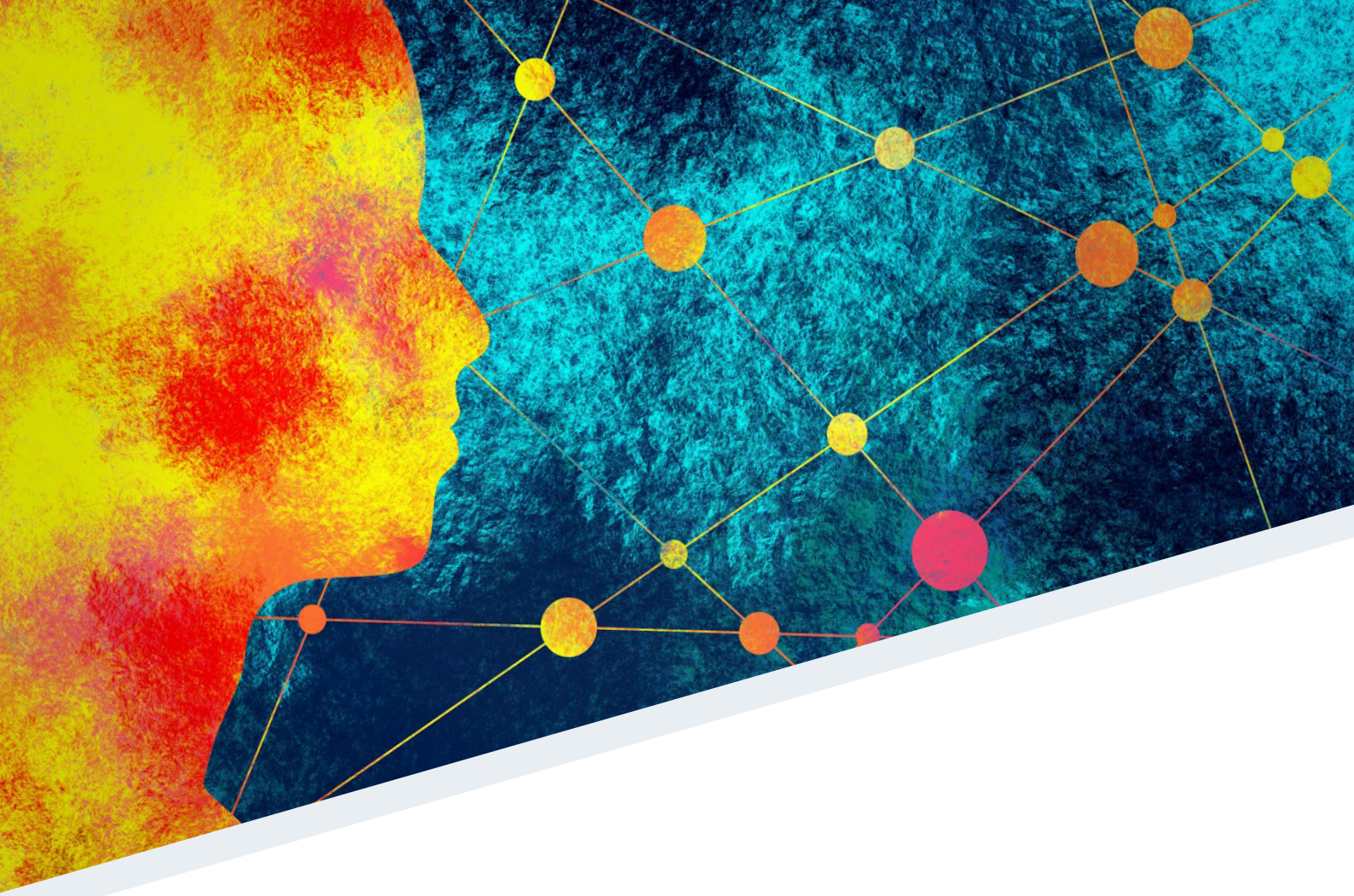

GREEN GROWTH
Knowledge Platform

Changing Behaviours, Changing Policy - Evidence on Behavioural Insights for Green Growth

GGKP Working Group on Behavioural Insights

Working Paper 01| 2018

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GGKP Working Group on Behavioural Insights

Sara Castro de Hallgren and Meredith Root-Bernstein

April 2018

GREEN GROWTH
Knowledge Platform

The Green Growth Knowledge Platform (GGKP) is a global partnership of leading organisations that identifies and addresses major knowledge gaps in green growth theory and practice. Established by the Global Green Growth Institute (GGGI), the Organisation for Economic Co-operation and Development (OECD), the United Nations Environment Programme (UNEP) and the World Bank, the GGKP includes over 60 partner organisations. For more information visit www.greengrowthknowledge.org.

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Abstract

In order to achieve the Sustainable Development Goals, green growth policy frameworks must address the limits of rational behaviour. While behaviourally-informed policy making is still in its infancy, there has been much progress in a range of social sciences in better understanding the factors and context that drive and affect human behaviour. This working paper reviews some of the key behavioural drivers and leverage points for encouraging green growth. It reviews case studies that illustrate these drivers and test policy-related behavioural interventions for green growth. On this basis, the working paper identifies knowledge gaps for further research and presents several recommended steps that decision makers may follow to ensure effective planning of green growth behavioural interventions.

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Executive Summary

This working paper reviews some of the key behavioural drivers and policy leverage points for encouraging green growth. Green growth aims to foster economic development in an environmentally sustainable manner. Policies that benefit from or positively shift everyday behaviours, and ultimately social norms, are an important part of achieving the Sustainable Development Goals and decoupling economic growth and human well-being from their negative impacts on the environment. While green growth ultimately depends on the aggregate behaviour of individuals, households, communities and organisations, this report focuses on individual behaviours.

The dominant paradigm in green growth policy making until today has been based on the rational choice theory. This theory presumes, for example, that market agents have well-defined preferences, are aware of all relevant information and make unbiased decisions under budget constraints. Behavioural researchers on the other hand have noted that human cognition is characterized by two different systems: System 1 or "fast" thinking and System 2 "slow" thinking (Kahneman 2011). "Fast" thinking is easy and automatic while "slow" thinking is conscious and calculated.

Several behavioural tendencies characterize System 1 thinking. These include representativeness heuristics which associate individual behaviours with the behaviours of their group and availability heuristics which cause judgment to be influenced by what first comes to mind rather than what is likely to occur. Anchoring and adjustment biases lock in recent observations over other pertinent information, while framing biases cause individuals to respond differently to the same choice based on how it is presented. Inter-temporal biases, such as the tendency to prefer rewards today over rewards in the future, and biases based on one's social environment may work for or against green growth.

A key insight for decision makers is that green growth policy interventions should be designed not only to incentivize green growth choices, but also to make these choices habitual and automatic. In order to habituate green growth behaviours, that is, move them from "slow" to "fast" thinking, decision makers must design interventions that disrupt brown growth routines, cue green growth choices and provide motivations that facilitate making these choices into new routines. Interventions that rely on the individual's bounded willpower alone, particularly in the long run, are unlikely to succeed. Finally, because the success of a behavioural intervention depends on biases and heuristics within the individual's immediate environment, the local context must be taken carefully into consideration.

The working paper illustrates the above points using a set of case studies aiming to achieve behaviour change in key green growth areas, particularly sustainable consumption and resource use. Each of these cases offers important insights into the goals and interventions that decision makers have used. Ideal case studies had the following characteristics: (1) Experimental evidence of a real (not intended or hypothetical) behavioural change; (2) Experimental evidence of a change in a green outcome due to the behavioural change; and (3) Evidence of economic growth due to or unaffected by the observed green outcome. Some of the most successful tools removed hassle factors, re-framed choices, changed contexts to encourage new routines and encouraged conformity bias to work for rather than against green growth. While behavioural interventions are not a panacea, successful interventions offer important complementarities to other green growth policy measures. In the future, behavioural scientists and policy makers must work more closely together to pursue evidence-based interventions.

The working paper presents several recommended steps that decision makers may follow to ensure effective planning of behavioural interventions for green growth. These steps include defining the green growth priority for impact; identifying the level of intervention and stakeholder targets; performing a thorough diagnostic of the behavioural context; selecting, implementing and evaluating interventions for the adoption of sustained habits; expanding and scaling up successful interventions.

Finally, the working paper identifies some important knowledge gaps for further research into behavioural insights for green growth. These include identifying keystone behaviours for green growth, developing behavioural intervention tools, understanding behaviour change in developing country contexts, determining behavioural tipping points and better understanding organizational behaviour.

1 Conceptualising Behaviour and Green Growth

Green growth aims to foster economic development in an environmentally sustainable manner.[1] Human impact on the planet since the last century has been enormous with 60 percent of global biodiversity lost.[2] The Great Acceleration of brown growth in the mid-twentieth century delivered a new geological era – the Anthropocene – caused by exponential growth in population, production and consumption, greenhouse gas emissions, waste and ecosystem pressures.[3] Studies note that with current middle-class numbers growing globally, climate change and resource scarcity are impending threats that require changes in individual consumption habits, including reducing fossil fuels and demand for meat (see Appendix – *Case study: Reducing meat consumption in developed countries*).[4]

To achieve green growth, policy should incentivize consumption and production behaviours that are more sustainable. Policies that benefit from or positively shift everyday behaviours, and ultimately social norms, are an important part of decoupling economic growth and human well-being from their negative impacts on the environment. Lessons derived from observation and experimentation in the behavioural and social sciences, including psychology, cognitive science, neuroscience and organisational behaviour, offer powerful insights for designing impactful and cost-effective green growth policies aligned with human decision-making.[5]

Human behaviour has different dimensions, dynamics and drivers at all levels of the economy. At the micro-economic level this includes the individual, household, and community levels.[6] At the meso- and macro-levels of the economy, organisational actors such as governments and corporations define the choice architecture for citizens, employees and consumers.

Green growth policy frameworks must become more behaviourally-informed. Currently, green growth policies are developed based on a view of citizens as rational actors. However, as behavioural sciences have advanced understanding of human decision-making, concepts such as "bounded rationality" and "information-processing biases" have been introduced. Policies addressing the limits of rationality facilitate a shift in behaviours and societal norms for green growth.

It is difficult to change social norms, but once social norms are changed they will have large and wide-ranging impacts on the system.

Behavioural science has made strong advances in analysing and designing behaviourally-informed policies. Today, governments from the United Kingdom to Singapore and Colombia are integrating behavioural insights into policy making for cost-effective solutions to governance challenges.[7] Targets across the 17 Sustainable Development Goals (SDGs) and the Paris Agreement on Climate Change cannot be achieved without incentivizing more sustainable behaviours and attitudes at scale. Behavioural insights offer an important set of new policy tools for developed and developing countries alike to achieve green growth.

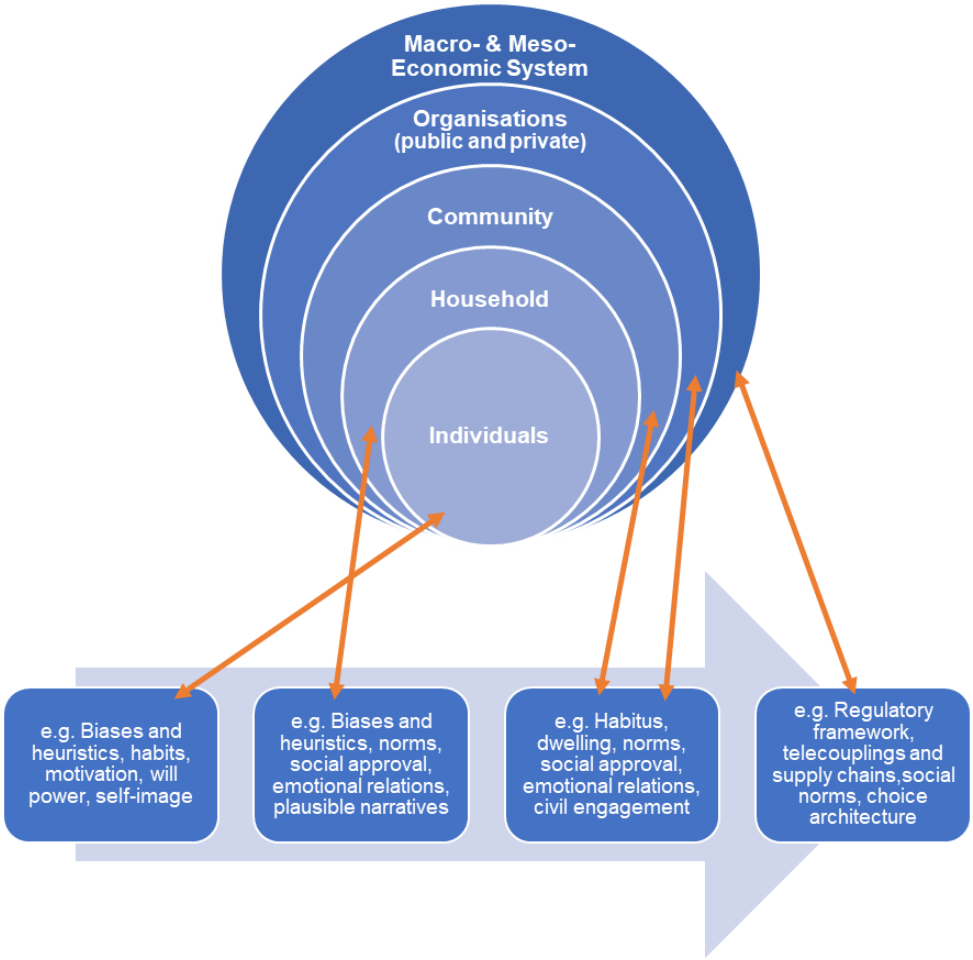
The goal of this working paper is to provide a framework allowing public decision makers to understand, test, and influence key drivers and leverage points influencing behaviours that have the potential to contribute to green growth. After an introduction including levels of behavioural intervention in Section 1, the working paper reviews some of the key behavioural barriers and leverage points applicable to green growth policy making (Section 2). It draws on a review of literature in the field as well as a set of exploratory case studies in three green growth sectors (see Section 2.4 and Appendix). Section 2 concludes with a list of knowledge gaps for continued research. Finally, the paper suggests five planning steps for developing and integrating behavioural insights in green growth policy-making (Section 3).

