



DNZ | DELIVERING NET ZERO

WORKSHOP BACKGROUND BRIEFING
SOCIAL CHANGE

INTRODUCTION

Fossil fuel energy has deeply shaped the socio-technical organisation of modern societies; economic structures, political institutions, finance, the flow of knowledge and social ideals have been founded in relation to the control and distribution of energy and natural resources¹. Confronting the dependency of modern societies on fossil fuels will require structural change across many of these institutions which shape every aspect of people's lives. As a result people and society are deeply implicated in the changes required to deliver net zero, to the extent that public support for transition pathways and their associated ambitious policies, alongside the ability to change social practices, could either greatly facilitate or alternatively derail possible plans. Ambitious policies will also be needed such that structures of governance, which have often acted as barriers to change, can be transformed to facilitate it.

SOCIAL CONTRACTS AND 'SOCIAL ACCEPTABILITY'

Shifting to an ultra-low carbon economy will undoubtedly bring substantial changes to people's lives. Reducing energy demand means changing social conduct and social practices, whilst any top-down changes to physical energy infrastructure will require acceptability by users. Substantial public funding will be required to finance the transition, and it is important that the many varied and different publics within UK society perceive this as being fairly and appropriately spent²⁻⁴. In the past, new energy infrastructure projects have often faced local hostility, which has led to projects being delayed or sometimes abandoned⁵. To ensure that low carbon infrastructure and policies are accepted within society, they must either resonate with current social values, or a new social contract for change must be built. While the values taken into consideration in low carbon policy development are usually limited to areas like efficiency, energy security and finance, research shows that the public take into account a much broader set of values, emphasising social justice and fairness, autonomy and broader environmental issues^{6,7}. Table 1 synthesises a set of social values and principles held by publics towards whole system energy transitions⁸.

Table 1 - Public value system for whole system energy change. Adapted from Demski et al. (2015).

Value	Details
Efficient and not wasteful	A preference for high levels of efficiency both in energy technologies themselves and in the ability of the system to capture new opportunities. There are negative attitudes towards waste, particular in relation to nuclear and CCS.
Environment and nature	Negative attitudes toward systems which produce pollutants and cause environmental damage. Fossil fuels are perceived as unsustainable and damaging, and there are concerns about contamination of the natural environment from fossil fuel and nuclear energy sources. Renewable energy is perceived as more natural. Biomass is not perceived as natural as other renewable sources and there are concerns about its mismanagement.
Security and stability	Energy systems should produce reliable and safe access to energy for everyone in society. There are concerns about affordability of access to energy, and safety of those working in or living in close vicinity to infrastructure. Technologies with limited local negative impact are perceived as more acceptable than those with more significant, but less likely risks. There are concerns that technological changes should not put people and businesses at risk.
Social justice and fairness	There are strong preferences for fair distributions of risks and benefits across society. Concerns that transitions should not disproportionately affect the vulnerable extend to those living outside the UK and future generations. There is a desire for institutions, industry and government to be more honest and transparent about their actions. The primary responsibility for ensuring transitions is placed with the national government, with a smaller responsibility given to energy companies and individuals.
Autonomy and power	Energy transitions should develop in ways that do not significantly threaten autonomy or personal freedoms. There is support for enabling shifts in demand through advice or information, but negative attitudes towards technologies perceived as being imposed or externally controlled. There are also negative views towards powerful energy companies perceived as monopolising the system, and dependency on energy imports, with favourable views towards micro-generation.
Process and change	There are preferences for a long-term focus in energy trajectories, which are complimentary with improvements in quality of life. There are concerns about some aspects of change negatively impacting quality of life and aspects of UK culture, for example reactions against flying less or eating less meat.

Following from this system of values, research shows clear preferences for certain technologies and approaches. Renewable energy is strongly favoured, particularly offshore wind, marine and solar energy. Reducing energy demand is also viewed positively, although some strategies perceived as restricting individual autonomy provoke resistance. There is more ambiguity around the use of biofuels, CCS, and nuclear, which are considered by many as only short term solutions^{6,8,9}. Although there are complex conceptual debates about what constitutes 'public acceptability', our view is that this is always conditional, determined not only by the type of technology but its compatibility with public values, which are often invoked by particular social and geographical contexts. Hence, even apparently popular technologies could face opposition if deployed in ways perceived to be contradictory to equity or other social values⁸, while others might equally gain a degree of acceptance if the right contextual or local conditions are in place.



