly 100 billion pieces of plastic packaging a year.[192] The UK is also among the biggest producers of electrical waste across Europe, producing 1.6 million tonnes per year, equivalent to 23.9kg per person.[193]

The emissions associated with material goods are counted within the footprint of the manufacturing country, which is why consumption and material waste tends to feature less heavily in domestic Net Zero pathways. When accounting for these imports, the UK has still cut its emissions significantly, albeit by less, over the last few decades.[194] Nonetheless, the moral duty and practical opportunity to cut these emissions lie just as much with consumers in the UK as they do with the overseas manufacturers. And it's not a trivial contribution to the problem: these 'consumption' emissions account for 46% of the UK's total carbon footprint, despite mostly being excluded from national reporting and the UK's Net Zero target.[195]

As consumers, we can therefore embrace a new relationship with material goods, but the onus is also on UK businesses (and by extension regulators) to consider the full lifecycle of the products they produce and sell, including scope 3 emissions associated with their international supply chains. In other words, while consumers can absolutely do their bit, it's clear that radical change must happen upstream: we cannot live in a world in which it is cheaper to replace than it is to repair; a world in which product lifespans are deliberately short and obsolescence is built-in; a world in which it is essentially impossible for consumers to truly know which products are more sustainable, from a pair of jeans to a personal pension; or a world in which the waste system is opaque, unreliable, and confusing.

Key behaviours to encourage, and known barriers		
Buying sustainable products	**Repairing and reusing**	**Recycling**
• Lack of knowledge about the impact of consumption on the planet • Difficulty with identifying truly sustainable products - no reliable labelling, and a lot of greenwashing • Higher upfront cost • Lack of positive social norms	• Low availability of second-hand, repair shops, and return schemes • Lack of consumer protection for second-hand / repaired goods • Low 'repairability' of items • Higher costs of repairs, compared to a new product • Negative attitudes ('the ick' factor for second-hand items) • Lack of positive social norms	• Lack of knowledge on how to recycle correctly • Confusing labelling on products, exacerbated by lack of standardised recycling across the UK • Lack of access to recycling infrastructure • Extra hassle of separating waste • Not believing it is worthwhile given problems with recycling system

Current progress on sustainable consumption: As highlighted within the introduction to this chapter, the stats on waste are stark. However there have been some notable points of progress. For example the amount of biodegradable waste going to landfill (that which creates methane when rotting and is therefore a major cause of global warming) has roughly halved over the last decade.[196] This is partly food waste, but also garden waste, paper and cardboard. Our studies show that many people do report 'considering the environment when making purchases', but it's clear that for most people this is a modest consideration overlaid upon a default of profligate consumption and waste. More positively, a range of policies are forthcoming to tackle material waste: a deposit return scheme on drinks containers; extended producer responsibility on the cost of managing waste; standardised recycling services across the country; and simplified recycling labels.

Required transition to circular economy: The main stated target from the CCC is to reach 70% household recycling by 2025 - an extraordinarily rapid increase from the current rate of 45%, where it has been stuck for many years.[197] The UK Government is also committed to implementing a circular economy package, though this mostly relates to waste, rather than any circular solutions further up the value-chain (e.g take-back schemes, repairing, second hand purchasing, sharing economy).[198]