[1] See http://www.greengrowthknowledge.org/page/explore-green-growth/
[2] WWF (2017)
[3] Myers (2016), Steffen et al. (2015)
[4] Putt del Pino et al. (2017), Devi et al. (2014), Ranganathan et al. (2016)
[5] Lunn (2014), OECD (2017)
[6] Or, in Paul Ginsborg's terminology, the individual, the family, and civil society (see Ginsborg 2005)
[7] OECD (2017)

1.1 Levels of behavioural intervention

Drivers of green growth behaviour may be studied at a number of levels (see Figure 1). The individual, household, community and local levels, which include small and medium-sized enterprises and local governments, are commonly studied at the microeconomic level. At the meso- and macroeconomic levels are organisations, including economic sectors, large firms, provincial and national governments.

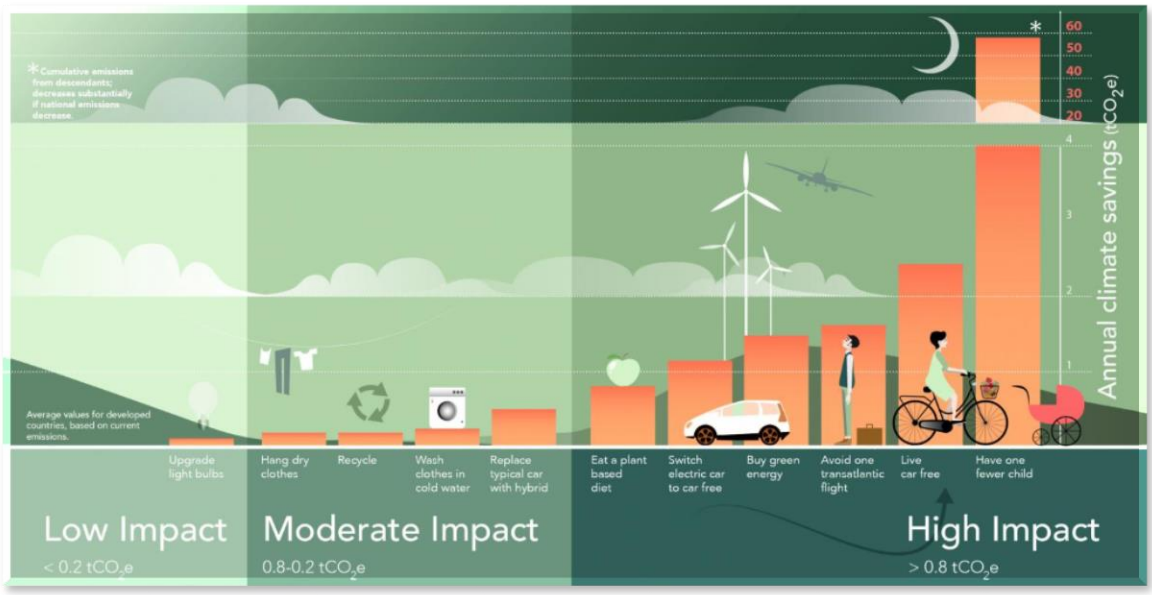
Figure 1. Drivers influencing behaviour and where they originate



This working paper focuses on behavioural insights at the individual level. Drivers of individual behaviour include prices, available choices and information; the mind's heuristics, cognitive biases and habits; community, regulatory and socio-economic contexts. Decision makers may target the choice architecture within which an individual behaviour is taking place to encourage sustainable choices.

New studies highlight the most impactful individual behavioural changes that can be made for green growth. Individual decisions that impact green growth include choices of personal investment (see Appendix – *Case study: Sharing and rental opportunities for physical assets*), transportation (*Case study: Switching from cars to walking and biking*), low-carbon technologies (*Case study: Fuel-efficient and clean stove uptake*), farming techniques, and conformity with environmental laws and regulations. Focusing on developed countries, one recent study highlights behavioural changes that can result in the greatest decreases in individual greenhouse gas footprints such as living car-free or avoiding transatlantic flights (Figure 2).

Figure 2. Key individual behaviour choices ranked by impact on climate change



Source: Seth Wynes, Kimberly Nicholas, 2017. Environmental Research Letters.

This working paper does not focus on organisation-wide behavioural interventions, but these remain important. Organisations drive individual green growth behaviours in at least three ways.[8] First, they define the working environments in which individuals make decisions and draw incomes. Second, they create, supply and regulate product choices for individual consumption. Third, they create many of the externalities that impact individuals and the ecosystems in which they live. While beyond the scope of this paper, more research is needed on organizational behaviours and the consequences for individuals.

[8] Other reports have addressed incentives for firms to adopt green growth strategies. See for example OECD (2011) and World Business Council for Sustainable Development (2008).

2 Overcoming Behavioural Barriers to Green Growth

A number of behavioural barriers remain to achieving green growth. In part, these barriers arise from individual behaviours that may be rational or irrational. While traditional economists have offered important insights based on the "rational actor" theory, the behavioural sciences increasingly challenge this theory with evidence that individual behaviour is not always rational.

This section reviews key behavioural insights from both approaches and their implications for green growth policy making. Wherever possible, it references specific examples from the case studies detailed in the Appendix. The case studies and their key insights are summarized in Table 1, section 2.4 below.

2.1 Insights on rationality from traditional economics

Mainstream economics, unlike behavioural economics, predominantly follows the rational choice theory of human behaviour whereby environmental challenges are treated as market failures. This dominant approach tends to assume that market agents have well-defined preferences, are aware of all relevant information and make unbiased decisions under budget constraints. On this basis, mainstream economists recommend market and regulatory solutions to environmental market failures such as Pigouvian taxes, contingent valuation and tradable permits. They also use Bayesian statistics and discounting to accommodate for individual preferences. Nevertheless, traditional economics has contributed two important insights into individual green growth behaviour.

First, mainstream economics has shown that people make decisions by trading off between multiple types of value, not just price. These types of value are often incommensurate. In classic economics, there are monetary benefits (i.e. income, profit), monetary costs, opportunity costs and monetarily undetermined benefits (and costs). Undetermined benefits usually occur outside markets and therefore have no standard monetary value. These include, for example, the value one derives from spending an hour with one's children or doing housework. Traditional economics has investigated several forms of non-monetary environmental values.[9] The insight about multiple forms of value helps explain choice overload. Choice overload often causes sub-optimal environmental decision-making.[10]

Second, traditional economics has shown that market failures, particularly externalities and tragedies of the commons, encourage unsustainable behaviours by rational actors. Externalities encourage price-sensitive individuals and groups, including firms, to act unsustainably by avoiding the full costs of their economic choices. Tragedies of the commons (see Appendix: Case studies on Renewable Resource Use - Other natural resources) occur when property or access to a resource is held in common without corresponding incentives to protect it. It typically results in over-exploitation and degradation of the resource.[11]

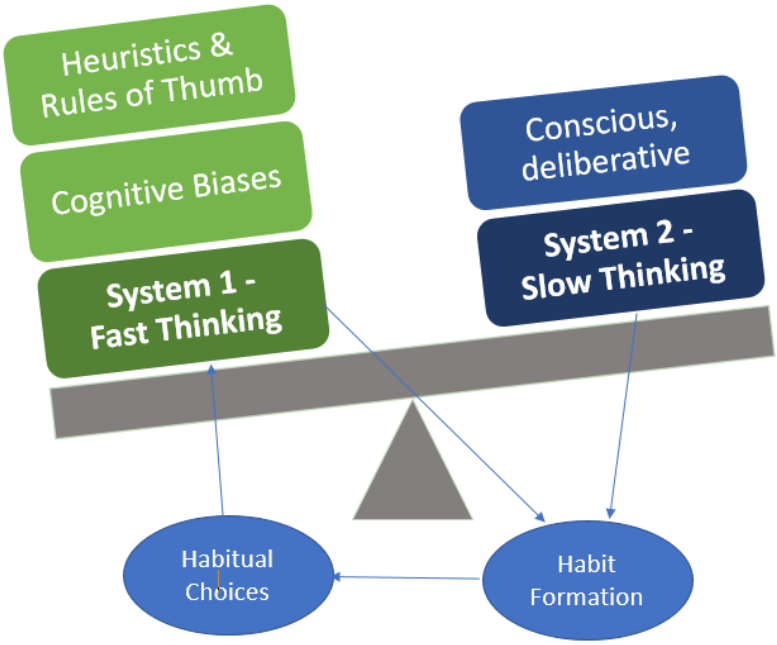
Behavioural insights offer new, cost-effective policy tools to ensure green growth. While traditional economics continues to make important advances into motivating rational actors to behave more sustainably, a deeper look into human behaviour including its departures from rationality offers insights for the development of important new policy tools.

2.2 Insights on cognitive biases and heuristics

Kahneman and Tversky's work on the biases and heuristics under risk distinguishes two cognitive systems for decision-making (Figure 3). **System 1**, or "fast" thinking, is automatic and intuitive, looks for plausibility and coherence, takes perceptions as complete representations of the world and substitutes complex questions for ones that are easily answered. System 1 forms the basis for most individual decision-making and routines. **System 2**, or "slow" thinking, is voluntary and deliberative, with complex cognitive manipulations and needs willpower. While System 1 can lead to "irrational" biases, it can also be trained or re-trained to support green growth automatically and intuitively.[12]

[9] Gómez-Baggethun at al. (2010)
[10] OECD (2016)
[11] Ostrom (1999)
[12] Kahneman & Tversky (2000), Kahneman (2011)

Figure 3. Why change is difficult: The relationship between our fast and slow cognitive systems



System 1 and System 2 framing is used in this paper to help explain consistent biases and heuristics in green growth behaviour. Kahneman and Tversky described four main types of biases and heuristics characterizing System 1 thinking: representativeness heuristics, availability heuristics, anchoring and adjustment biases and framing biases. These and related biases are reviewed in this section.

Representativeness heuristics – mental shortcuts that associate one behaviour with the behaviours of a group – can facilitate or impede green growth.[13] For example, if an individual observes three unfriendly neighbours who recycle, and six friendly neighbours who do not recycle, he or she may be dissuaded from recycling. On the other hand, an advertising campaign that presents recycling as done by friendly and attractive people, then representativeness may encourage green growth behaviour.

Availability heuristics – decisions based on what first comes to mind rather than what is likely to occur – also facilitate or impede green growth. For example, the mention of climate change may prompt some to be concerned about drought, rising sea levels or hurricanes if they live in areas prone to natural disasters. In politically stable regions, it may be difficult to imagine deeper consequences such as violence over resource access. Others may have little association with climate change other than the pleasant thought of warmer temperatures.

Anchoring and adjustment biases relate to what an individual finds probable, particularly when numbers are involved. Individuals are likely to be influenced by, or "anchor" to, recently observed numbers and, relevant or not, adjust their calculation of probabilities closer to the observed number.[14] Used positively for green growth, strong associations with metrics co-relating economic growth with improving environmental indicators will tend to encourage green growth decision-making. Contrary metrics may lead to the conclusion that a brown economy is necessary for economic growth.

Framing biases cause individuals to respond differently to a choice on the basis of how it is presented (*Case study: Adoption of practices and technologies of energy efficiency in Australia*). This is related to loss aversion, whereby individuals are more likely to act to avoid loss than to pursue gain.[15] For example, long-term savings from the purchase of an electric car can be framed positively or negatively – positively as a means to gain savings in a few years' time or negatively as a way to avoid losses in a few years' time. This bias suggests that the latter framing will tend to be more effective.[16]

[13] Kahneman & Tversky (1972)
[14] Tversky & Kahneman (1974)
[15] Kahneman (2011)
[16] For more information on these and other behaviours, see http://www.ideas42.org/

The present bias and other inter-temporal biases are a consistent challenge for green growth. Many green growth decisions involve costs and benefits that mainly occur in the future, while individuals tend to discount future rewards in favour of the present. For example, in deciding whether or not to invest in energy efficient technologies, individuals are likely to weigh upfront costs disproportionately higher than long-term savings (*Case study: Fuel-efficient and clean stove uptake*). Procrastination can also serve as an inter-temporal bias whereby motivation or willpower are insufficient for immediate action.

Inter-temporal biases are a challenge for green growth

Social and physical environments create the architecture in which individuals frame choices. A number of anthropologists have emphasized the links between human behaviour patterns, the local environment and social relations (*Case study: Reindeer herding in Siberia*).[17] In response, many conservationists today use a "citizen science" approach to promote green growth behaviours. This approach involves local lay people in defining the programme's end goals and research questions as well as gathering data and conducting research.[18]

2.3 Insights on motivation and willpower for sustainable routines

A key problem facing decision makers is ensuring that green growth behaviours are maintained in the long run (*Case study: Waste pickers and recycling behaviours in Peru*). This is equally important as designing policies which encourage adoption in the first place. In order to maintain green growth behaviours, motivation and willpower are often necessary. Research shows that motivation and willpower are difficult to maintain over time.[19]

Motivation is a short or long term drive to fulfil a need or goal. Motivations are stimulated by cues and proceed until the motivation is lost or replaced. Typical cues (*Case study: Water purification in Kenya*) include physical needs (e.g. hunger, thirst, sleep) or personal goals (e.g. increasing social status). Rewards (*Case study: Solving externalities by incentivising workers directly; Case Study: Sharing and rental opportunities for physical assets*) fulfil those desires and encourage similar action in the future.

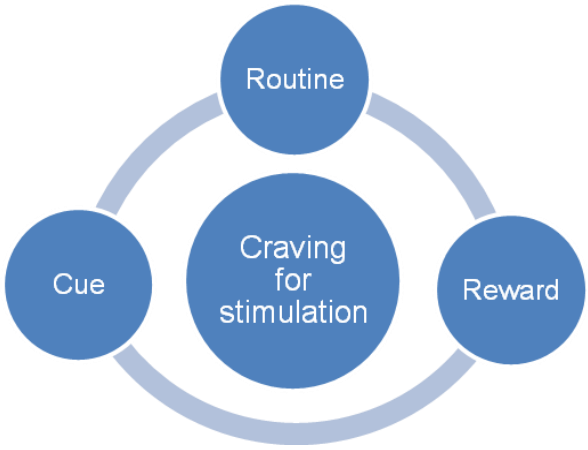
Willpower is an internal resource that contributes to motivation (*Case study: Forest commons management in Africa*). Willpower is required to initiate and maintain a decision, plan or set of values, particularly when contrary motivations are present. While motivations address needs or goals (e.g. "I want to take a shower…"), willpower shapes the agenda ("…and I want limit myself to 5 minutes to save energy and water"). Willpower can be an important factor in encouraging individuals to change behaviours in order to support green growth.