LOCAL ACCEPTABILITY OF INFRASTRUCTURE

While there are high levels of public support for renewable energy infrastructure, communities can sometimes object strongly to projects in their local area¹⁰. Local objectors are frequently understood as ‘NIMBYs’ (not-in-my-back-yard) who support renewable energy infrastructure in principle, but oppose development in their local area due to ignorance, irrationality or self-interest¹¹. The NIMBY concept has been strongly critiqued by social scientists, but it remains a powerful public discourse¹². There is little clear empirical evidence to demonstrate that communities oppose energy infrastructure projects simply because of calculated self-interest or irrationality (NIMBYism)^{13,14}.

Research shows that there are other rational drivers behind local opposition to infrastructure projects which are important for developers to understand: as for example concerns over visual and noise impacts, impacts on local wildlife, economic impacts on land value, and a lack of trust in developers¹⁵. Another consideration is that opposition arises from the disruption of place-based attachments, when residents feel that energy infrastructure, which is often perceived as ‘industrial development’, clashes with historical, aesthetic or ‘natural’ place-based identities¹⁶. Projects are therefore more likely to be accepted if they maintain or promote place-based distinctiveness and historical continuity¹⁷. While characterising local opposition as NIMBYism has led to a belief that offshore wind is likely to be more locally acceptable than onshore wind due to the distancing of the infrastructure, a place-based analysis reveals that the same issues can arise as place-based attachments extend out to the view of the horizon¹⁶. Technological symbolism, for example a project being viewed as ‘experimental’ vs ‘pioneering’, can also drive public support or opposition¹⁸.

Despite much evidence questioning the concept, NIMBYism still dominates the way that many policy-makers and technology developers perceive the public, and this often impacts the way that public engagement is carried out¹². In the past, public engagement has typically comprised education campaigns and one-way communication aimed to minimise anticipated disputes. However, giving publics limited opportunities to participate can fuel opposition if residents feel that their concerns are unheard¹¹, and focusing on financial compensation can reinforce fears that ‘bribes’ are being provided so that powerful institutions can unfairly profit from a project bringing local harms⁵. More participatory consultation processes could bring normative and substantive benefits¹¹, however this means keeping proposals flexible to adapt to the locally acceptable conditions.

SOCIAL PRACTICES AND BEHAVIOURAL CHANGE

Changes to social practices and lifestyles can also play a key role in the transition to net zero. Modelling from the UK¹⁹ and US²⁰ suggests that changes to lifestyles and household consumption can achieve significant emissions savings through energy demand reduction. The Climate Change Committee (CCC) estimates that over 15% of emissions abatement requires direct behavioural change, and a further 40% of measures involve a combination of behavioural and technological change²¹. A recent meta-analysis of studies for the CREDS consortium ranks various consumption options in terms of their capacity to reduce carbon footprints²² (see Annex 1) concluding that taken together the top ten items have the potential for reduction of 9.2 tCO₂ equivalent per capita as against the current US (13.4) and European (7.5) averages. However, longstanding research also shows that theoretically achievable demand reduction is rarely achieved²³ in part because assumptions being made in models about human behaviour prove partly or wholly unrealistic.

In addition, we know that many environmental actions which are relatively easy and popular (recycling) may have low impact in terms of emissions reduction, while those which are more consequential (living car free in a rural location) are often far harder for people to enact. Other changes may depend upon first providing major infrastructure, such as that needed for active travel, which require time and resources to put in place. The situation becomes even more complex when we consider that much of our consumption derives from activities which support and sustain our valued social relationships, particularly those that we share with others that we care about (children, family members, partners, friends, animals) or with objects and activities that we value. Such practices are as a consequence particularly difficult to change in psychosocial terms because they define for many people what it means to live a worthwhile life²⁴. As consumption is also underpinned by the growth economy and bolstered by governments to support public revenues, fundamentally shifting consumption patterns may require corresponding transformational shifts in economic structures.