7.1 Greener consumption
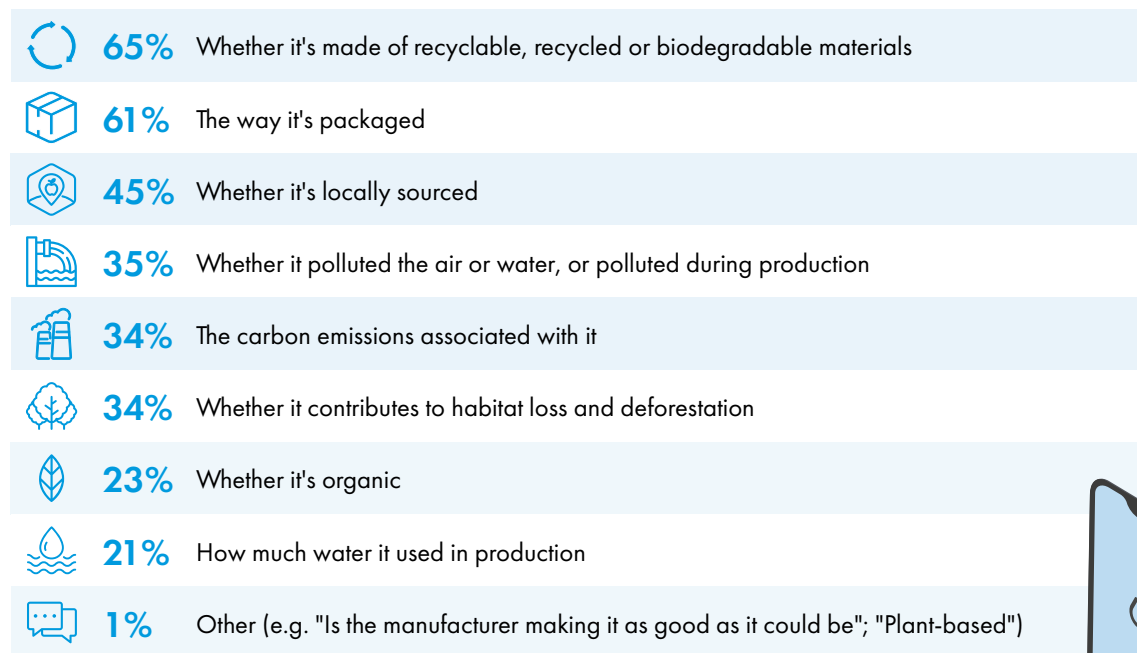
Buying less and choosing green

The first step to reducing the carbon impact of material consumption is to encourage consumers to buy less, and when they do, buy more sustainably. The former goes against the grain of our consumerist society, as we live in an age when it is not unusual to buy clothes for single wearing, with reality TV shows focusing on how to help declutter households overflowing with stuff they don't need. Even so, the majority say they only buy what they need (especially in the context of a cost of living crisis), but it may be that the very perception of 'need' has been twisted - compared to the times when, for example, people only bought new clothes when the old ones could be repaired no further. This highlights the depth and complexity of our collective norms and expectations, which may be difficult to shift. The most viable solutions are likely ones which reduce absolute consumption of material resources while permitting the norms of consumerism to mostly continue, such as greater provision of leasing of products, take-back-schemes, or upgradable, modular and repairable goods (see case study 19, later in this chapter).

If buying less is unappealing, maybe we can just buy green? This is an altogether separate challenge. BIT's research with Cogo has found that 9 in 10 say they consider the environment at least sometimes when choosing what to buy and 3 in 4 want to know more about the environmental impact of their purchases - food, fuel and flights top the list of their 'items of concern', ahead of household goods. Just 1 in 10 think about the environment when making investment decisions, such as saving for pension - a small figure when you consider the potential impact of £2.3 trillion in UK pensions (an issue BIT explored in our Greening Pensions report).[199] The data below also shows a trend which is now becoming very familiar: the public's attention is skewed towards salient and tangible issues, specifically plastics and waste, above hidden impacts such as embodied carbon in the production of those goods.
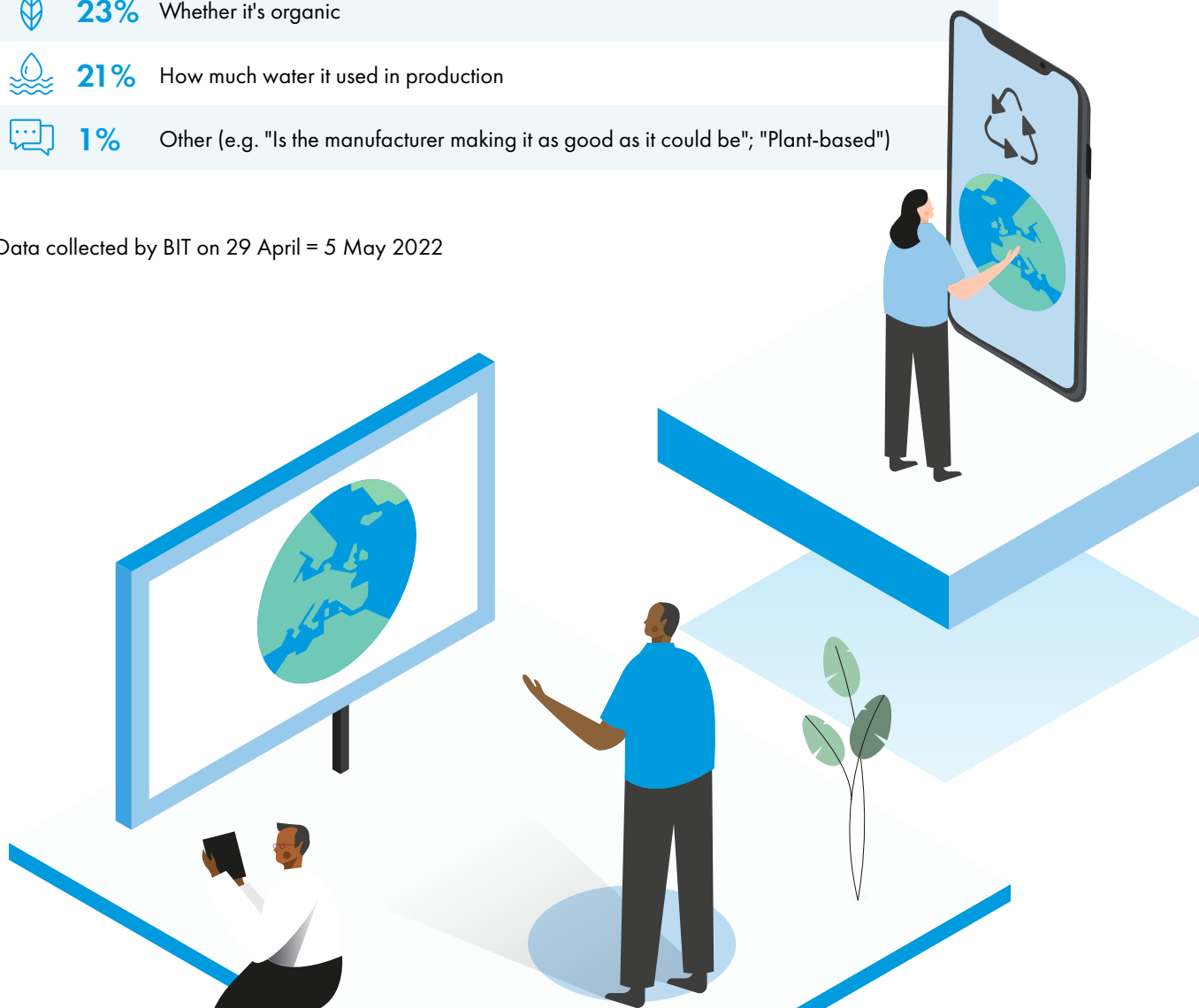
Figure 34. Factors customers consider when thinking about the environmental impact of their spend