Bounded willpower may reduce an individual's motivation to fulfil a need or goal. In behavioural economics, willpower is considered limited or "bounded", thus occasionally preventing action in accordance with self-interest. Various cues can reduce willpower, including complexity, the lack of expected feedback or decision fatigue. Moreover, even when a motivation has been rewarded, if an individual's willpower is depleted then they are likely to transition to a behaviour in which willpower is not needed – a rebound effect. For green growth behavioural interventions to be successful, they must reward a person's motivation rather than challenging their willpower.[20]

Habituation – moving a behaviour from System 2 "slow" thinking to System 1 "fast" thinking – can reduce the need for willpower by setting new routines. Habituation is a process that Charles Duhigg has described as a "habit loop". Habit loops are formed when a physical or environmental cue triggers a habitual behaviour or "routine", which is in turn reinforced by a reward (Figure 4). A person who smokes in response to stress, for example, would be cued to smoke by a stressful event and rewarded by smoking a cigarette.[21] (*Case study: Switching from cars to walking and biking; Case study: Waste pickers and recycling behaviours in Peru; Case study: Adoption of practices and technologies of energy efficiency in Australia; Case study: Water purification in Kenya*)

[17] Bourdieu (1977), Ingold (2000, 2013), Miller (2008)
[18] Hulme & Murphree (1999), Sarkar & Montoya (2011)
[19] American Psychological Association (No Date)
[20] Baumeister & Tierney (2011), Kahneman & Tversky (2000)
[21] Duhigg (2012b)

Figure 4. Duhigg's Habit Loop: Habituating green growth behaviours



Source: Duhigg (2012b)

Decision makers can motivate the formation of new green growth routines by designing appropriate cues and rewards. New cues are capable of interrupting brown growth routines while rewards may support the establishment of new routines. A set of cues is more easily learned when it is presented in multiple dimensions including form, colour, spatial and temporal location (e.g. separate slots that represent recycling categories). Rewards should be given after all necessary steps are taken to avoid loss of important subsequent steps (*Case study: Sharing and rental opportunities for physical assets*).

Subtle cues over time may be more impactful for transitioning System 2 to System 1 behaviours. Strong cues such as loud noises, bright lights or pungent smells are helpful for transitioning between System 1 behaviours, but may be distractions for new or complex behaviours. Moreover, "hassle factors" such as complex forms or multiple steps to achieving a motivation should be minimized (*Case study: Waste pickers and recycling behaviours in Peru; Case study: Water purification in Kenya*).[22]

Motivations based on external rewards such as money may be less durable than internal motivations (*Case study: Decreasing food waste by increasing purchase of imperfect fruits and vegetables*). An individual's choice of behaviour can become dependent on the external reward. Thus, if green growth choices are based on an external reward such as a tax rebate, the motivation to continue pursuing green growth may last only as long as the rebate. While more difficult to achieve, inherent rewards such as satisfaction and social approval (*Case study: Forest commons management in Africa*) are more likely to maintain motivation over time (*Case study: Payment-by-results agri-environment schemes*). For example, decision makers may facilitate new behaviours by aligning with civic or spiritual ideals (*Case study: Reducing meat consumption in developed countries*).[23]

2.4 Exploring the case studies

Many of the key behavioural insights described in detail above derive from case studies of behavioural interventions for green growth. These cases, including their behavioural goal and the selected intervention, are summarised in Table 1 below.

Table 1 is useful for decision makers to consider when designing policies that are intended to incentivize green growth behaviours. Behavioural goals are broken down into four categories: removing or making use of biases, changing habits, changing perceptions or attitudes and empowering local action. Multiple behavioural interventions are also considered.

Descriptions of and references to the selected cases may be found in the Appendix. The case studies listed there are not intended to be comprehensive, but rather explorative. Examples of cases and tools which do not show clear causal effects on behaviour have been omitted from the Table. These are provided in the Appendix for information purposes only.

[22] Thaler & Sunstein (2008), see also http://www.ideas42.org/blog/principle/hassle-factors-2/
[23] Wilson (2011), Baumeister & Tierney (2011), Thaler & Sunstein (2008), Deci et al. (1999)

Table 1: Summary of case studies reviewed (see Appendix)

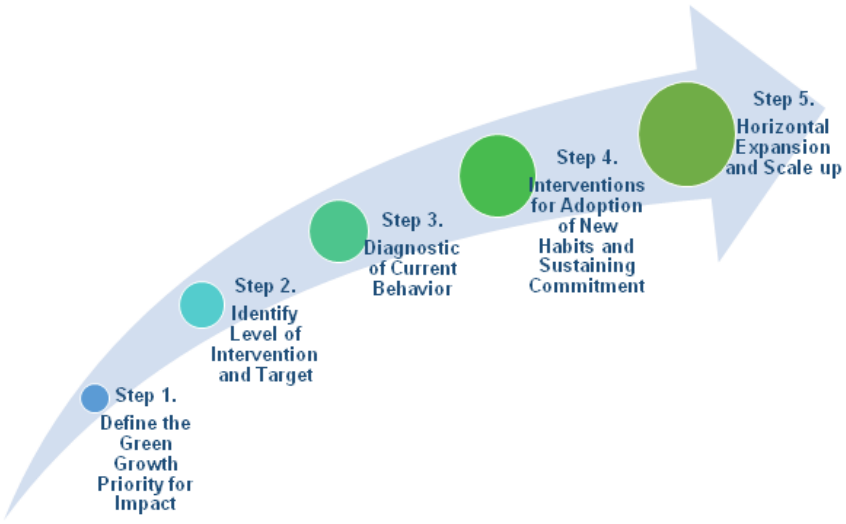
Behavioural Goal	Intervention	Case Study	Remarks
Remove or use biases	Introduce sharing/mesh economies to reduce status quo bias and inter-temporal biases	Case study: Sharing and rental opportunities for physical assets	Substituting a large up-front investment with a small rental or membership fee for an immediate short-term use
	Make use of the default effect	Case study: Smart grid technology uptake Case study: Default effects and follow-on behaviour in an electricity pricing program	Opt-out framings are an example of a positive use of the status-quo bias
	Provide information and experience through a free trial period	Case study: Fuel-efficient and clean stove uptake	Lack of information about the durability and efficiency of the stoves may reinforce present bias and time-inconsistent preferences
Change habits	Provide multiple forms of reward to users to maintain motivation over long periods of time	Case study: Sharing and rental opportunities for physical assets	In an "ecosystems of services" one Mesh product or service facilitates the use of other products and services
	Make use of moments of context change (e.g. moving to a new house or town)	Case study: Switching from cars to walking and biking	Set of cues and feedbacks supporting habits disappears during a context change
	Introduce bike sharing schemes to induce people to switch from using private cars to bikes	Case study: Switching from cars to walking and biking	Further research is required to understand how to induce new users to participate in bike sharing schemes
	Remove hassle factors	Case study: Waste pickers and recycling behaviours in Peru Case study: Water purification in Kenya	Good design plays an important role in facilitating habit formation and reducing hassle factors
	Introduce self-set goals to keep up motivation and commitment	Case study: kWh saved in a washing machine simulation game	Self-set goals may be set with reference to a lofty ideal like "being green"
	Position individual consumers as producers within mesh economies to provide multiple rewards and motivations	Case study: Adoption of practices and technologies of energy efficiency in Australia	
	Introduce a set of measures instead of reinforcing only one behaviour	Case study: Adoption of practices and technologies of energy efficiency in Australia	Design for human error and inconsistency; each behaviour acts as a cue for the other ones, forming a self-reinforcing group of habits
	Lower upfront cost of adoption, introduce instalment plans	Case study: Fuel-efficient and clean stove uptake	If barriers to efficient stove adoption are removed, the poor are likely to take the risks of alternative stove adoption due to lack of risk aversion
	Design firm-level incentive schemes for workers to engage in green behaviours (through information and feedback)	Case study: Solving externalities by incentivising workers directly	

	Use peer comparisons as a feedback and information mechanism	Case study: Using peer comparisons and incentives to reduce household electricity consumption	Challenge to policy makers: behavioural instruments may interact in complicated ways with incentives and market prices
	Provide feedback with different anchors and framings (city or neighbourhood performance)	Case study: Reducing water use in Belem, Costa Rica	
Change perceptions or attitudes	Create self-identification and new self-images through framing and plausible narratives	Case study: Waste pickers and recycling behaviours in Peru	Do not require constant cues and feedback from the environment, may have longer-term effects than reducing hassle factors
	Make people learn a new reward	Case study: Reducing meat consumption in developed countries	
	Create new narratives and change social norms	Case study: Reducing meat consumption in developed countries	Social norms alone are unlikely to impact food consumption patterns – individuals may need to be motivated by lofty ideals
	Create broad cultural change through linking lofty ideals to motivations and habits, and forming communities of civic engagement	Case study: Reducing meat consumption in developed countries	
	Use non-numerical framing in form of direct messages to the consumer	Case study: Decreasing food waste by increasing purchase of imperfect fruits and vegetables	Additional price discount may be counterproductive: it may lead people to frame their actions as “only for the money”, which is not self-motivating and dependent on price
	Introduce payment for results agri-environment schemes	Case study: Payment-by-results agri-environment schemes	Payment for results agri-environment schemes will affect farmers’ attitudes and values
Empower local action	Trust the ability of individuals to self-organize practices and regulations	Case study: Non-timber forest product (honey) governance in Ethiopia	Ethiopian beekeepers prevent over-exploitation of wild honey, reduce conflicts over honey harvesting, and promote forest conservation
	Fit the decision scale to the scale of use	Case study: Energy cooperatives Case study: Non-timber forest product (honey) governance in Ethiopia Case study: The Po Delta water and wetland management	
	Promote civic engagement, cooperatives, and other associative organizations	Case study: Energy cooperatives Case study: Forest commons management in Africa Case study: The Po Delta water and wetland management Case study: Gruppi di Acquisto Solidale as an example for food cooperatives	

3 Planning Behavioural Interventions for Green Growth

There are several recommended steps that decision makers may follow in developing and implementing behavioural interventions for green growth.[24] The steps enumerated below have been developed by the authors on the basis of the literature review and case studies presented in Section 2.

Figure 5. Steps for planning green growth behavioural interventions



Step 1: Define the green growth priority for impact

Many countries have specific priorities or challenges for achieving green growth. Decision makers should begin by acquiring a clear understanding of the main causes, drivers and challenges of the brown economy in their country context, including such questions as:

- What national priorities relate to green growth, including the Sustainable Development Goals, Aichi targets, climate commitments under the Paris Agreement and so on?
- What are the main green growth challenges that need to be overcome?
- Which challenges can be addressed through behaviourally-informed policy change?
- How might the proposed interventions impact national economic sectors?

Step 2: Identify the level of intervention and stakeholder targets

Setting the intervention level and target allows decision makers to define a clear problem statement and measureable results.[25] The intervention level may be at the sector level (e.g. the coal sector), the household level in a certain geographic area or the individual level for a specified demographic group. The target identifies the desired behaviour change and how progress is measured towards achieving it.

Decision makers may consider such questions as:

- Who is the key stakeholder group and what defines them?
- What stakeholder behaviours should be targeted for change?
- How can progress towards the target be measured?

Step 3: Perform a diagnostic of current behaviour

After setting the above parameters of the intervention, decision makers should conduct a full diagnostic of relevant behaviour patterns in the target stakeholder group. The following set of questions offers a starting point for such a diagnostic:

- What are the keystone habits and routines that define the targeted behaviour?
- What cues prompt these habits and routines?
- What feedbacks and rewards reinforce the targeted behaviour?

[24] Datta (2017)

[25] Kheel & Botero (2016). An example problem statement is, "Rural communities in Haiti have clean cookstoves and education on their health benefits, but they are not using them and local deforestation for coal continues."

- Who provides feedback, including social praise or approbation?
- What are the social stereotypes plausible narratives around this behaviour?
- How does the behaviour relate to prevalent social norms such as morality or lofty ideals?

Step 4: Design interventions for adoption of new habits and sustaining commitment

The next step is to define the interventions that will best ensure a sustained commitment to new green growth behaviours within the target stakeholder group. Table 1 above provides concrete examples of behavioural interventions that can be used to remove or make use of biases, change habits, change perceptions or attitudes and empower local action (see Section 2.4 and Appendix).

Decision makers may consider such questions as:

- What are the best behaviour change tools to use given the Step 3 diagnostic?
- What needs to be changed to support new cues, new routines and new rewards?
- How will the intervention interact with other behaviours in the household or community?
- What limitations are there to choosing interventions, including timeframe and budget?
- What methodology will be used for implementing the intervention and tracking impact?
- How will the behaviour change and chosen interventions be monitored and evaluated?
- How will the planning and evaluation process be tested, iterated and adjusted over time?

Step 5: Expand and scale up

The final step is to consider how a proven behavioural intervention will be scaled up to achieve widespread impact. In many cases, this will involve multiple interventions over time and across stakeholder groups aiming to achieve the same result (e.g. water saving). Alternatively, it could involve targeting multiple behaviours within the same stakeholder group, perhaps in the same place (e.g. within an institution).

Decision makers may consider such questions as:

- What were the keys to success for the best interventions and how can they be improved?
- Can less successful interventions be tweaked in order to make them effective?
- Can the most effective interventions be replicated in other key stakeholder groups?
- Were there unintended consequences of the intervention such as rebound effects?
- Did the intervention cause multiple new behaviours, suggesting it is a "keystone" behaviour?[26]
- Has the intervention improved the policy case for wider adoption of green growth behaviours?

Testing and Reiteration

A key part of the policy process is the testing, monitoring and evaluation of the selected behavioural interventions. The above steps may be undertaken over a period of time and in multiple iterations. The results of this experimentation should be used to adjust policy planning through modifications to Steps 1-4, including the design and selection of interventions. This process should be repeated until the evidence has established the effectiveness of an intervention or set of interventions. The process of testing and reiteration is a powerful tool for successfully scaling up behavioural interventions for green growth and should be repeated as they are horizontally expanded.

[26] Duhigg (2012a)

4 Conclusions for green growth policy making

Behavioural economics, psychology, ethology, anthropology and conservation research provide a series of insights that fit together to form the puzzle of human behaviour. Perception, learning, behavioural patterning and interactions with social and physical environments and institutions influence green growth behaviours. The best interventions look closely at these variables.