While there is little precedent in peacetime for how to deliver far-reaching pro-environmental lifestyle change, the response to the COVID-19 pandemic shows that rapid behavioural change is possible if the situation demands it. Research suggests that times of disruption are when people are most likely to break old habits²⁵, hence some pro-environmental behavioural change brought about by the pandemic may be retained into the future²⁶. However, the sudden and stringent government lockdown restrictions have brought immense costs to welfare and the economy, as well as disruptions to our valued social relations, and are evidently not a readily transferrable model for climate action. Governments currently lack the social mandate to enforce the scale of lifestyle change seen in the pandemic as a response to climate change, which is still generally perceived as a psychologically distant threat²⁷ in comparison to the urgent mortal danger of COVID-19^{26,28}. Ultimately, governments will need to build a social contract for transformative change such that the kind of behavioural interventions necessary to deliver on net zero promises are both possible for people as well as socially acceptable²⁸.

However, there is a lack of consensus over how best to achieve long-lasting behavioural change. Some focus on using smart technologies and automation to engineer behavioural change without relying on the public to take action²⁹. Social psychologists assert that behaviour can be influenced by changing the choices of individuals, which are in turn influenced by values and attitudes^{30,31}. Strategies to change behaviour therefore focus on changing beliefs and attitudes, and in some cases changing the conditions under which decisions are made or framed³². This individualistic approach has until very recently been politically popular in the UK due to its compatibility with neoliberal thinking, and many interventions have

focused on supporting individuals to manage their own behavioural change^{33,34}. However, this approach has been criticised by social scientists who argue that it lacks an emphasis on the social contexts and constraints under which decisions are made, and fails to challenge the fundamental social and economic systems and processes which create current unsustainable social practices^{31,35}. Other critiques note the limited effectiveness of many individualistic behavioural change interventions such as ‘nudge’ mechanisms and information based policy instruments^{33,36}.

Social practice theory by contrast views the unit of analysis to be the social practice itself (caring for others, travelling for work, socialising), which is constructed by material elements (infrastructure/ technologies), social meanings and competences/procedural elements^{33,37}. This approach emphasises that interventions to change individual behaviours are rarely enough to alter social practices, which are constituted at a systems level³⁸. Hence, referring to the lifestyle and other consumption-based changes listed in Annex 1²², one should ask, not only what decision might individuals take to adopt the change, but can structural, economic or governance changes be made which are compatible with the proposed alterations to practice. While social practice theory gives a stronger understanding of the complex range of elements which constitute social behaviour, and a broader range of potential interventions, its implications for policy are less clear³⁸. Indeed, Marsden et al.³² show that policy makers understand and accept that individual choice interventions are likely to have a limited impact on behaviour, and that more significant changes to social and economic structures are necessary to facilitate change, and yet the individual choice model still dominates with policies rarely aiming to significantly alter contextual conditions. This reveals an additional challenge of confronting deeply engrained policy logics and the social practices and behaviours of policy makers themselves³², which is further discussed below.

A potential route to structural change is found in the literature around limits to growth, de-growth and ideas such as the ‘doughnut economy’, which look at restructuring economic priorities away from consumption and GDP growth towards environmental sustainability and wellbeing^{39–41}. This argues for a more radical transformation of society which lies in tension with the behavioural science perspective described previously which seeks to reform individual choices. Radical transformations require not only changes on a personal and technical scale, but equally a transformation of the power relations and social inequalities entrenched in the structures which have created the current unsustainable systems; capitalism, the nation-state, patriarchy, colonialism, individualism, etc.⁴². It is argued by some that challenging political hegemony in this way must come from the bottom up, making social movements the key to radical transformations⁴³. Grassroots activism is also important for ensuring that climate justice is at the centre of the net zero transition, as community organising is often actively orientated more towards impacts of any changes upon the marginalised. Furthermore, through lobbying and presenting a radical case for the actions needed to live sustainably, social movements can open up new possibilities and push policy makers towards them⁴⁴.

CLIMATE GOVERNANCE

This section explores in more detail the implications of the need for rapid transformational change in the field of governance. There are a wide range of strategies available to policy makers to deliver net zero, from stronger product standards, building regulations, pricing mechanisms, technology subsidies, nationalisation of transport and energy infrastructure, accessing alternative forms of finance, to broader approaches aiming to change the structure of the economy. The latter include encouraging new business models, adopting alternative indicators to GDP, and de-growth strategies like universal basic income/ services, reducing working hours, job guarantees and job shares etc. ^{41,45}. However, political institutions face multiple levels of inertia and current systems of governance are acting as barriers to change ^{46,47}. Ideologically, neoliberal thinking has entrenched system liberalisation and privatisation whilst constraining state capacity to intervene or legislate⁴⁵ (although this may well be one aspect of contemporary UK political ideology which is indeed shifting as a result of the pandemic). This has centred individualistic, market-based solutions to climate change and facilitated an energy system dominated by a small group of incumbent energy firms with influence over energy policy making. Market-pull focused policies supporting the low carbon electricity transition have led to the development of large-scale, centralised technologies by existing system actors, which consequently limits the ability of local authorities to invest in and develop regional projects⁴⁸. Local governments and other actors could also play a much stronger role in developing low carbon planning, public services, decentralised energy infrastructure (for both supply and demand reduction), and engaging citizens in their local community⁴⁹. However a decade of budget cuts has severely weakened local government institutional and financial capacity^{50,51}.