"What factors do you consider when thinking of the environmental impact of your purchases?"
(n=1,758; participants could choose more than one answer)

	65%	Whether it's made of recyclable, recycled or biodegradable materials
	61%	The way it's packaged
	45%	Whether it's locally sourced
	35%	Whether it polluted the air or water, or polluted during production
	34%	The carbon emissions associated with it
	34%	Whether it contributes to habitat loss and deforestation
	23%	Whether it's organic
	21%	How much water it used in production
	1%	Other (e.g. "Is the manufacturer making it as good as it could be"; "Plant-based")

Data collected by BIT on 29 April = 5 May 2022

In fairness to consumers, these issues are nuanced and it is hard to trade off multiple dimensions of environmental impact. This is why there is such a great need for simple eco-labelling on products and services, and a need for stronger regulation around what constitutes a 'green' product (the CMA's fight against greenwashing being the main vehicle for helping customers navigate this enormously complex issue, but inadequate, and only reactive). In this vacuum of information and regulation, consumers' best intentions easily fall prey to unsubstantiated marketing claims or mere games of mental association: drawn to earthy hues, green imagery, natural-looking materials (the 'natural is good' fallacy) or 're-usable' products that might actually have a far greater carbon or resource footprints than their disposable but recyclable counterparts. And, unfortunately, greenwashing works: in BIT's recent research on the topic, 6 in 10 participants exposed to greenwashed claims believed they were a reliable source of information on a company's eco practices (see case study 18 below).

BIT case study 18. Testing greenwash claims [200]

These days every business seems to have gone green – or at least that's the way it looks on the surface. Organisations make bold environmental claims, often in place of substantive green action, a.k.a: greenwashing. The definitions of greenwashing are nuanced and far broader than out-right falsehoods. The most common offence is a more subtle projection of green credentials that don't stack up against the company's wider actions. For example, highlighting token efforts on Scope 1 operational emissions that sound grandiose (such as a commitment to being Net Zero by 2050), when this might overlook the 99% of emissions associated with the products they sell.[201]

We ran an online experiment to test ways to protect consumers against greenwashing, randomising participants into three groups, based on promising interventions in the academic literature:

- **A literacy intervention** – providing information to help participants understand greenwashing and its intentions. This intervention most closely resembles existing anti-greenwashing campaigns
- **A pre-bunking intervention** – participants imagined they were an energy company and were asked to plan a marketing campaign with a greenwashing goal. The idea is that exposure to greenwashing strategies can build resistance to future manipulation.
- **Control** – no greenwashing intervention.

They then saw greenwashed ads of fictional energy companies. One distracted consumers from the wider impact of the energy company by drawing attention to a vague low impact action ("our offices are now green"). The other exaggerated individual responsibility by promoting a carbon footprint calculator. We also showed participants a non-greenwashed ad ("we're creating thousands of jobs").

Figure 35. Ads of fictional energy companies shown to participants

What we found:

**Greenwashed**   **Non-greenwashed**

Unfortunately, we found that greenwashing works. Over half (57%) of consumers in the control condition believed that greenwashed claims were a reliable source of information about a company's eco-practices, and that our fabricated greenwashed energy companies had stronger green credentials.

Figure 36. The effect of greenwashed vs non-greenwashed ads on perceived green credentials of company among participants in the control condition.
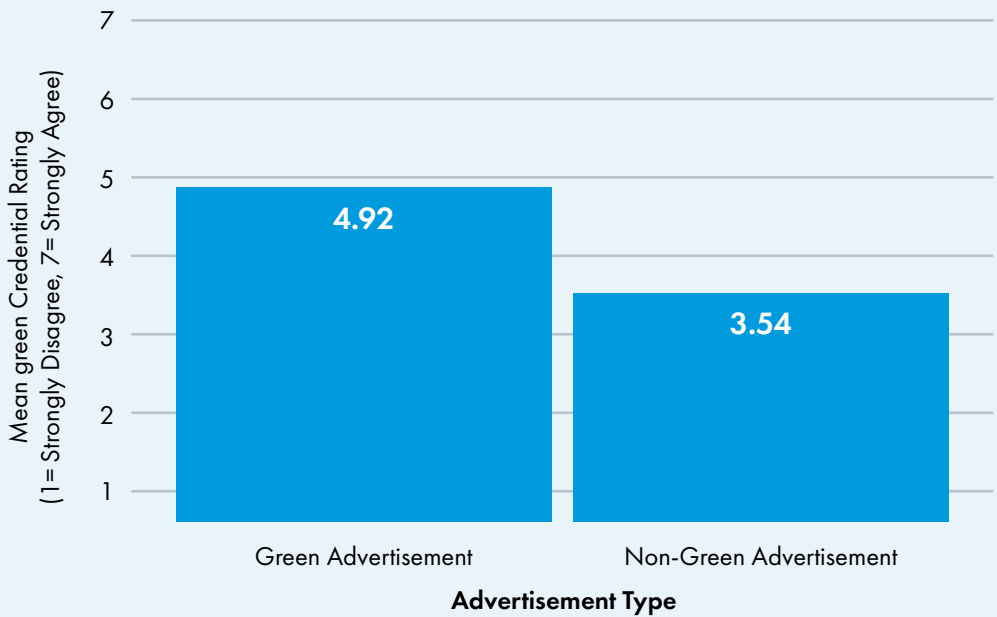
The better news is that our interventions had a modest but highly significant impact. We also found that those who are most concerned about the environment are most susceptible to greenwashing, which is concerning given they are the market seeking out (often bogus) eco-products and services. However this same group also benefited most from the interventions.