System 1 or "fast" thinking should work for rather than against green growth. System 1 thinking uses cognitive shortcuts such as presence and familiarity to decide what information is relevant, likely and normal. It reduces complexity to something simple and familiar, preferring answers that come to mind easily or automatically. Decision makers should design green growth programmes that not only support green growth behavioural choices, but that make them habitual and automatic.

Decision makers must identify the cues, habits and rewards that discourage green growth and design effective policies for changing them. Studies show that in developed countries there are common behaviours driving brown growth patterns at individual level, such as meat-intensive diets (*Case study: Reducing meat consumption in developed countries*) and personal car use (*Case study: Switching from cars to walking and biking*). Practical solutions include making recycling bins bigger and easier to access than other trash bins (*Case study: Waste pickers and recycling behaviours in Peru*), making plates smaller in order to reduce portion sizes and making environmentally-preferable food choices the easiest and most attractive options on the market.

Local conditions are essential to the success of green growth behavioural interventions. Social and physical environments supply a wealth of implicit information about culturally-appropriate behaviours. This information can be accessed by researchers and decision makers through the continuous engagement and citizen science approaches.

4.1 Further research

This working paper has been prepared in support of a collaborative process led by the GGKP Behavioural Insights Working Group to identify behavioural knowledge gaps for green growth. Through the process, the committee has identified the following knowledge gaps for further research.

Identifying keystone behaviours for green growth. Further research is required at national and sub-national levels to identify "keystone behaviours", that is, the economic behaviours that contribute to or detract most from green growth, particularly in developing countries.[27]

Developing behavioural intervention tools. The development of policy interventions or tools for influencing green growth behaviour lags behind existing insights into individual behaviour. New tools are needed to support decision makers in applying behavioural insights for greener economic growth.

Understanding behaviour change in developing country contexts. Behavioural science studies are typically conducted in Western, Educated, Industrialized, Rich and Democratic — so-called "WEIRD" — societies. These represent 80 percent of study participants and only 12 percent of world population.[28]

Determining behavioural tipping points. There is little conceptual understanding or data available on the important question of when an economy – developed or not – may achieve a behavioural tipping point. Achieving a tipping point is an important goalpost for green growth decision makers.

Moving beyond individual to organizational behaviour. Prior behavioural research, including that reviewed in this working paper, has mostly focused on individuals. Addressing organizational behaviour is an opportunity for new insights that can be scaled at the corporate, institutional and sectoral levels.

[27] Duhigg (2012a)
[28] Azar (2010)

Appendix – Case Studies

This section outlines selected case studies reviewed to develop recommendations on the most effective tools to influence behavioural change for green growth at the individual level. These case studies have been summarized in Table 1 in Section 2.4.

The case studies have been assigned to five different sections:

- Sustainable Consumption
- Renewable Resource Use - Energy
- Renewable Resource Use - Water
- Renewable Resource Use - Other natural resources
- Sustainable Food Consumption and Production

The ideal case study would have the following characteristics:

(1) Experimental evidence of a real (not intended or hypothetical) behavioural change
(2) Experimental evidence of a change in a green outcome due to behavioural change
(3) Evidence of economic growth due to or unaffected by the observed green outcome

To assist in the assessment of the case studies, each is tagged with:

- Intervention: experiment, survey, spontaneous, imposed top-down, non-experimental application, non-controlled applied intervention
- Country context
- Theme
- Behavioural insights
- Evidence characteristics (i.e. (1), (2) and/or (3), as above)

Sustainable consumption

Individual consumption of green products can have large impacts. Household consumption accounts for at least 60% of the lifecycle impacts of all consumption.[29] Key sectors with the largest product life cycle impacts are food, housing, transport and manufacturing.[30] These are thus sectors where behavioural interventions may have the greatest impacts. Hotspot analysis across supply chains can provide insights into where to intervene to reduce product life cycle impacts—sometimes through affecting the behaviour of individual consumers, e.g. by reducing food waste or reducing demand for disposable products and products with "planned obsolescence".[31]

Consumption patterns are an important component of lifestyle changes. The lifestyle framework recognizes that consumption choices are made within a "system of provisions" or economic and socio-ecological infrastructure.[32] As some of the case studies in this and other subsections indicate, individuals can participate in changing these systemic factors through new forms of networking that give them direct access to products they want on novel and attractive terms. However, consumers may face barriers to choice if green products are not available or have significant disadvantages compared to other options. For example, although housing has a large impact on the carbon footprint, house buyers are generally constrained by the existing housing stock.[33] Another aspect of lifestyles is that consumption increases with wealth. As a consequence, unsustainable consumption could be reduced by replacing increases in wealth with increased access to services that guarantee quality of life and the SDGs[34]. In other words, individuals might receive some income in the form of non-fungible services.

There are numerous areas where waste can be reduced at the point of production and consumption, or recycled back into a circular economy. Examples include food waste and electronic waste.[35] In many

[29] UNEP (2010)
[30] Ibid.
[31] Hellweg & i Canals (2014)
[32] UNEP (2016)
[33] Brown (2017)
[34] Ibid.
[35] Ministry of the Environment, Japan (2016)

cases, putting a circular economy in place requires industrial coordination and (inter-)governmental action and is thus outside the scope of interventions in the behaviour of individuals. However, consumption is the main driver of increasing material use, with domestic material consumption increasing dramatically in all regions of the world. Decoupling material use from economic growth is one path to more sustainable resource use, and reductions in consumption and waste as well as recycling can contribute to this goal. Individual behaviours can reduce consumption-related waste. However, as income rises, opportunity costs for one's time increase, and thus richer individuals are less likely to invest in durable and reusable products.[36] It would thus appear that in order to reduce demand for disposable products as people become wealthier, social or cultural benefits, rewards and motivations will have to be developed that outweigh the opportunity costs of investing in maintenance and repair. Problems of personal investment can be reduced through a sharing or mesh economy. Design for emotional relations between people and their environments and meaningful feedback from products has also been suggested as a way to reduce the discard culture.[37]

Case study: Sharing and rental opportunities for physical assets

Intervention	spontaneous
Country context	United Kingdom
Theme	waste, sustainable design
Behavioural insights	status quo bias, inter-temporal biases, channelling, reward, motivation
Evidence characteristics	(3)

Lisa Gansky describes the "Mesh economy" as one focusing on sharing platforms, rich data flows tracking products, services and users, and social networks.[38] The Mesh economy works best for items that individuals use infrequently and that can be shared frequently, where the quality of the product or service can be improved with rich data, and where a good-quality product or service is expensive to buy outright. Examples include sharing and rental of tools, clothes, houses, offices, cars, books, skills, and money (peer-to-peer credit markets). We discuss bike sharing as a separate case study in this section. Another interesting example is land-sharing for food producers. Fresh Start Land Enterprise Centre in the United Kingdom brings landowners and land-based business entrepreneurs together.[39] Shared Earth, in the US, brings together landowners with gardeners and farmers to create "the largest community garden on Earth".[40]

Mesh economies can reduce negative effects on adoption of the **status quo bias** and **inter-temporal biases** by substituting a large up-front investment in a product of presumably long but unknown durability (especially in the era of manufactured obsolescence and climate change) with a small rental or membership fee for an immediate short-term use. For the entrepreneur or an individual contributing their own physical assets to a Mesh community, there is an incentive to purchase high-quality durable products (reducing lifecycle waste). This is particularly interesting for "green" products, which often have a price premium. Mesh businesses can contribute to **channelling** by using data to make the product as convenient to access and tailored to the user's needs as possible, while also reducing the monetary costs as mentioned above, or even facilitating the negotiation of an individualized price for an individualized service. Gansky also describes the possibility of putting together "ecosystems of services" so that one Mesh product or service facilitates the use of other products and services, through community formation and data linking. She gives the example of Zipcar, the car-sharing company, which has partnered with food, hotel, and fitness companies and even national parks. This kind of partnering provides opportunities to provide multiple forms of **reward** to users, to maintain **motivation**

[36] McCollough (2007)
[37] Chapman (2015)
[38] This case study is derived from her book, Gansky (2010).
[39] See http://freshstartlandenterprise.org.uk/land-partnership/
[40] See https://sharedearth.com

over long periods of time: for example, an individual who is making progress towards an energy savings goal could receive a coupon, free trial or savings on a membership fee for one or more partnered Mesh businesses. In addition, an ecology of Mesh businesses can provide options for low-willpower activities to transition to after achieving a difficult goal.

Case study: Switching from cars to walking and biking

Intervention	spontaneous
Country context	Multiple Countries
Theme	transport, sharing economy, circular economy, energy, design
Behavioural insights	motivation, habits, channelling
Evidence characteristics	(1), (3)

Transport is one of the areas with the largest negative impacts on sustainability. Transport choices reflect a combination of personal choices and infrastructural and contextual limitations. For example, in order to choose walking or bicycling over personal car use, the urban, suburban or rural landscape has to provide paths that can be traversed on foot or on bicycle wheels, and destinations have to be close enough to be reached efficiently by these modes of transport.

Urban design is one approach to encouraging walking and biking. Ewing and Cervero (2010)[41] conducted a meta-analysis (quantitative review) of numerous studies on the effects of urban design on walking. They found that the diversity of the built environment, especially intersection density, jobs-housing ratio, and distance to stores had the greatest average impacts on walking. However, the contextual multi-factorial nature of built environments makes it hard to control for all variables affecting walking, and results of "natural experiments" comparing different urban designs vary. For example, a three-year study comparing two newly built residential neighbourhoods found no impact of urban design on walking.[42] However, in communities where walking and bicycling is common, some studies[43] have shown that pedestrians and bicyclists make more frequent trips to spend money, spending less each time, but on average spending as much as or more than car-driving consumers. They also are more likely to return to the same shops or restaurants regularly. Thus, an argument can be made for positive economic impacts of walking and bicycling—which could be greened if combined with insights on influencing consumer choice.

Bike sharing schemes appear to be a key way to induce people to switch from using private cars to bikes. However, a review of bike sharing schemes draws several conclusions that suggest that bike shares "preach to the choir" rather than converting people from car use. Fishman et al. (2013) find that users place a high value on convenience and price; that users are more likely to own private bicycles than non-users; that users prefer not to wear helmets, which can limit uptake where helmets are legally required; and that the majority of users substitute bicycling for sustainable modes of transport (e.g. collective transport) rather than private car use. Further research is required to understand how to induce new users to participate in bike sharing schemes. Areas to address might include perceptions of risk and normalcy of bicycling (through availability heuristics, framing and adjustment biases), and channelling factors including how to obtain a helmet at short notice, existence of bike lanes, bike availability, ease of finding stations, etc. Data technologies can help to align **motivations** to go from one place to another with immediately accessible information (e.g. from a mobile app) about where to find the nearest bike and the relative time and other benefits of biking vs. other modes of transport. The Vélib mobile app for the bike sharing scheme in Paris, France, is an example with some of these functions. Finally, bike sharing schemes have created green growth opportunities for vendors and

[41] Ewing & Cervero (2010)
[42] Christian et al. (2013)
[43] Popovich & Handy (2014), Clifton et al. (2012)

technology developers selling the physical systems and technological solutions supporting modern bike sharing schemes.[44]

The complementary flip-side of walking and biking more is using private cars less. Studies of private car use consider it to be a **habitual** action and thus particularly difficult to change despite intentions to use public transport or other modes of transport. A study[45] using self-records of real daily trips in a university town with multiple forms of non-private car transport infrastructure showed that individuals who had recently moved to the area and were environmentally conscious were more likely to use alternative forms of transport, compared to those with less environmental consciousness and also those who had not moved house recently. They explain these results by arguing that (1) behavioural change requires cognitive activation or deliberate reflection in order to reflect self-image, (2) **habits** are broken up and new ones formed more easily during moments of context change, such as moving to a new house or town. This is because the set of cues and feedbacks supporting habits disappears during a context change. Thus, environmentally conscious people who had not moved recently had not had the opportunity to stop old transport habits and to form new ones consistent with their green self-images.

Case study: Waste pickers and recycling behaviours in Peru

Intervention	experiment
Country context	Peru
Theme	waste, recycling
Behavioural insights	hassle factors, habit, information, framing, narratives
Evidence characteristics	(1), (2), (3)

The PRISMA NGO in Peru supports waste pickers to develop small recycling businesses, among other development activities.[46] The NGO originally provided small bags for waste pickers to give to households to collect recyclable waste, but they found that the quality and quantity of the waste was low. In an experimental intervention, they replaced the bags with (1) nothing (control condition), (2) a bin, (3) a bin with an informative sticker. They found that the bin improved collection of recyclables, but that the sticker had no effect. This suggests that the problem was primarily a design and **hassle factor**s issue—it is easier to collect recyclable trash in a large bin than a small bag. This points to the role of good design in facilitating **habit** formation and reducing hassle factors. By contrast, **information** provision had no effect on increasing recycling behaviour. This example also shows a benefit to green growth since the waste pickers would have benefited financially from increased collection of recyclables.

There are many studies on the uptake and sustainability of recycling behaviour. An early review found that most recycling behaviours were not continued after particular interventions ended.[47] A study in Italy found that willingness to recycle was partly explained by self-identification with a "typical recycler" identity.[48] This suggests that **framing** and availability of plausible **narratives** of recycling and self-image can be used to manipulate recycling adoption as well. These elements, since they remain in memory and do not require constant cues and feedback from the environment, may have longer-term effects than reducing hassle factors or providing information.

[44] Shaheen et al. (2010)
[45] Verplanken et al. (2008)
[46] Chong et al. (2015); see also http://www.prisma.org.pe
[47] Porter et al. (1995)
[48] Mannetti et al. (2004)

Sustainable food consumption

A goal for global food production is to provide food security for all. The principle of food security states that it "is the condition in which all people, at all times, have physical, social and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life"[49]. In order to meet sustainability goals while feeding a growing human population[50], a range of agro-environmental practices will need to be integrated into agriculture, in Europe and elsewhere.[51] These range from tillage management, crop fertilization and irrigation methods at the field scale, to management and design of land-cover elements at the landscape scale. More broadly, sustainable food production requires taking a food systems approach, and identifying different areas in which inefficiency and waste occur, from producer to consumer.[52] Where the largest inefficiencies and wastes occur, and thus the extent to which interventions in individual behaviour will make a difference, depends on the production and distribution system in place.