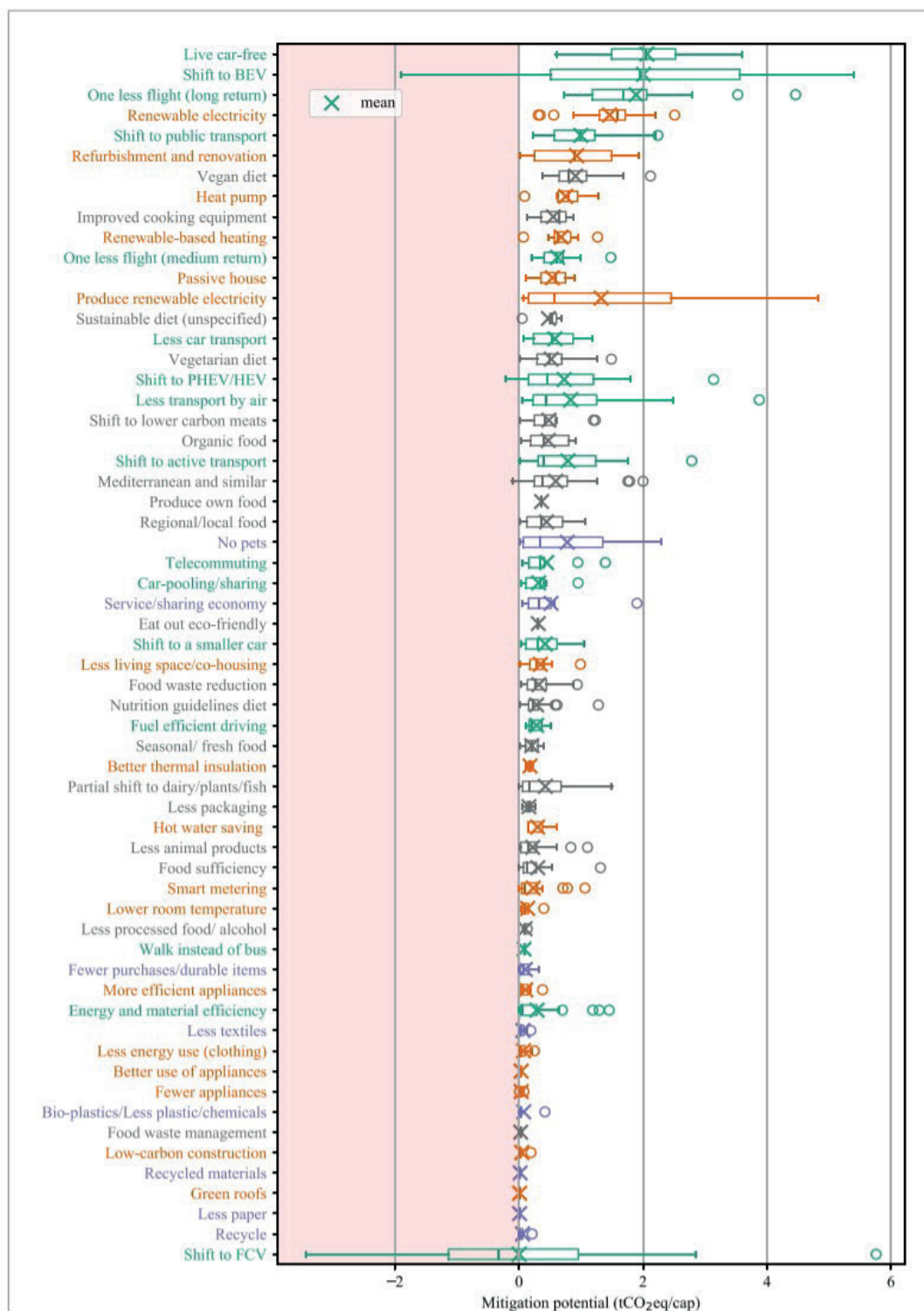
Furthermore, mainstream economic thinking remains firmly rooted in the paradigm of economic growth as both necessary and desirable and this shapes the transition pathways considered politically palatable to governments⁴⁵. Reshaping economic priorities away from GDP growth towards environmental and social wellbeing could broaden mitigation options and reconfigure economic activities away from increasing carbon intensive material throughput⁴¹. However, currently economic interests are reinforced by the disproportionate influence of corporate vested interests in the policy process, which work to maintain the status quo of fossil fuelled consumer capitalism⁵². Notably, the UK government is still supporting the fossil fuel industry through fiscal policy, the largest subsidy in the EU and one significantly larger than those available for renewables⁵³. There is also a lack of transparency in the UK over the activities of lobbyists, and evidence suggests a revolving door between politicians, civil servants and the fossil fuel industry^{54,55}. Mobilising the power of investors through divestment campaigns could be an important way to disrupt the financial influence of the fossil fuel industry^{56,57}, and steps should be taken to increase transparency over the lobbying of government ministers and civil servants⁵⁸. Strengthening legal access could also be an approach to help citizens hold polluting companies and governments to account⁴⁵.