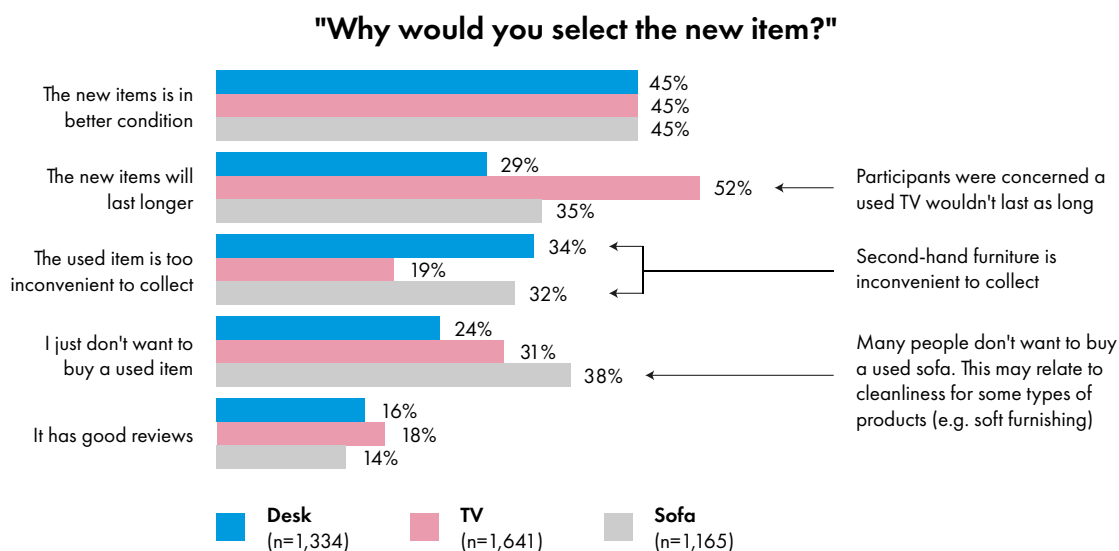*Figure 37. Perceived green credentials of company*
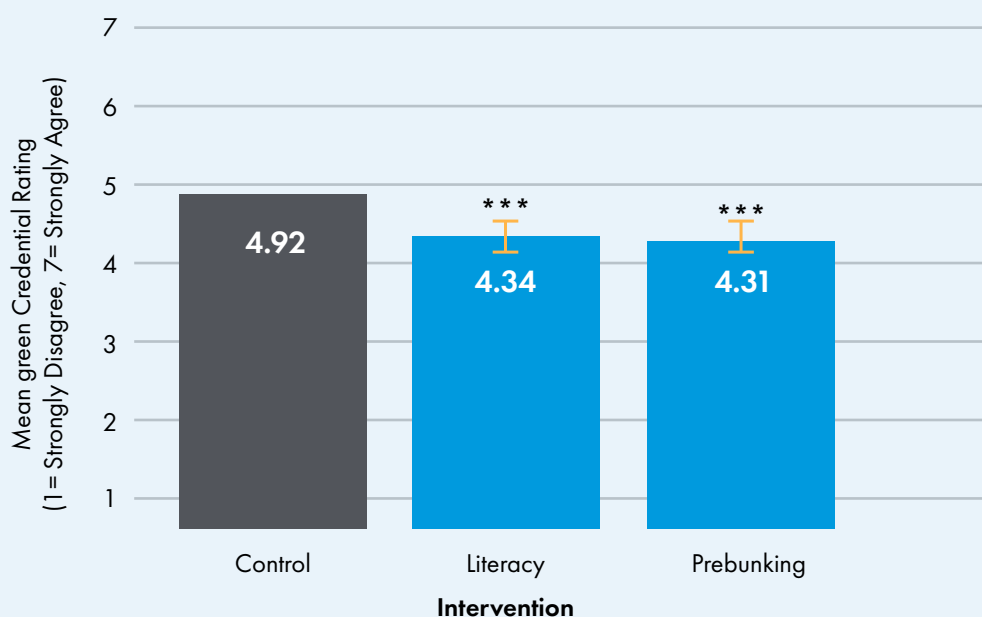
This work highlights the potential for behaviourally-informed interventions to help consumers navigate these complex consumer decisions. However, in practice, such interventions are hard to scale, and we would prioritise stricter regulation against greenwashing, and the introduction of robust, standardised eco-labels on products and services so that consumers have no need to rely on dubious marketing claims.