Case study: Decreasing food waste by increasing purchase of imperfect fruits and vegetables

Intervention	experiment
Country context	Italy
Theme	food production, consumption
Behavioural insights	framing, price, lofty ideals
Evidence characteristics	(1)

An experiment carried out at the Expo Milano (which had a sustainable food production theme) presented both "perfect" and "imperfect" fruits and vegetables with either a regular price, a 15% discount, or a 30% discount; and with either no message, an anti-food waste message, or an "ugly fruits are authentic fruits" message.[53] The messages are forms of non-numerical **framing,** in which the ugly fruit or vegetable is repositioned as having or representing an inherent value. Both discounts and messages, separately and in combination, increased purchase of the imperfect fruits and vegetables. The authors suggest that either of the messages in combination with a small discount may be an effective intervention. However, they also note that the **price** discount may be counterproductive. Effectively, if people will buy ugly fruits and vegetables without a monetary savings, this may enhance self-motivation, i.e. people will see themselves as motivated by a **lofty ideal** such as being ethical or "green". The monetary savings, like a monetary reward, may lead people to frame their actions as "only for the money", which is not self-motivating and dependent on price.

Case study: Experiments on eco-labelling food products

Intervention	experiment
Country context	Belgium
Theme	food production
Behavioural insights	attention, saliency, price
Evidence characteristics	(1), (3)

[49] See http://www.ifpri.org/topic/food-security, FAO (1996)
[50] Godfray et al. (2010)
[51] Wezel et al. (2014)
[52] Ingram (2011)
[53] OECD (2017)

A number of experiments have been carried out to look at the impacts of eco-labels on consumer choice. Examples include energy efficiency labels on appliances[54], the FSC (Forest Stewardship Council) label for wood-based products, the Fairtrade label which certifies production standards with an emphasis on equity for producers in developing countries, the dolphin-free label for tuna, or the organic labels certified by different countries and entities. The large number of labels (especially in some countries such as the UK) and the differences in certification (e.g. third-party certified or not) may be confusing to consumers who want to make informed choices—or consumers may simply ignore them.

Vlaemink et al. (2014)[55] used an online survey to design a label for eco-friendly products. They then tested it out in a supermarket in Belgium, comparing its effects to an existing eco-label, and a label that simply presented data on the environmental impact of the product. They found that the eco-label designed with input from the online survey led to increased product sales compared to the other labels. Van Loo et al. (2015)[56] looked at different sustainability labels on coffee and found that people pay more attention to the eco-labels that they consider most important. People also pay more **attention** overall to eco-labels the more they consider eco-friendly factors important to coffee choice. However, they also confirmed that even for eco-conscious consumers, the taste and **price** of the coffee were the most important attributes influencing choice. These studies suggest that labels can be factors influencing product choice, and that label design is important. However, the impact of eco-labels compared to non-labelled or non-eco-friendly products are not shown.

A more complete experiment addressing these questions was conducted by Hainmueller et al. (2015).[57] Also looking at eco-labels for coffee, they used a before-after experimental-control comparison (no labels before, then eco-label and control label added) across two coffees with different prices. They also introduced a price change during the experiment (a better experimental design would have randomized the order for these changes across different sites). They found that sales of the eco-labelled coffees rose by 10% over the control label. They also found that after a price increase consumers were unwilling to buy the cheaper eco-labelled coffee, but consumers buying the more expensive eco-labelled coffee continued to do so. This study shows that eco-labels can have a modest impact on sales, and that there may be different segments of consumers interested in buying eco-labelled products: those who are price-sensitive, and those who are willing to pay extra for eco-friendly goods.

Case study: Food waste reduction in the UK

Intervention	non-experimental application
Country context	United Kingdom
Theme	waste
Behavioural insights	channelling, commitment, information
Evidence characteristics	(2)

Food waste occurs throughout the food system[58] including at the stages of production, storage, transport, sale and post-sale. The contribution of each stage to total food waste varies between countries. Individuals can usually contribute most to reducing waste at the sale and post-sale stages. In the UK, the "Love Food, Hate Waste" program targeted the 1/3 of bought food that is ultimately not eaten and thrown out.[59] Interventions included encouraging **channelling** and **commitment** through making shopping lists and plans, and **information** on how to properly store food, how to prepare meals with left-over food, how to portion food correctly during preparation to avoid left-overs, and how to interpret the "use by" and "best by" dates on food containers. The individual interventions were not tested, but a decrease in food waste of 13% was observed in the UK during the period of the

[54] Mont et al. (2014)
[55] Vlaeminck et al. (2014)
[56] Van Loo et al. (2015)
[57] Hainmueller et al. (2015)
[58] Ingram (2011)
[59] UNEP (2017)

programme. Direct causality is not clear since other factors such as food prices were not controlled for. It is also not clear that reducing over-consumption in this case leads to green growth, unless the money saved by consumers led them to switch to green food products.

Case study: Gruppi di Acquisto Solidale as an example for food cooperatives

Intervention	spontaneous
Country context	Italy
Theme	food production, consumption
Behavioural insights	civil society
Evidence characteristics	(1), (3)

One way in which individuals can influence their access to food is to form cooperatives. An example are the Gruppi di Acquisito Solidale (GAS, Solidarity Purchasing Groups) in Italy.[60] Consumers form networks in which their food product orders are grouped and relayed directly to local or regional farmers. In this way, they avoid packaging waste and the costs of intermediaries. This represents the power of **civic engagement** to alter consumer choices while promoting green growth in the form of economic growth or stability of the local producers that the GAS work with.

Case study: Payment-by-results agri-environment schemes

Intervention	non-controlled applied intervention
Country context	European Union (EU)
Theme	food production, practices, effectiveness
Behavioural insights	rewards, motivation, social approbation
Evidence characteristics	(1), (2), (3)

Agri-environment schemes are governmental schemes, primarily in the European Union, that provide subsidies to farmers in exchange for the voluntary uptake of various practices designed to improve nature conservation on farmland. National or regional governments decide which habitats to target and what measures to require to get the subsidies. Around 20% of all farmland in the EU is in an agri-environment scheme—the EU considers this to be very successful, but is below what is called for in scenarios for conserving ecosystem services, adapting to climate change and feeding the future planet.[61] As a consequence, a new perspective argues that farmers should not be required to carry out specific pre-determined measures. Rather, agri-environment schemes may be more effective when farmers are paid by results (biodiversity indicators).[62]

Burton & Schwartz (2013)[63] argue that there are three main problems that need to be addressed: ineffectiveness of the required agri-environment measures for conserving biodiversity and ecosystem services[64]; preference for applying the easiest measures on the worst land, reducing the value for money of the schemes; and lack of evidence that agri-environment schemes change environmental attitudes and values of farmers[65]. In their review of existing payment for results agri-environment schemes in Europe, they find that adoption rates and satisfaction of farmers is high. Ecological outcomes are usually good, although due to short time-scales it is difficult to be sure if they are better

[60] Brunori et al. (2012)
[61] Burton & Schwarz (2013), Wezel et al. (2014)
[62] Hasund (2013), Gibbons et al. (2011)
[63] Burton & Schwarz (2013)
[64] Kleijn & Sutherland (2003)
[65] Burton et al. (2008), De Snoo et al. (2013)

than traditional agri-environment schemes. They speculate that payment for results agri-environment schemes will affect farmers' values by forcing them to form social links with conservationists in order to learn from them, by allowing them to innovate and develop their social and cultural capital, and by framing nature conservation as a "product" of the farm system. Further research on this topic could for example focus on the role of monetary **rewards** in reducing internal **motivation** vs. the role of **social approbation** as a reward.

Case study: Reducing meat consumption in developed countries

Intervention	none
Country context	Developed countries including Europe, United States
Theme	food production, consumption
Behavioural insights	reward, narrative, norms, channelling, lofty ideals, motivations, habits, civic engagement, social approbation, information
Evidence characteristics	(none)

Meat consumption rises with income around the world.[66] Meat can be inefficient to produce, representing both a loss of calories per energy input due to conversion from plant to meat, and a large amount of irrigation input per mass unit of meat produced.[67] Ruminant livestock also produce a large contribution of methane, a greenhouse gas.[68] Where meat is currently produced in water-intensive, methane-producing intensive systems a general approach seeking to reduce all meat consumption may be appropriate.

De Bakker and Dagevos (2012)[69] argue that there are several approaches to reducing individuals' meat consumption. They note that while few people are vegetarians or vegans, many people do not eat meat every day ("flexitarians"). They propose three possible approaches to reducing meat consumption among flexitarians: (1) Substitute meat-imitation products—passive consumers will not really notice or care at first, but eventually they may notice they are eating vegetables and will learn it tastes good (learning a new **reward**), (2) creation of **narrative**s, changing social **norms** and **channelling** of meatless meals via advertising, recipes, etc. and (3) creating broad cultural change around concern about food production, animal welfare and the environment, through linking **lofty ideals** to **motivations** and **habits**, and forming communities of **civic engagement** as "food citizens", who can reinforce one another with **social approbation**, **information**, and access to products. They give the example of the Slow Food movement[70] as a community of civic engagement fostering ideals of high-quality, ecological food production and consumption. However, it is not against meat. In an experiment using an online survey to try to influence willingness to consume meat, researchers[71] found that animal welfare concerns were most likely to affect intentions to reduce meat consumption, followed by human health and environmental concerns. Social perceptions of personal image came last. This suggests that social norms alone are unlikely to strongly impact food consumption patterns. Individuals may need to be motivated by lofty ideals. However, interactions with information and cues (e.g. eco-labels), price, channelling, and habits, remain to be examined.

[66] FAO (2008), Steinfeld & Chilonda (2006)
[67] Mekonnen & Hoekstra (2012)
[68] McMichael et al. (2007)
[69] De Bakker & Dagevos (2012)
[70] See http://www.slowfood.com
[71] Cordts et al. (2014)

Renewable resource use

Energy use

Transitioning to renewable energy is essential with multiple impacts for sustainability.[72] Increased energy efficiency is a key intervention for greening the energy sector. Smart grid technologies are a key approach for increasing energy efficiency. A greener energy sector can be obtained through market mechanisms providing consumers with more choice and information, through financial incentives for infrastructure investments, and through regulation.[73] Here, we consider case studies of how to affect uptake behaviours leading to more efficient and green energy use.

Case study: Adoption of practices and technologies of energy efficiency in Australia

Intervention	experiment
Country context	Australia
Theme	energy efficiency
Behavioural insights	framing, adjustment biases, reward, habits
Evidence characteristics	(1), (2), (3)

Havas et al. (2015)[74] report on a programme in which participants in Australia received a free personalized home energy audit, discounts on one of two energy efficient technologies and further energy-efficiency measures, as well as informational updates on energy use over time. The two energy efficient technologies offered were solar hot water (SHW) and photovoltaic (PV) systems. The authors report that participants "reduced their electricity usage immediately after adoption by 10% and 34% respectively [SHW, PV], and this was maintained in the long term". They also report a positive correlation between the number of other energy efficiency measures adopted, and the reduction in usage. It is interesting that while the SHW provided a direct savings, the PV technology generated energy that was sold back to the grid, providing the opportunity to use the profit to buy more energy for household use.

However, the PV adopters showed greater savings than the SHW adopters. This interesting outcome could be a result of **framing and adjustment biases**, since gains are preferred to savings. The PV may have been perceived as both an energy savings and a monetary gain, so doubly attractive—and providing an incentive to simultaneously maximize satisfaction over two types of **reward**, energy saved and money earned. This suggests that positioning individual consumers as producers within mesh economies can be effective by providing multiple rewards and motivations. The study is also interesting because it suggests that a set of *several* efficiency behaviours is better than only reinforcing one behaviour. This could be potentially understood in two different ways. One possibility is that when individuals fail to carry out one efficiency behaviour, they may still carry out another. In this sense, having a set of efficiency behaviours may be a good way to design for human error and inconsistency. Another possibility is that by introducing a set of efficiency behaviours, each behaviour acts as a cue for the other ones, forming a self-reinforcing group of **habits.** These possibilities need further research.

[72] See http://www.iea.org/topics/renewables/
[73] OECD (2011)
[74] Havas et al. (2015)

Case study: Default effects and follow-on behaviour in an electricity pricing program

Intervention	experiment
Country context	United States
Theme	energy efficiency, energy, design, consumption
Behavioural insights	framing, default effect, price
Evidence characteristics	(1), (2)

When confronted by a choice with a default option, decision-makers are often more inclined to accept the default. Fowlie et al. (2017)[75] have analysed the use of default provisions in the setting of time-varying electricity pricing. An increase in customer participation in electricity demand response programs and time-varying pricing programs could generate substantive efficiency gains and would lead to lower electricity system operating costs, lower renewable integration costs, and a more resilient electricity grid. The study implemented a large-scale randomized controlled trial as a field experiment run by the Sacramento Municipal Utility District (SMUD) in 2011-2013 in a residential time-varying electricity pricing program. While customers were invited to opt-in to a new time-based pricing structure in one set of treatment groups, in another set of randomly selected groups, customers were informed that they would be defaulted onto the new pricing programs unless they opted out. The study provides evidence of the **default effect**, with only about 20% of customers opting into the new pricing programs and over 90% staying on the programs when it was the default option. The economic importance of the default effect depends critically on customers' electricity consumption in light of the **pricing** plan they face ("follow-on" behaviour), i.e. on whether complacent customers adjust their consumption in response to time-varying pricing. The study finds that consumers do adjust electricity consumption in response to the time-varying prices, even if they did not actively select them.

Case study: Energy cooperatives

Intervention	spontaneous
Country context	The Netherlands
Theme	cooperatives, growth
Behavioural insights	context, scale
Evidence characteristics	(1), (2), (3)

Gansky (2010) gives the example of energy cooperatives that emerged during the New Deal in rural communities, to take advantage of government subsidies that were uninteresting to large energy companies that did not expect rural electrification to turn into sufficient profit. The cooperatives were able to electrify rural areas, bringing their members a service tailored to their needs. Today, a number of energy cooperatives exist and many have invested in renewables. For example, Windunie[76] is a Dutch wind energy cooperative that sells the energy it produces. Energy cooperatives can be seen as solutions to local and regional energy needs that are sensitive to local socio-ecological contexts, and where **decision-making scales** and use scales are matched. Since energy cooperatives may also be profitable, this is an area with a clear link between individual behaviour and green growth.