Another barrier to political action is created by the tension between short-term electoral cycles and the need for long-term climate strategies involving significant upfront capital expenditure⁴⁵. Although the creation of the UK Climate Change Committee supported by an all-party consensus was one early governance response to that dilemma⁵⁹, the unambitious UK policy landscape remains bedevilled by a lack of political will from short-term focused and risk adverse policy makers who do not perceive decarbonisation as a priority for their electorate⁶⁰. Strengthening popular understanding and support for mitigation options is therefore likely to be important to incentivise policy makers to pass stronger legislation without fear of a public backlash. More effective communication of the required changes which better appeal to the values of different groups in society is central to this⁶¹. Prior to the COVID-19 pandemic, there was a wave of experimentation in the UK with deliberative processes like the National Citizen's Climate Assembly and several local citizen's juries, which largely revealed an appetite amongst the public for much more ambitious climate action, a finding also consistent with previous academic research^{8,9}. A further expansion of similar public participation methods will likely be important to build a social contract and the necessary political mandate for change²⁸. Social movements and the media also have the potential to play a key role in galvanising public support^{62,63}. Overall a closer attention must be paid to overcoming the political barriers to net zero, which pose a challenge which may be even larger than the technical ones.



ANNEX

Figure 1 - A summary of the mitigation potential of consumption options, from Ivanova et al. (2020). Negative values (in red area) represent the potential for backfire. The x-s represent the average mitigation potential within the same consumption option (options ordered by medians).