Moving towards a circular economy: second hand purchases

Moving from a linear economy (where we make, use and dispose of products), to a circular economy (whereby a product's lifecycle is extended through closed loops of re-use, repairing and sharing) can be a win-win. For instance buying second-hand not only helps to prevent waste and reduce carbon emissions, but it also provides the opportunity to grab a bargain and find something unique, and is becoming increasingly popular for many. BIT's own research with Gumtree shows that 7 in 10 buy second hand because of the lower price, with just 4 in 10 doing it for environmental reasons or to prevent waste.[202]

However, this research also shows that barriers for buying second-hand remain abundant. Compared to buying new, there are fewer opportunities to buy second-hand both on the high street and online; with less choice and lower quality; relatively little consumer protection or right of returns; and less convenient delivery options. Buying second-hand can also come with negative emotions (the ick factor) and perceptions about social status, given it remains far from the norm. Our research also highlights how these barriers differ by product category. Used soft furnishings come with cleanliness concerns; used electricals have longevity concerns; and large furniture is difficult to transport compared to free delivery when buying new.[203] This highlights the wide range of interventions and novel business solutions that might be needed, at scale, if the UK is to shift towards a more circular economy and compete against hyper-convenient online shopping and returns. For instance, around 1 in 3 claim they would switch to a second-hand item if it came with a guarantee and was delivered straight to their home.

Figure 38. Reasons to buy new in BIT's online shopping simulation, undertaken for Gumtree

"Why would you select the new item?"

	Desk (n=1,334)	TV (n=1,641)	Sofa (n=1,165)
The new items is in better condition	45%	45%	45%
The new items will last longer	29%	52%	35%
The used item is too inconvenient to collect	34%	19%	32%
I just don't want to buy a used item	24%	31%	38%
It has good reviews	16%	18%	14%

Participants were concerned a used TV wouldn't last as long

Second-hand furniture is inconvenient to collect

Many people don't want to buy a used sofa. This may relate to cleanliness for some types of products (e.g. soft furnishing)

Repairability

Many products today seem almost designed to break or become redundant, and when they do break, can be hard to repair. This is a good example of the futility of relying too heavily on downstream solutions: encouraging people to repair broken items is of limited value so long as we live in an economy saturated with cheap, short-life-span products which are either impossible to repair, or cost more to do so than to replace. We therefore need to change the upstream incentives for businesses to produce repairable, long-lasting products. The forthcoming 'right to repair' [204] legislation mandating electronics manufacturers to meet minimum repairability standards is a good start, but we fear this regulation will have little impact if it remains only a theoretical possibility for consumers. If the price and hassle of spares and repairs is still greater than buying a replacement, nothing will change. It's therefore critical to extend the legislation so that most common repairs and parts are offered at fair prices and with convenience in mind.

BIT case study 19. French repairability index [205]

In 2020, France passed a law announcing the creation of a repairability index to help guide purchases of electronic and homeware products. A year earlier, in parallel to the technical design of the index' criteria, we worked with the French Ministry of Environment, the Direction interministérielle de la transformation publique and Thibaud Griessinger on designing and testing visual designs for the index. Our work aimed at identifying how to design the visual most likely to be noticed, understood and effectively considered by consumers. We ran two experiments - one in the lab and one in the field, drawing on a repairability index that a major French distributor had itself already developed for laptops, to study consumer choices in real conditions (ie with an index that already existed). The field experiment, run online on the distributor's website, tested whether the visual options considered for the index were likely to affect the probability of 1) buying a laptop with an index and 2) buying a more repairable laptop. A qualitative component complemented this study to explore consumers' understanding of, and interest in, the index.

What we learned: Interviewed consumers expressed an interest in the index and in having additional information. They, however, also expressed confusion surrounding the concept of repairability, suggesting a need for acculturation. The presence of one of the two visuals was associated with a reduction in the likelihood of buying a laptop with an index (suggesting fewer or delayed purchases). Among customers who bought a laptop with an index, the visuals did not affect the probability of buying a more repairable laptop.

Figure 39. Repairability index in situ

These results should be looked at in context:
- Repairability was a relatively new and unfamiliar concept for consumers, which also appeared to be less important to them for laptops than, say, for larger appliances which were later targeted by the scale up of the index. Following this project, a large sensitisation campaign also accompanied the launch of the index.
- 40% of the laptops on offer had not yet had their repairability index calculated. The average score of the laptops for which it had was 5.4/10 - offering participants a choice between only moderately repairable laptops. This led to a strong push by the government to ensure that the index would ultimately be compulsory, to ensure that consumers are consistently provided with complete information to make their decision.

We collaborated again with the same partners in 2023 to conduct an ex-post evaluation of the rollout of the index - results to be published in November 2023.

7.2 Greener waste

Recycling

Given the enormous challenges associated with reducing the consumption of material resources, we must also look to the other end of the value chain and ensure materials are recycled at the end of their useful lives.

Recycling is routinely the most commonly reported green behaviour. Our data show that 9 in 10 report recycling frequently.[206] It benefits from very wide awareness, and seems to have an intuitive appeal to many: the act of wasting or throwing items into landfill is visceral and easily understood to be bad. Indeed, as we saw in Chapter 3, it's routinely over-estimated in its importance for the environment.