[75] Fowlie et al. (2017)
[76] See www.windunie.nl

Case study: Fuel-efficient and clean stove uptake

Intervention	spontaneous
Country context	Uganda
Theme	energy efficiency, poverty
Behavioural insights	inter-temporal biases, risk aversion, information
Evidence characteristics	(1)

Around 3 billion people in developing countries currently use fuel-inefficient wood-burning stoves.[77] Although biomass, including wood, is a renewable resource, harvesting wood for burning in inefficient stoves can have negative impacts including maladies from smoke inhalation, local deforestation and land degradation from over-harvest, and release of pollutants and CO_2 into the atmosphere.[78] Nevertheless, uptake of efficient stoves and clean stoves using other forms of fuel is low.[79] There are many studies looking at factors preventing and facilitating adoption of alternative cook stoves in various developing countries. In one study in Uganda[80], researchers noted that barriers to adoption of fuel-efficient stoves are the relatively high up-front costs of the stoves. Lack of information about the durability and efficiency of the stoves may reinforce **present bias** and **time-inconsistent preferences**, because the cost today is not clearly offset by a large benefit in the near and distant future. In addition, under poverty, all costs are losses.[81] This is not subject to framing effects, since it represents the fundamental fact that all trade-offs are bad options: money spent on one essential thing is money that cannot be spent on another essential thing. At the same time, the poor do not experience the endowment effect, where the status quo bias makes giving up what you have more painful a loss than the gain of something new. Lacking the endowment effect, and since all costs are perceived as larger or smaller losses, the poor also do not usually experience **risk aversion**. Thus, it would seem that if barriers to efficient stove adoption can be removed, at least in economic terms the poor should be likely to take the risks of alternative stove adoption. The researchers in Uganda found that an offer of an initial free trial period, combined with payments on an instalment plan, increased uptake by 45%, compared to paying upfront. Thus, providing **information** (experience) and making the price of each instalment a better trade-off appear to be effective.

A meta-analysis (quantitative review) of efficient stove uptake and fuel switching[82] suggested that household education, credit availability, and price were the most significant factors affecting fuel-efficient stove adoption across studies, while price was often important for fuel choice but with few clear trends. A qualitative review notes several barriers and trends.[83] For example, many individuals engage in "fuel stacking" or the complementary use of multiple fuels, which may reduce the benefits of clean and efficient stoves. They also note that alternative fuels do not provide the wood-smoke flavour valued in many local cuisines linked to traditions and the emotional nostalgia this produces. Thus, while some adoption barriers can be removed by lowering upfront costs of adoption, each alternative system implies multiple other context-specific factors determining continued use.

[77] Global Alliance for Clean Cookstoves (2011)
[78] Lewis & Pattanayak (2012)
[79] Global Alliance for Clean Cookstoves (2011), Lewis & Pattanayak (2012)
[80] Levine & Cotterman (2012)
[81] Kahneman (2011)
[82] Lewis & Pattanayak (2012)
[83] Puzzolo et al. (2016)

Case study: kWh saved in a washing machine simulation game

Intervention	experiment
Country context	The Netherlands
Theme	energy efficiency
Behavioural insights	framing, lofty ideals, motivation
Evidence characteristics	none

An experiment using a game-like simulation of a washing machine feedback panel either asked people to set their own energy savings goal, set a goal for them, or set no goal (the control group).[84] Individuals in the self-set goal group saved the same amount of (imaginary) energy whether their goal was to save 5, 10, 15 or 20% relative to the baseline, and this overall savings did not differ from the group for whom a goal was set. However, there was an effect of the social orientation of participants: socially oriented individuals did significantly worse than self-oriented individuals when the experimenter set the goal. A possible explanation is that self-set goals are an example of non-numerical **framing** of a negative kind. Self-set goals may be set with reference to a **lofty ideal** like "being green". By contrast, experimenter-set goals may be **framed** as "following instructions" rather than "being green". This may have reduced **motivation and commitment** especially in social individuals, who might see little social benefit to following instructions (self-oriented individuals may have been motivated to win the game). Although self-set goals were not very effective (users did not increase their savings in line with increased goals), they appeared to work better for both socially and self-oriented individuals. A weakness of this study is its game-like simulated nature. Real behaviour is likely to be more complex.

Case study: Opower intervention

Intervention	experiment
Country context	United States
Theme	effectiveness, energy efficiency
Behavioural insights	feedback, information, status quo bias
Evidence characteristics	(1), (2)

Opower is a company offering data platforms to energy utilities, aimed at improving energy efficiency among users, and providing transparent information and good user experiences. Currently, the company serves 100 energy utilities, and has reduced energy use by 3% and customer service calls about billing by 19% across users. In a randomized study of Opower customers who received letters informing them about their home energy use, Allcott and Rogers (2014)[85] found that energy savings persisted as long as the letters continued to be received, and declined at 10-20% per year after the letters were stopped. The authors describe an "action and backsliding" phenomenon of saving immediately after the letter was received followed by not saving, which reduced in extremes over time. It should be noted that due to the noisiness of the energy use data, these results are estimates and not clear and obvious trends. Also, not emphasized in the study is that the savings were very small, apparently in the order of 0.1 % of control household use, and in two of the three sites there were actually average *increases* in energy use between treatment-control or before-after comparisons. Consequently, questions remain about the overall impact of the intervention. A possible lesson is that **information** alone is not adequate to change individual behaviour in a large or persistent way. Another

[84] McCalley & Midden (2002)
[85] Allcott & Rogers (2014)

possibility is that greater information about the status quo, without a comparison case or alternate framing, actually increases **status quo bias** and satisfaction.

Case study: Smart grid technology uptake

Intervention	survey
Country context	Denmark, Norway and Switzerland
Theme	energy efficiency
Behavioural insights	framing, status quo bias
Evidence characteristics	(1)

Expanding the smart grid is a key policy and supply-side intervention that will lead to greening of the energy sector. The smart grid refers to a set of technologies that are designed to make better use of energy resources, through increased efficiency, data transparency for consumers, and technical solutions to allow integration of renewable energy and to better deal with demand surges.[86]

In a survey in Denmark, Norway and Switzerland, Browman Toft et al. (2014)[87] framed a choice to allow smart grid technology to be installed in individuals' homes as either opt-in, opt-out, or active choice (no pre-selected option). As in other examples of using opt-out framings, they found that opt-out led to greater acceptance of the smart grid technology, by framing installation as the status quo. Opt-out **framings** are an example of a positive use of the **status-quo bias**. In a further real-life experiment in Denmark, the researchers confirmed that opt-out framings led to the highest uptake of smart grid technology.

Case study: Solving externalities by incentivising workers directly

Intervention	experiment
Country context	none
Theme	transport, energy efficiency
Behavioural insights	information, feedback, social rewards
Evidence characteristics	(1), (2)

One of the lowest-hanging fruits in combating climate change is to design firm-level incentive schemes for workers to engage in green behaviours. Especially in air transportation, increasing efficiency and thus decreasing resource/energy use can, in addition to the positive effect on climate, lead to increased profits, by reducing fuel burn from eliminating operational inefficiencies. Gosnell at al. (2016)[88] undertook a field experiment with Virgin Atlantic Airways (VAA) in order to explore the extent to which several experimental treatments—implemented from February 2014 through September 2014—influence captains' behaviours with regard to fuel efficiency across three distinct phases—pre-flight, in-flight, and post-flight. The experiment tries to understand how the act of measurement as well as other factors—information about recent fuel efficiency, exogenous performance targets, and prosocial incentives (a donation to the captain's chosen charity conditional on achieving the target provided)—affect captains' behaviours from pre-flight to post-flight. The study finds that already by simply **informing** the captains that their behaviours are measured, fuel inefficiency is considerably reduced. While personal targets (a **feedback** on the captain's personal efficiency performance) increase efforts in-flight and post-flight, prosocial incentives were found to increase efforts across all phases. Interestingly, it is observed that providing an additional prosocial incentive as a **reward** does not

[86] OECD (2011)
[87] Broman Toft et al. (2014)
[88] Gosnell et al. (2016)

increase effort beyond the effects of providing a personal target. While this study provides important insights into labour economics with regard to principal-agent settings, it mostly presents designing incentives for workers as a promising approach to combating firm-level externalities and a practical and cost-effective fuel solution for the air transport industry.

Case study: Using peer comparisons and incentives to reduce household electricity consumption

Intervention	experiment
Country context	India
Theme	energy, energy efficiency, consumption
Behavioural insights	saliency, feedback, information, price, rewards
Evidence characteristics	(1), (2)

Demand side management programs are used by electricity utilities around the world to reduce electricity consumption, to increase energy efficiency, to mitigate overconsumption and to reduce peak hour consumption through dynamic and real-time pricing. An immediate challenge involves identifying the instruments which are best suited to achieve these goals. Sudarshan (2014)[89] conducted an electricity demand management experiment in a community of urban middle-class households in India to compare the effectiveness of three instruments designed to reduce electricity consumption: (i) behavioural nudges using peer comparisons, (ii) nudges augmented with financial incentives and (iii) price changes. The study finds that behavioural nudges (in this case using peer comparisons as a **feedback** and **information** mechanism) reduce household electricity consumption by over 8 percent and can thus change energy behaviours. While the effect of nudges on electricity consumption is significant even compared with price response, their effectiveness is significantly reduced when market **price**s for electricity are higher. Peer comparisons also become much less effective when they are combined with financial incentives/**rewards**. The results suggest that behavioural instruments may interact in complicated ways with incentives and market prices. This poses a challenge to policy makers, as demand side management programs are rarely implemented in isolation.

Water use

Although water is a renewable resource, its distribution across the planet is uneven and becoming unpredictable and extreme under climate change.[90] Only 3% of the world's water is fresh, and only 0.5% of this is in liquid form—most of which is in increasingly exploited underground aquifers. Thus, water use is primarily about water access. Agriculture and industry are the largest users of water, with only around 8% of water use attributed to households.[91] Thus, the ability of individuals to directly reduce unsustainable use of water through personal use is limited. Avoiding the consumption of agricultural products that are water intensive is one way for individuals to potentially have more impact on reducing water over-exploitation. Avocadoes are a prime example and meat is also frequently pointed to as water-intensive (see below). Another issue is that where fresh water is available, it may not always be potable due to contamination or water-borne disease. Thus, providing clean water is an important aspect of making efficient use of water resources.[92]

Despite the relatively small contribution towards water conservation that individual water efficiency can make, abundant research exists on this topic. A review[93] suggests that attitudes towards water conservation, knowledge, trust in the institution, experience of the process (e.g. demonstration project, tour), perception of fairness (for water restrictions), norms, and attitudes about importance and efficacy of proposed solution (e.g. waste water recycling, desalination) are all important to adoption of

[89] Sudarshan (2014)
[90] World Business Council for Sustainable Development (2006)
[91] Ibid.
[92] Ibid.
[93] Hurlimann et al. (2009)

water efficiency programmes.

Case study: Reducing water use in Belem, Costa Rica

Intervention	experiment
Country context	Costa Rica
Theme	water
Behavioural insights	salient cues, anchoring, framing, social approbation, channelling
Evidence characteristics	(1), (2)

A large intervention at the household level in Belem, Costa Rica, tested the effects of several behavioural insights on reducing domestic water use.[94] Group 1 received **feedback** comparing their water use to other households in their neighbourhood, and Group 2 received feedback comparing their water use to the average of the city. These provided feedback with different **anchors and framings** (city or neighbourhood performance), in the form of **salient cues** simulating **social approbation** (performance relative to the anchor was signalled with a smiley or frowny face). Group 3 received similar treatment but was also **channelled** to make a plan or commitment to save water. Groups 1 and 3 showed greater declines in water use than the control group, on average around 4%. The authors also suggest that the channelling intervention was most effective for households that already consumed little water, while the neighbourhood comparison was most effective for high-water-consumption households.

Case study: Water purification in Kenya

Intervention	iterative intervention
Country context	Kenya
Theme	water
Behavioural insights	motivation, hassle factors, salient cues, habit
Evidence characteristics	(1)

Researchers studied the provision of chlorine at water collection points in Kenya.[95] When the chlorine was located at a different place from the water, people failed to integrate chlorine collection with habitual water collection, even though they understood that it was important. If they remembered to get chlorine after they collected water, they were likely to experience low **motivation** to make the effort to collect the chlorine, which appeared as additional steps after the main goal of water collection had been satisfied. Additional steps after motivation is satisfied can also be identified as **hassle factors**. When the chlorine was placed in a highly visible location next to the water collection point, people were able to associate chlorine and water **cues** into a **habit** in which they collected both at once.

Use of other resources

Sustainable resource use is a broad area, which includes industrial exploitation of renewable and non-renewable resources, as well as activities carried out by individuals such as hunting, fishing, gathering wild foods and fuels, grazing livestock or irrigating crops. A common feature of individual-scale sustainable resource use is that the resources in question are not the legal property of the individual using them. The resources may constitute a commons, and/or they may be subject to traditional use

[94] OECD (2017)
[95] Kremer et al. (2010), Duflo et al. (2011), Kremer et al. (2011)

rights. Research by Ostrom and others has shown that in many, though not all, cases, individuals form regulations or norms to prevent over-exploitation or "tragedies of the commons". Ostrom states, "when expected benefits of managing a resource exceed the perceived costs of investing in better rules and norms for most users and their leaders, the probability of users' self-organizing is high."[96]

Case study: Forest commons management in Africa

Intervention	spontaneous
Country context	Ethiopia and other African countries
Theme	forest management, governance, traditional rights, commons
Behavioural insights	feedback, social approbation, inter-temporal biases, willpower, civil society
Evidence characteristics	(1), (2)

Participatory forest commons management is common throughout Africa.[97] The Bale Oromo people in Ethiopia were granted land tenure over their forest, as a commons, in exchange for a promise to maintain the forest cover. The communities design and implement their own forest resource exploitation rules, and they monitor compliance through forest patrolling. A group of economists found that the proportion of conditional cooperators (people willing to cooperate in a prisoner's dilemma game if the other player cooperates, but not otherwise) explains success in maintaining forest cover in the commons.[98] This was not the only important factor however: While a 1% increase in conditional cooperators resulted in a 0.27% increase in number of trees in the forest, a 1% increase in market distance (access to a market for forest products) decreases potential crop trees by 0.73%. The authors argue that conditional cooperators are also more likely to engage in forest monitoring and patrolling, which ultimately is the mechanism by which commons regulation is possible. The authors point out that cultural factors may determine the "cultural transmission" of being a conditional cooperator. If we look beyond the game theory framing of the study, it appears that stable monetary incentives (market access for forest products) and performance **feedback and social approbation** mechanisms (monitoring and patrolling) are key to maintaining sustainable use of commons forest products. A key area for future work would be to understand the role of **inter-temporal biases** in the assessment of the long-term benefits of sustainable management, and how this influences the decision to participate in patrolling. **Willpower** and **habits of civic engagement** are also areas that likely influence maintenance of patrolling behaviour: for example, older management projects were more successful, which might reflect the time necessary to develop habitual practices supporting the project.