REFERENCES

- 1 Mitchell T. Carbon democracy. *Econ Soc.* 2009;38(3):399-432. doi:10.1080/03085140903020598
- 2 Clayton S, Devine-Wright P, Stern PC, et al. Psychological research and global climate change. *Nat Clim Chang.* 2015;5(7):640-646. doi:10.1038/nclimate2622
- 3 Eriksson L, Garvill J, Nordlund AM. Acceptability of travel demand management measures: The importance of problem awareness, personal norm, freedom, and fairness. *J Environ Psychol.* 2006;26(1):15-26. doi:10.1016/j.jenvp.2006.05.003
- 4 Dreyer SJ, Walker I. Acceptance and Support of the Australian Carbon Policy. *Soc Justice Res.* 2013;26(3):343-362. doi:10.1007/s11211-013-0191-1
- 5 Pidgeon N, Demski CC. From nuclear to renewable: Energy system transformation and public attitudes. *Bull At Sci.* 2012;68(4):41-51. doi:10.1177/0096340212451592
- 6 Butler C, Demski C, Parkhill K, Pidgeon N, Spence A. Public values for energy futures: Framing, indeterminacy and policy making. *Energy Policy.* 2015;87:665-672. doi:10.1016/j.enpol.2015.01.035
- 7 Thomas G, Demski C, Pidgeon N. Deliberating the social acceptability of energy storage in the UK. *Energy Policy.* 2019;133:110908. doi:10.1016/j.enpol.2019.110908
- 8 Demski C, Butler C, Parkhill KA, Spence A, Pidgeon NF. Public values for energy system change. *Glob Environ Chang.* 2015;34:59-69. doi:10.1016/j.gloenvcha.2015.06.014
- 9 Parkhill KA, Demski C, Butler C, Spence A, Pidgeon N. Transforming the UK Energy System : Public Values, Attitudes and Acceptability - Synthesis Report. UKERC; 2013.
- 10 Cohen JJ, Reichl J, Schmidthaler M. Re-focussing research efforts on the public acceptance of energy infrastructure: A critical review. *Energy.* 2014;76:4-9. doi:10.1016/j.energy.2013.12.056
- 11 Devine-Wright P. Public engagement with large-scale renewable energy technologies: breaking the cycle of NIMBYism. *Wiley Interdiscip Rev Clim Chang.* 2011;2(1):19-26. doi:10.1002/wcc.89
- 12 Burningham K, Barnett J, Walker G. An Array of Deficits: Unpacking NIMBY Discourses in Wind Energy Developers' Conceptualizations of Their Local Opponents. *Soc Nat Resour.* 2015;28(3):246-260. doi:10.1080/08941920.2014.933923
- 13 Bell D, Gray T, Haggett C, Swaffield J. Re-visiting the 'social gap': public opinion and relations of power in the local politics of wind energy. *Env Polit.* 2013;22(1):115-135. doi:10.1080/09644016.2013.755793
- 14 Jones CR, Eiser JR. Identifying predictors of attitudes towards local onshore wind development with reference to an English case study. *Energy Policy.* 2009;37(11):4604-4614. doi:10.1016/j.enpol.2009.06.015
- 15 Petrova MA. From NIMBY to acceptance: Toward a novel framework - VESPA - For organizing and interpreting community concerns. *Renew Energy.* 2016;86:1280-1294. doi:10.1016/j.renene.2015.09.047
- 16 Devine-Wright P, Howes Y. Disruption to place attachment and the protection of restorative environments: A wind energy case study. *J Environ Psychol.* 2010;30(3):271-280. doi:10.1016/j.jenvp.2010.01.008
- 17 Devine-Wright, Batel P&. Citation for published item: multiple place attachments and climate change concern on social acceptance of energy infrastructure. doi:10.1016/j.gloenvcha.2017.08.003
- 18 McLachlan C. Technologies in Place: Symbolic Interpretations of Renewable Energy. *Sociol Rev.* 2009;57(2_suppl):181-199. doi:10.1111/j.1467-954X.2010.01892.x