However, actual recycling remains stubbornly low. The proportion of household waste which is recycled has been stuck at around 45% for 10 years now. This makes the CCC's recommendation - for 75% recycling by 2025 - seem extremely optimistic. However, several policies are due to be implemented in the next few years which, cumulatively, could have a major impact: extended producer responsibility to recover the costs of waste processing; a deposit return scheme (DRS) for drinks containers; standardised recycling rules across england; and (largely enabled by the former) a simplified labelling scheme for recycling.

Our attention is therefore on the details of how these policies should be optimised, and one area of particular interest is label design. Dozens of studies show the public are confused by current recycling labels, with our own data finding just 1 in 20 passing a knowledge test on what can and cannot be recycled.[207] Our case study below looks at one potential approach to simplifying the design on on-pack recycling labels.
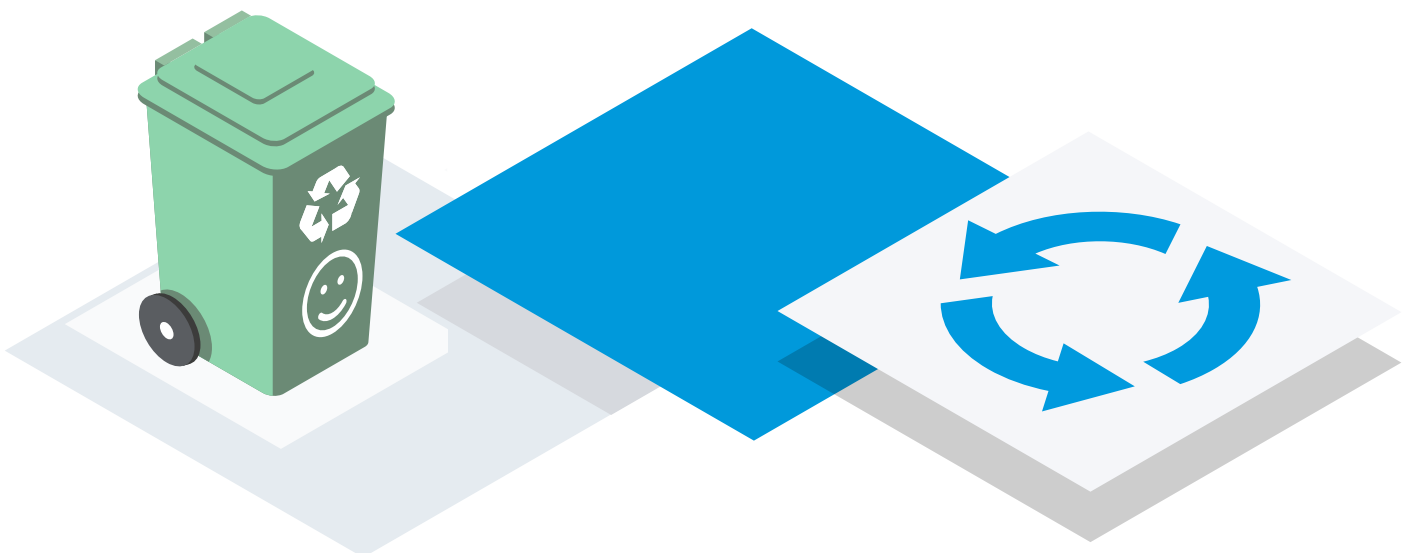
BIT case study 20. Using front-of-pack labels to encourage bathroom recycling

It has been reported that consumers are less likely to recycle in the bathroom than in the kitchen. Lack of knowledge on and confusion about what can be recycled remains a major barrier, for 1 in 3, as does poor access to a recycling bin. Even though it might only take a moment to carry an empty shampoo bottle to the kitchen recycling bin, the easier option may be a general waste bin in the bathroom (and we know that very small frictions can make a big difference).

What we did: BIT worked with a large consumer goods company to design and test behavioural interventions to boost recycling in the bathroom. We tested these in a field trial with 10,500 customers, who were given a hamper of free bathroom products under the guise of market research.

We randomly split participants into into three groups: for group 1, products had a salient front-of-pack label (a green sticker with a 'recycle me' prompt); group 2 had the same label plus a free bathroom caddy they could hang on the back of the door, with additional recycling prompts; and a control group who received products without the sticker. In total, 2,649 subscribers completed our survey measuring their bathroom recycling six weeks later.

What we learned: Overall, the label and label + caddy interventions increased self—reported recycling rate by 3-4pp from 91% to 94% and 95% respectively. This included a subgroup who said they had recycled the items, and others who said they intended to (if they hadn't yet finished the product). This suggests the caddies did not add significantly to the gains achieved by the labels (the effect of which were statistically significant). Overall, our interventions nearly halved the gap in bathroom recycling when measured as a blend of past and intended future behaviour.

7.3 Greening consumption: recommendations

Government should:

C1. Sharpen and extend the UK carbon tax to consumables including clothing, electricals and household goods. Include border adjustments to mitigate against carbon leakage, given these product categories are widely imported.