Case study: Non-timber forest product (honey) governance in Ethiopia

Intervention	spontaneous
Country context	Ethiopia
Theme	non-timber forest products, governance, traditional rights, commons
Behavioural insights	scale of decision making, motivation, habit
Evidence characteristics	(1—with limitations), (2), (3—with limitations)

[96] Ostrom (2009)
[97] Wily (2002)
[98] Rustagi et al. (2010)

Some Ethiopian agriculturalists have developed a bee-keeping tradition in the forest.[99] They construct hives which they hang on trees, baiting them and waiting for them to be colonized. Individuals have traditional access rights (*kobo* rights) to plots or individual trees. 79% of farmers actively conserve individual kobo trees and 34% conserve kobo plots. The government recognises kobo rights, but disputes are settled at the local level through traditional dispute settlement practices, since they are not integrated into formal regulations or laws. Development agencies tried to introduce superior beehives and techniques yielding more honey, but as these require constant oversight, they are not suitable for forest use and have been adopted by only 6% of beekeepers. Productivity remains low and farmers are not organized to get a good price at market. This case study illustrates the ability of individuals to self-organize practices and regulations that prevent over-exploitation of wild honey, reduce conflicts over honey harvesting, and promote forest conservation. It may be an example of fitting the **decision scale** to the scale of use, since conflict resolution and use rights allocation occurs locally through local traditions. On the other hand, it shows how economic growth can be limited by structural limitations in resource-based systems, e.g. the costs of constantly tending to improved beehives when located in forests. Although details of the design of the new and improved beehives and techniques are not provided in the paper, the reason given for lack of adoption suggests that the design did not take into account **motivational** structure and **habit** formation, by requiring frequent and intensive new behaviours that were difficult to integrate into existing patterns of livelihoods and forest visits.

Case study: Reindeer herding in Siberia

Intervention	imposed top-down
Country context	Eastern Europe, former Soviet states
Theme	governance, livestock management, telecouplings
Behavioural insights	habitus, dwelling, scale of decision making
Evidence characteristics	(1), (2), (3)

Piers Vitebsky, in his book Reindeer People[100], describes how the Soviet system, with its centralized planning of herding activities, sedentarisation of the population, and subsidized modern services such as helicopter rides between distant areas radically altered the economic and cultural relations between reindeer herders, reindeer, and their environment. The collapse of the centralized and subsidized Soviet system has left the reindeer herders with a system that is neither self-sufficient, sustainable, nor economically viable in a market economy. They cannot simply go back to their traditional reindeer management practices, due to loss of knowledge and practices, the formation of settled lifestyles, and dependence on economic links and technologies from other parts of the world. These telecouplings have formed a new **habitus** and forms of **dwelling** that cannot simply be reversed or abandoned. This points to the ways in which economic growth, the dynamics, scale and realities of landscapes and species' ecologies, and sustainable livelihoods can be profoundly in conflict, for structural reasons. This account is a cautionary tale that system transformation does not always work out well. Such failures usually arise out of a profound disinterest on the part of decision-makers in the realities of landscapes and place-based contextual factors. Lacking attention to these factors, and respect for how existing traditions have dealt with them, all decisions are working with incomplete information and will eventually run into structural conflicts.

[99] Wiersum & Endalamaw (2012)
[100] Vitebsky (2005)

Case study: The Po Delta water and wetland management

Intervention	spontaneous
Country context	Italy
Theme	water, governance, wetland management
Behavioural insights	scale of decision making, civil society
Evidence characteristics	(1), (2)

The two Regional Parks of the Po Delta in Italy provide an example of the role of community-level organization in permitting the emergence of well-functioning conservation institutions that promote sustainable resource use and rural development initiatives supported by the local populations.[101] The Emilia Romagna Po Delta Regional Park was formed out of a pre-existing fishermen's and craftsmen's cooperative; Emilia Romagna has a long tradition of cooperatives. By contrast, the Veneto Po Delta Regional Park was established via top-down decree. Veneto does not have a tradition of cooperatives, and the Po Delta in Veneto historically was dominated by the latifundia of the nobles of the Venetian Republic. These different landholding and organizational traditions strongly influenced the effectiveness of the conservation governance institutions that grew out of them. The Veneto Park, established in 1997 after many delays, has mainly been a paper park providing almost no services or results, and embroiled in land-use disputes with local hunters. The Emilia Romagna Park has been much more effective since its inception in 1988, and has a clear and widely shared vision for the restoration and development of the area. On the other hand, both Parks do suffer from problems related to the mismatch between **decision scales and scales of use**. A wide variety of national, regional, municipal and local public and private entities control water management, rural development, land-use rights, and restoration and conservation actions in wetlands and other habitats. This creates a confusing patchwork of regulations without very much coordination. This is widely regarded as a fundamental problem standing in the way of implementing a vision for sustainable rural development.[102]A lesson from the Po Delta example is that promoting **civic engagement**, cooperatives, and other associative organizations that aim to improve the lives of members, is an essential pre-condition to promoting functioning institutions.[103] When people understand how to deliberate together, work together, and engage in improving their social and civic lives, they carry this habitus into other institutional settings.

[101] Root-Bernstein & Frascaroli (2016)
[102] Ibid.
[103] Ginsborg (2005)

Glossary of Key Terms

- **Anchoring and adjustment biases**. Basing frequency estimates on available numbers that may be irrelevant to the problem at hand.
- **Associative learning.** This is the fundamental theory of learning that is often understood as the basis all kinds of learning. Events and cues that co-occur are used to predict each other and thus to anticipate carrying out appropriate behaviours.
- **Availability heuristics**. Cognitive shortcuts based on the example or case that is easiest to think of rather than the statistically probable case.
- **Bounded rationality.** Rational decision-making is limited by factors such as time to decide, cognitive biases, and the context where decisions are made. Policy frameworks must become more people-centred accounting for limited rationality among citizens.
- **Bounded willpower.** Willpower is a limited resource and requires training like a muscle. Applying willpower to engage in a behaviour requires training and commitment, such as to delay gratification.
- **Channelling.** A way to assist people in carrying out some actions, by making the necessary cues and materials present or easily available.
- **Choice overload**. When an individual has a large number of options (roughly > 6) it is cognitively difficult to compare and rank-order choices for optimal choice. Cognitive overload can lead to choice abandonment, default to status quo, or sub-optimal choice.
- **Cognitive bias**. When the brain systematically deviates from rationale choice using mental shortcuts, heuristics or rules of thumb in decision making. This can happen as a result of limited time for decision making or the need to simplify complex information creating stereotypes, false perceptions or habits. This is all shaped by a variety of biases such as the bandwagon effect or conformity bias, planning fallacy, loss aversion and many more.
- **Cognitive dissonance**. The cognitive conflict produced when two or more conflicting attitudes or beliefs are held simultaneously. People are generally good at reducing the dissonance produced by the opposing beliefs through various arguments and strategies, or sometimes by changing opinion.
- **Context change**. Context refers generally to environmental cues and conditions that affect behaviour. Changes in context provide opportunities to learn new cue-behaviour associations and new habits.
- **Decision fatigue.** The cognitive system gets tired and stops functioning well after having to make a large number of decisions over a given period of time. This is related to choice overload, which can cause decision fatigue. The counter-strategy is to make each decision easier (e.g. bright lines) and/or form habits in which the decision is made in the same way every time.
- **Dwelling.** An anthropological concept describing how habits, skills, and ways of life are formed out of continuous interaction with the environment, people and living beings.
- **Framing biases.** Responding differently to a choice on the basis of how it is framed. Typically, due to loss aversion, individuals are more likely to act to avoid loss than to pursue gain.
- **Green Growth.** The pursuit of economic development in an environmentally sustainable manner.
- **Great Acceleration, The.** The sharp acceleration in human activity since the 1950s with take-off points marking acceleration on the Earth system, e.g. ocean acidification, greenhouse gas emissions, with clear data points now bringing a new geological era, The Anthropocene.
- **Habit**. A habit is a behavioural sequence that has been learned and can be performed automatically in response to cues in the environment.
- **Hassle factors.** Elements in the local environment or in a badly-designed procedure that prevent easy performance and habit formation, and which force decision making and pose problems requiring commitment to resolve.
- **Inter-temporal biases.** The tendency to give more weight to the present than the future, incorrectly perceiving future needs or preferences.
- **Last-mile problem.** When an individual has the knowledge, good intentions, principles or values to change their behaviour but does not go the "last-mile" to do so. This creates what is commonly known as a value-action gap or intention-action gap, where the solution is not necessarily more awareness, but frameworks to facilitate action.

- **Leverage points.** Aspects of a system (e.g. a practice, technological system, business, lifestyle, economy, socio-ecological system, etc.), that can be manipulated in order to produce change in the functioning and dynamics of the system.
- **Lofty ideals.** In this report, lofty ideals refers to the idea that willpower can be maintained by acting in accordance with a general concept about altruism or good actions, whether religious, civic, moral, etc. Lofty ideals work like a bright line but have very broad applicability to many situations.
- **Meso-economic level.** The economic level between micro and macro-economic units of analysis, referring to sectoral economic analysis and sub-group in the economy, such as cities and purchasing patterns, changes in specific industrial practices, and similar sectoral data.
- **Motivation.** In behavioural terms, motivation is a drive to complete a sequence of actions that lead to a particular kind of reward. Different motivations correspond to different forms of reward that individuals need to survive, or have learned to want.
- **Norms.** Informal social expectations about patterns of behaviour and belief.
- **Nudges.** Interventions in decision-making processes that help people to make decisions maximizing their own self-interest.
- **Path dependency**. The property of systems that they are hard to change once initial decisions have been made and parameters and organizational arrangements are set.
- **Plausible narratives**. In psychology, stories that individuals tell themselves or others about what is possible, likely, common, or desirable in the world.
- **Present bias**. An inter-temporal bias that results in individuals preferring things that happen now to things that may happen in the future.
- **Representativeness heuristics**. A mental shortcut whereby a person associates a given behaviour such as recycling with the (positive or negative) behaviours of a group (e.g. sports players).
- **Status-quo bias**. One of the framing biases, it results in most people preferring things the way they are compared to taking a risk to change the situation.
- **System 1.** A description of the cognitive system that handles automatic “fast” thinking through biases and heuristics, intuitions, skills and habits, allowing reflexive decision-making.
- **System 2.** A description of the cognitive system that handles deliberation, “slow” thinking, reasoning and analysis.

Bibliography

Allcott, H., & Rogers, T. (2014). *The Short-Run and Long-Run Effects of Behavioural Interventions: Experimental Evidence from Energy Conservation*. American Economic Review, 104(10), 3003– 3037.

American Psychological Association. (No Date). *Is Willpower a Limited Resource?* Retrieved 20/12/2017 from: https://www.apa.org/helpcenter/willpower-limited-resource.pdf

Azar, B. (2010). *Are your findings 'WEIRD'?* Retrieved 20/12/2017 from: http://www.apa.org/monitor/2010/05/weird.aspx

Baumeister, R. F., & Tierney J. (2011). *Willpower: Rediscovering the greatest human strength.* The Penguin Press, New York.

Bourdieu, P. (1977). *Outline of a theory of practice.* Cambridge University Press, Cambridge.

Broman Toft, M., Schuitema, G., & Thøgersen, J. (2014). *The importance of framing for consumer acceptance of the Smart Grid: A comparative study of Denmark, Norway and Switzerland.* Energy Research & Social Science, 3, 113–123.

Brown, H. (2017). *Sustainable Lifestyles: Individual Action vs. System Change*. Lecture. Retrieved 15/12/2017 from: http://scorai.org/videos/halina-%E2%80%8Cbrown-sustainable-lifestyles-individual-action-vs-system-change/

Brunori, G., Rossi, A., & Guidi, F. (2012). *On the new social relations around and beyond food. Analysing consumers' role and action in Gruppi di Acquisto Solidale (Solidarity Purchasing Groups).* Sociologia Ruralis, 52(1), 1-30.

Burton, R. J. F., Kuczera, C., & Schwarz, G. (2008). *Exploring farmers' cultural resistance to voluntary agri-environmental schemes.* Sociologia ruralis, 48(1), 16-37.

Burton, R. J. F., & Schwarz, G. (2013). *Result-oriented agri-environmental schemes in Europe and their potential for promoting behavioural change.* Land Use Policy, 30(1), 628-641.

Chapman, J. (2015). *Emotionally durable design: Objects, experiences and empathy.* Routlegde, New York.

Chong, A., Karlan, D., Shapiro, J., & Zinman, J. (2015). *(Ineffective) Messages to Encourage Recycling: Evidence from a Randomized Evaluation in Peru.* World Bank Economic Review, 29(1), 180-206.

Christian, H., Knuiman, M., Bull, F., Timperio, A., Foster, S., Divitini, M., Middleton, N., & Giles-Corti, B. (2013). *A new urban planning code's impact on walking: The residential environments project.* American Journal of Public Health, 103(7), 1219-1228.

Clifton, K., Currans, K. M., Muhs, C. D., Ritter, C., Morrissey, S., & Roughton, C. (2012). *Consumer behaviour and travel choices: A focus on cyclists and pedestrians.* 92nd Annual Meeting of the Transportation Research Board, Washington, DC.

Cordts, A., Nitzko, S., & Spiller, A. (2014). *Consumer response to negative information on meat consumption in Germany.* International Food and Agribusiness Management Review, 17(A).

Datta, S. (2017). *Consuming differently, consuming sustainably: Behavioural Insights for Policy making. Report Overview*. GGKP Webinar. Behavioural Insights: Changing Human Behaviour for Green Growth. Retrieved 20/12/2017 from: http://www.greengrowthknowledge.org/learning/ggkp-webinar-behavioural-insights-changing-human-behaviour-green-growth

De Bakker, E., & Dagevos, H. (2012). *Reducing meat consumption in today's consumer society: questioning the citizen-consumer gap.* Journal of Agricultural and Environmental Ethics, 25(6), 877-894.

Deci, E. L., Koestner, R., & Ryan, R. M. (1999). *A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation.* Psychological Bulletin, 125(6), 627-668.

De Snoo, G. R., Herzon, I., Staats, H., Burton, R. J. F., Schindler, S., van Dijk, J., Lokhorst, A. M., Bullock, J. M., Lobley, M., Wrbka, T., Schwarz, G., & Musters. C. J. M. (2013). *Toward effective nature conservation on farmland: making farmers matter*. Conservation Letters, 6(1), 66-72.