C2. Greatly simplify recycling standards and labels, but also explore novel behavioural strategies. Evidence reveals significant confusion around recyclability. Forthcoming plans to standardise regional systems and introduce new labels should help. We advise:
a. The simplest possible 'recycle me' labels, salient on front of pack, are effective.
b. Explore the use of a lottery-based deposit return scheme (e.g. pay 10p deposit, but have a 1-in-1 million chance of winning a £100,000 prize draw upon return).

C3. Encourage greater repairability and re-use of appliances and other items. Forthcoming 'right to repair' legislation may help, but there is a need to regulate against excessive costs or consumer friction for spares and repairs (and consider making repairs VAT-free) to ensure most typical repairs are cheaper than buying a replacement, and easy to do.

Note also recommendation **A4. Regulate advertising and greenwashing**, which particularly applies to daily consumption of products and services.
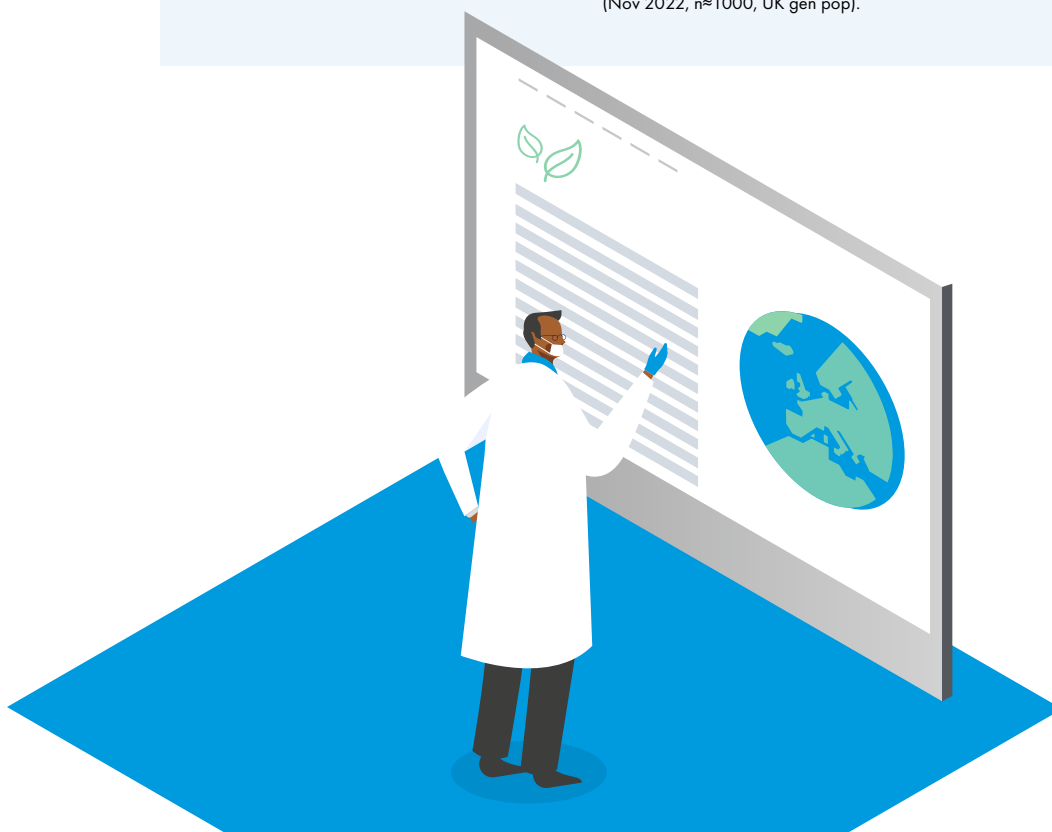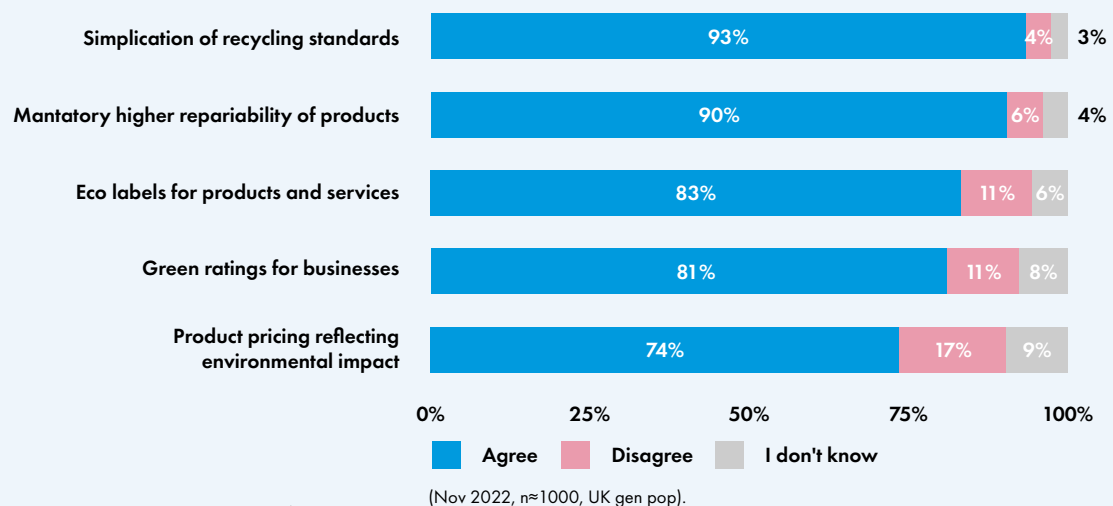
Local authorities and businesses additionally could:

*   Create easily accessible, local hubs which can host a variety of circular economy initiatives, for example an 'appliance library', repair shops or repair skills classes.
*   Businesses need to transition to more circular consumption models, including take-back schemes, refillables, rental models, and modular products which can be more easily repaired as well as upgraded.