Devi, S. M., Balachandar, V., Lee, S. I., & Kim, I. H. (2014). *An Outline of Meat Consumption in the Indian Population - A Pilot Review.* Korean Journal for Food Science of Animal Resources, 34(4), 507-515.

Duflo, E., Kremer, M., & Robinson, J. (2011). *Nudging Farmers to Use Fertilizer: Theory and Experimental Evidence from Kenya.* American Economic Review, 101(6), 2350–2390.

Duhigg, C. (2012a). *How 'Keystone Habits' Transformed a Corporation.* Retrieved 20/12/2017 from: https://www.huffingtonpost.com/charles-duhigg/the-power-of-habit_b_1304550.html

Duhigg, C. (2012b). *The Power Of Habit: Why We Do What We Do In Life And Business.* Random House, New York.

Ewing, R., & Cervero, R. (2010). *Travel and the Built Environment: A Meta-Analysis.* Journal of the American Planning Association, 76(3), 265-294.

Food and Agriculture Organization of the United Nations. (1996). *Rome Declaration on World Food Security.* FAO, Rome.

Food and Agriculture Organization of the United Nations. (2008). *Meat and Meat Products*. In: FAO. (2008). Food Outlook. Global Market Analysis. FAO, Rome.

Fowlie, M., Wolfram, C., Spurlock, C. A., Todd, A., Baylis, P., & Cappers, P. (2017). *Default effects and follow-on behaviour: evidence from an electricity pricing program.* NBER Working Paper No. 23553. National Bureau of Economic Research, Cambridge.

Gansky, L. (2010). *The Mesh: Why the future of business is sharing*. Penguin Books, London.

Gibbons, J. M., Nicholson, E., Milner-Gulland, E. J., & Jones, J. P. (2011). *Should payments for biodiversity conservation be based on action or results?* Journal of Applied Ecology, 48(5), 1218-1226.

Ginsborg, P. (2005). *The Politics of Everyday Life: Making choices, changing lives*. Yale University Press, New Haven.

Global Alliance for Clean Cookstoves. (2011). *Igniting Change: A Strategy for Universal Adoption of Clean Cookstoves and Fuels*. Global Alliance for Clean Cookstoves, Washington, DC.

Godfray, H. C. J., Beddington, J. R., Crute, I. R.,Haddad, L., Lawrence, D., Muir, J. F., Pretty, J., Robinson, S., Thomas, S. M., & Toulmin, C. (2010). *Food security: the challenge of feeding 9 billion people.* Science, 327(5967), 812-818.

Gómez-Baggethun, E., De Groot, R., Lomas, P. L., & Montes, C. (2010). *The history of ecosystem services in economic theory and practice: from early notions to markets and payment schemes.* Ecological Economics, 69(6), 1209-1218.

Gosnell, G. K., List, J. A., & Metcalfe, R. (2016). *A new approach to an age-old problem: solving externalities by incenting workers directl*y. NBER Working Paper No. 22316. National Bureau of Economic Research, Cambridge.

Hainmueller, J., Hiscox, M. J., & Sequeira, S. (2015). *Consumer demand for fair trade: Evidence from a multistore field experiment.* Review of Economics and Statistics, 97(2), 242-256.

Hasund, K. P. (2013). *Indicator-based agri-environmental payments: A payment-by-result model for public goods with a Swedish application*. Land Use Policy, 30(1), 223-233.

Havas, L., Ballweg, J., Penna, C., & Race, D. (2015). *Power to change: Analysis of household participation in a renewable energy and energy efficiency programme in Central Australia.* Energy Policy, 87, 325-333.

Hellweg, S., & i Canals, L. M. (2014). *Emerging approaches, challenges and opportunities in life cycle assessment.* Science, 344(6188), 1109-1113.

Hulme, D., & Murphree, M. (1999). *Communities, wildlife and the 'new conservation' in Africa.* Journal of International Development, 11(2), 277.

Hurlimann, A., Dolnicar, S., & Meyer, P. (2009). *Understanding behaviour to inform water supply management in developed nations–A review of literature, conceptual model and research agenda.* Journal of Environmental Management, 91(1), 47-56.

Ingold, T. (2000). *The perception of the environment: Essays in livelihood, dwelling and skill*. Routledge, London.

Ingold, T. (2013). *Making: Anthropology, archaeology, art and architecture.* Routledge, London.

Ingram, J. (2011). *A food systems approach to researching food security and its interactions with global environmental change.* Food Security, 3(4), 417-431.

Kahneman, D. (2011). *Thinking fast and slow.* Farrar, Straus and Giroux, New York.

Kahneman, D., & Tversky, A. (1972). *Subjective probability: A judgment of representativeness*. Cognitive Psychology, 3(3), 430–454.

Kahneman, D., & Tversky, A. (2000). *Choices, values, frames.* Cambridge University Press, Cambridge.

Kheel, J., & Botero, J. M. (2016). *Death by a Thousand Cuts: Charcoal and Deforestation Threaten Hispaniola*. Retrieved 20/12/2017 from: http://cleancookstoves.org/about/news/08-23-2016-death-by-a-thousand-cuts-charcoal-and-deforestation-threaten-hispaniola.html

Kleijn, D., & Sutherland, W. J. (2003). *How effective are European agri-environment schemes in conserving and promoting biodiversity?* Journal of Applied Ecology, 40(6), 947-969.

Kremer, M., Ahuja, A., & Peterson-Zwane, A. P. (2010). *Providing Safe Water: Evidence from Randomized Evaluations.* Discussion Paper 2010--23, Harvard Environmental Economics Program.

Kremer, M., Miguel, E., Mullainathan, S., Zwane, A. P. & Null, C. (2011). *Social Engineering: Evidence from a Suite of Take-up Experiments in Kenya.* Working Paper.

Levine, D.I., & Cotterman, C. (2012). What Impedes Efficient Adoption of Products? *Evidence from Randomized Variation in Sales Offers for Improved Cookstoves in Uganda*. IRLE Working Paper No. 121-12. Working Paper Series, Institute for Research on Labor and Employment, University of California, Berkeley.

Lewis, J. J., & Pattanayak, S. K. (2012). *Who adopts improved fuels and cookstoves? A systematic review.* Environmental Health Perspectives, 120(5), 637.

Lunn, P. (2014). *Regulatory Policy and Behavioural Economics*. OECD Publishing, Paris.

Mannetti, L., Pierro, A., & Livi, S. (2004). *Recycling: Planned and self-expressive behaviour*. Journal of Environmental Psychology, 24(2), 227-236.

McCalley, L. T., & Midden, C. J. (2002). *Energy conservation through product-integrated feedback: The roles of goal-setting and social orientation*. Journal of Economic Psychology, 23(5), 589-603.

McCollough, J. (2007). *The effect of income growth on the mix of purchases between disposable goods and reusable goods.* International Journal of Consumer Studies, 31(3), 213-219.

McMichael, A. J., Powles, J. W., Butler, C. D., & Uauy, R. (2007). *Food, Livestock Production, Energy, Climate Change, and Health.* Lancet, 370, 1253-1263.

Mekonnen, M. M., & Hoekstra, A. Y. (2012). *A global assessment of the water footprint of farm animal products.* Ecosystems, 15, 401–415.

Miller, D. (2008). *The comfort of things*. Polity Press, Cambridge.

Ministry of the Environment, Japan. (2016). *Toyama Framework on Material Cycles.* Draft from G7 Toyama Environment Ministers' Meeting.

Mont, O., Lehner, M., & Heiskanen, E. (2014). *Nudging: A tool for sustainable behaviour?* Report 6643. Swedish Environmental Protection Agency, Stockholm.

Myers, J. (2016). *What is the Anthropocene? And why does it matter?* Retrieved 20/12/2017 from: https://www.weforum.org/agenda/2016/08/what-is-the-anthropocene-and-why-does-it-matter/

Organisation for Economic Co-operation and Development/International Energy Agency. (2015). *Energy efficiency market report 2015: Market trends and medium-term prospects.* IEA Publications, Paris.

Organisation for Economic Co-operation and Development. (2011b). *Towards Green Growth.* OECD Publishing, Paris.

Organisation for Economic Co-operation and Development. (2016). *Protecting Consumers through Behavioural Insights: Regulating the Communications Market in Colombia*. OECD Publishing, Paris.

Organisation for Economic Co-operation and Development. (2017a). *Behavioural Insights and Public Policy: Lessons from Around the World.* OECD Publishing, Paris.

Ostrom, E. (2009). *A general framework for analyzing sustainability of social-ecological systems.* Science, 325(5939), 419-422.

Ostrom, E., Burger, J., Field, C. B., Norgaard, R. B., & Policansky, D. (1999). *Revisiting the commons: local lessons, global challenges.* Science, 284(5412), 278-282.

Popovich, N., & Handy, S. (2014). *Bicyclists as Consumers: Mode Choice and Spending Behaviour in Downtown Davis, CA.* 93rd Annual Meeting of the Transportation Research Board, Washington, DC.

Porter, B. E., Leeming, F. C., & Dwyer, W. O. (1995). *Solid waste recovery: A review of behavioural programs to increase recycling.* Environment and Behaviour, 27(2), 122-152.

Putt del Pino, S., Metzger, E., Drew, D., & Moss, K. (2017). *The Elephant in the Boardroom: Why Unchecked Consumption Is Not an Option in Tomorrow's Markets*. World Resources Institute, Washington, DC.

Puzzolo, E., Pope, D., Stanistreet, D., Rehfuess, E. A., & Bruce, N. G. (2016). *Clean fuels for resource-poor settings: A systematic review of barriers and enablers to adoption and sustained use.* Environmental Research, 146, 218-234.

Ranganathan, J., Vennard, D., Waite, R., Dumas, P., Lipinski, B., Searchinger, T., & GLOBAGRI-WRR model authors. (2016). *Shifting Diets for a Sustainable Food Future*. Working Paper, Installment 11 of Creating a Sustainable Food Future. World Resources Institute, Washington, DC.

Root-Bernstein, M., & Frascaroli, F. (2016). *Where the fish swim above the birds: configurations and challenges of wetland restoration in the Po Delta, Italy*. Restoration Ecology, 24(6), 773-784.

Rustagi, D., Engel, S., & Kosfeld, M. (2010). *Conditional cooperation and costly monitoring explain success in forest commons management*. Science, 330(6006), 961-965.

Sarkar, S., & Montoya, M. (2011). *Beyond parks and reserves: The ethics and politics of conservation with a case study from Perú.* Biological Conservation, 144(3), 979-988.

Shaheen, S., Guzman, S., & Zhang, H. (2010*). Bikesharing in Europe, the Americas, and Asia: past, present, and future.* Journal of the Transportation Research Board, 2143, 159-167.

Steinfeld, H. & Chilonda, P. (2006). *Old Players, New Players*. In: FAO. (2006). Livestock Report. FAO, Rome.

Steffen, W., Broadgate, W., Deutsch, L., Gaffney, O., & Ludwig, C. (2015). *The trajectory of the Anthropocene: The Great Acceleration.* The Anthropocene Review, 2(1), 81-98.

Sudarshan, A. (2014). *Nudges in the marketplace: Using peer comparisons and incentives to reduce household electricity consumption.* Working Paper. Energy Policy Institute, Chicago.

Thaler, R., & Sunstein C. (2008). *Nudge: Improving decisions about health, wealth and happiness.* Yale University Press, London.

Tversky, A., & Kahneman, D. (1974). *Judgment under Uncertainty: Heuristics and Biases*. Science, 185 (4157), 1124–1131.

United Nations Environment Programme. (2010). *Assessing the Environmental Impacts of Consumption and Production: Priority Products and Materials.* A Report of the Working Group on the Environmental Impacts of Products and Materials to the International Panel for Sustainable Resource Management. UNEP, Paris.

United Nations Environment Programme. (2016). *A framework for shaping sustainable lifestyles: determinants and strategies.* UNEP, Kenya.

United Nations Environment Programme. (2017). *Consuming Differently, Consuming Sustainably: Behavioural Insights for Policy making.* UNEP, Kenya.

Van Loo, E. J., Caputo, V., Nayga, R. M., Seo, H. S., Zhang, B., & Verbeke, W. (2015). *Sustainability labels on coffee: Consumer preferences, willingness-to-pay and visual attention to attribute*s. Ecological Economics, 118, 215-225.

Verplanken, B., Walker, I., Davis, A., & Jurasek, M. (2008). *Context change and travel mode choice: Combining the habit discontinuity and self-activation hypotheses*. Journal of Environmental Psychology, 28(2), 121-127.

Vitebsky, P. (2005). *Reindeer People*. HarperCollins, New York.

Vlaeminck, P., Jiang, T., & Vranken, L. (2014). *Food labeling and eco-friendly consumption: Experimental evidence from a Belgian supermarket*. Ecological Economics, 108, 180-190.

Wezel, A., Casagrande, M., Celette, F., Vian, J. F., Ferrer, A., & Peigné, J. (2014). *Agroecological practices for sustainable agriculture. A review.* Agronomy for Sustainable Development, 34(1), 1-20.

Wiersum, K. F., & Endalamaw, T. B. (2012). *Governing Forests for Provisioning Services: The Example of Honey Production in Southwest Ethiopia.* Governing the Provision of Ecosystem Services, 4, 303-318.

Wilson, T.A. (2011). Redirect: *The surprising new science of psychological change*. Little, Brown and Company, New York.

Wily, L.A. (2002). *Participatory forest management in Africa: an overview of progress and issues.* In: Second international workshop on participatory forestry in Africa. Defining the way forward: sustainable livelihoods and sustainable forest management through participatory forestry, Arusha, United Republic of Tanzania, 18-22.

World Business Council for Sustainable Development. (2008). *Sustainable consumption. Facts and trends: From a business perspective.* World Business Council for Sustainable Development, Geneva.

World Business Council for Sustainable Development. (2006). *Facts and Trends: Water.* World Business Council for Sustainable Development, Geneva.

WWF. (2017). *Appetite for Destruction.* Retrieved 20/12/2017 from: https://www.wwf.org.uk/sites/default/files/2017-11/WWF_AppetiteForDestruction_Full_Report_Web_0.pdf

Wynes, S., & Nicholas, K. A. (2017). *The climate mitigation gap: education and government recommendations miss the most effective individual actions*. Environmental Research Letters, 12(7).

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