Public support for greening consumption

All of the recommended solutions for greening consumption enjoy very high levels of support. We have included below the recommendations on green labels for businesses and products (from Chapter 3) as they are also relevant to enabling greener material consumption. As to be expected, carbon pricing for consumables (C1) was the least popular, though still attracted support from 7 in 10. Almost everyone is in favour of simplified recycling and greater repairability of products.

	Agree	Disagree	I don't know
Simplication of recycling standards	93%	4%	3%
Mantatory higher repariability of products	90%	6%	4%
Eco labels for products and services	83%	11%	6%
Green ratings for businesses	81%	11%	8%
Product pricing reflecting environmental impact	74%	17%	9%

0%   25%   50%   75%   100%

Agree   **Disagree**   **I don't know**

(Nov 2022, n≈1000, UK gen pop).

Conclusions and take-aways

In this report we've sought to outline a plausible blueprint to deliver the changes in public behaviour necessary to build a Net Zero society. The central narrative of our argument is as follows:

• **Delivering Net Zero in the UK is an absolute necessity:** on moral grounds, by legal commitments, and in response to a strong democratic mandate.

• **Doing so depends on substantial social and behavioural change.** Some of the biggest carbon reductions will come from the widespread adoption of cleaner technologies. We also require a range of lifestyle changes in how we travel, what we eat, when and how efficiently we use energy, and how we consume and dispose of material goods. Even supply-side issues like the expansion of clean power generation depend on social and behavioural constraints, such as public support.

• **Behaviour change is therefore just as critical as, and inseparable from, technological innovation.**

• **Consumers want to change:** 9 in 10 want to make more sustainable choices. But they find it too hard due to information, cost or convenience barriers. Put simply, our society (economy, infrastructure, norms, media) is not well designed for those who wish to live sustainably without great personal effort or compromise (that is, almost everyone).

• **To focus on 'behaviour' is not to imply individuals have the greatest burden of responsibility.** An evidence-based and sophisticated understanding of behaviour reveals the interplay between individuals making choices (downstream), within choice environments that currently tend to nudge them towards unsustainable consumption (midstream), which exist as they do because of a system of flawed commercial incentives, regulation and institutional leadership (upstream).

• **Our proposed solutions cut across these three levels.** There is a role for i) informing and encouraging direct individual action, but a bigger role for ii) building choice environments which enable greener choices, and the biggest impacts of all will come from iii) aligning commercial incentives and regulations with Net Zero, in ways which in turn create greener choice environments for consumers and citizens, at scale. That way, we can all consume green by default, and the burden of proactive 'behaviour change' is lifted.

• **Communications and public engagement play a strategic role.** In particular, to (i) inform and steer people towards worthwhile steps (given widespread misperceptions of which actions to prioritise), (ii) take people on a journey that fits their capabilities and

opportunities, for instance encouraging small 'stepping stone actions' that lead towards the bigger changes, (iii) articulating a positive narrative of Net Zero, and (iv) engaging in two-way dialogue to ensure legitimate interests are heard and the transition is fair and benefits from widespread public support. These are 'downstream' interventions.

- **However, for the most part, communications are just a foundation.**

- **There is a critical role for businesses:** to make green choices easier, more attractive, more socially normative and timely. These are 'midstream' interventions.

- **There is equally a critical role for the Government:** to use its regulatory and fiscal powers to align commercial incentives with greener consumption (thus driving businesses to do their bit), and to lead by example. These are mostly 'upstream' interventions.

- **We must remain aware of potential feedback loops and tipping points that can be leveraged to drive rapid, exponential change in behaviours.** These include the spreading of social norms, economies of scale, the escalation of public-political rhetoric, and reinforcing demand-supply loops. But these will only emerge unhindered if we plan for them, and unblock predictable barriers such as constraints on supply chains or lack of skilled installers.

- **Specific policy recommendations and ideas for businesses are given, which focus on addressing financial, practical, and psychological barriers.** We cover domestic energy use (Chapter 4), transport (Chapter 5), food (Chapter 6) and material consumption and waste (Chapter 7). Refer back to the individual chapters or the executive summary for the list of recommendations.

- **Moreover, these specific recommendations broadly attract high levels of public support.** This further builds the case for political feasibility.

We hope this report provides guidance, ideas and insight for policymakers, businesses, charities, educators, communicators and citizens particularly in the UK, but globally too. We know we haven't covered everything - leveraging green finance, delivering a just transition, and building climate resilience are all equally deserving of a behavioural lens. But it's a start.

And continue we must - if you can help us deliver this blueprint, as a decision maker in government or business, as a funder, or as a research partner, please do get in touch. info@bi.team

Further reading:
Sign up to our blog
Other reports of interest: Menu for Change, The Little Book of Green Nudges, Behaviour Change for Nature.
See also individual reports associated with many of the projects given as case studies, with references linked in those case studies.

Endnotes

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