REFERENCES CONTINUED

- 19 Skea J, Ekins P, Winskel M. Making the Transition to a Secure and Low-Carbon Energy System: Synthesis Report.; 2009. Accessed January 18, 2021. www.ukerc.ac.uk
- 20 Dietz T, Gardner GT, Gilligan J, Stern PC, Vandenberg MP. Household actions can provide a behavioral wedge to rapidly reduce US carbon emissions. *Proc Natl Acad Sci U S A*. 2009;106(44):18452-18456. doi:10.1073/pnas.0908738106
- 21 Committee on Climate Change. Policies for the Sixth Carbon Budget and Net Zero.; 2020. Accessed December 11, 2020. www.theccc.org.uk/publications
- 22 Ivanova D, Barrett J, Wiedenhofer D, Macura B, Callaghan M, Creutz F. Quantifying the potential for climate change mitigation of consumption options. *Environ Res Lett*. 2020;15(9):093001. doi:10.1088/1748-9326/ab8589
- 23 Wilson C, Dowlatabadi H. Models of Decision Making and Residential Energy Use. *Annu Rev Environ Resour*. 2007;32(1):169-203. doi:10.1146/annurev.energy.32.053006.141137
- 24 Henwood K, Pidgeon N, Groves C, Shirani F, Butler C, Parkhill K. Energy Biographies: Research Report.; 2016. doi:10.13140/RG.2.1.1942.0245
- 25 Kurz T, Gardner B, Verplanken B, Abraham C. Habitual behaviors or patterns of practice? Explaining and changing repetitive climate-relevant actions. *Wiley Interdiscip Rev Clim Chang*. 2015;6(1):113-128. doi:10.1002/wcc.327
- 26 Fuentes R, Galeotti M, Lanza A, Manzano B. COVID-19 and Climate Change: A Tale of Two Global Problems. *SSRN Electron J*. Published online May 20, 2020. doi:10.2139/ssrn.3604140
- 27 Spence A, Poortinga W, Pidgeon N. The Psychological Distance of Climate Change. *Risk Anal*. 2012;32(6):957-972. doi:10.1111/j.1539-6924.2011.01695.x
- 28 Howarth C, Bryant P, Corner A, et al. Building a Social Mandate for Climate Action: Lessons from COVID-19. *Environ Resour Econ*. 2020;76(4):1107-1115. doi:10.1007/s10640-020-00446-9
- 29 Staddon SC, Cycil C, Goulden M, Leygue C, Spence A. Intervening to change behaviour and save energy in the workplace: A systematic review of available evidence. *Energy Res Soc Sci*. 2016;17:30-51. doi:10.1016/j.erss.2016.03.027
- 30 Avineri E. On the use and potential of behavioural economics from the perspective of transport and climate change. *J Transp Geogr*. 2012;24:512-521. doi:10.1016/j.jtrangeo.2012.03.003
- 31 Shove E. Beyond the ABC: Climate Change Policy and Theories of Social Change. *Environ Plan A Econ Sp*. 2010;42(6):1273-1285. doi:10.1068/a42282
- 32 Marsden G, Mullen C, Bache I, Bartle I, Flinders M. Carbon reduction and travel behaviour: Discourses, disputes and contradictions in governance. *Transp Policy*. 2014;35:71-78. doi:10.1016/j.tranpol.2014.05.012
- 33 Spotswood F, Chatterton T, Tapp A, Williams D. Analysing cycling as a social practice: An empirical grounding for behaviour change. *Transp Res Part F Traffic Psychol Behav*. 2015;29:22-33. doi:10.1016/j.trf.2014.12.001
- 34 Hargreaves T. Practice-ing behaviour change: Applying social practice theory to pro-environmental behaviour change. *J Consum Cult*. 2011;11(1):79-99. doi:10.1177/1469540510390500
- 35 Batel S, Castro P, Devine-Wright P, Howarth C. Developing a critical agenda to understand pro-environmental actions: contributions from Social Representations and Social Practices Theories. *Wiley Interdiscip Rev Clim Chang*.

REFERENCES CONTINUED

2016;7(5):727-745. doi:10.1002/wcc.417

36 Moloney S, Strengers Y. 'Going Green'?: The Limitations of Behaviour Change Programmes as a Policy Response to Escalating Resource Consumption. *Environ Policy Gov.* 2014;24(2):94-107. doi:10.1002/eet.1642

37 Kurz T, Gardner B, Verplanken B, Abraham C. Habitual behaviors or patterns of practice? Explaining and changing repetitive climate-relevant actions. *Wiley Interdiscip Rev Clim Chang.* 2015;6(1):113-128. doi:10.1002/wcc.327

38 Heiskanen E, Laakso S. Editing out unsustainability from consumption: From information provision to nudging and social practice theory. In: *A Research Agenda for Sustainable Consumption Governance.* Edward Elgar Publishing; 2019:156-171. Accessed December 11, 2020. https://econpapers.repec.org/RePEc:elg:eechap:18253_10

39 Jackson T. Prosperity without Growth? The Transition to a Sustainable Economy.; 2009. Accessed February 5, 2021. www.sd-commission.org.uk/Scotland@sd-commission.org.uk
www.sd-commission.org.uk/scotlandWalesWales@sd-commission.org.uk
www.sd-commission.org.uk/waleswww.sd-commission.org.uk/northern_ireland

40 Raworth K. Why it's time for Doughnut Economics. *IPPR Progress Rev.* 2017;24(3):216-222. doi:10.1111/newe.12058

41 Hickel J. Degrowth: a theory of radical abundance. *Real-World Econ Rev.* 2019;(87). Accessed December 18, 2020. <https://rwer.wordpress.com/comments-on-rwer-issue-no-87/>

42 Temper L, Walter M, Rodriguez I, Kothari A, Turhan E. A perspective on radical transformations to sustainability: resistances, movements and alternatives. *Sustain Sci.* 0:3. doi:10.1007/s11625-018-0543-8

43 Stuart D, Gunderson R, Petersen B. The climate crisis as a catalyst for emancipatory transformation: An examination of the possible. *Int Sociol.* 2020;35(4):433-456. doi:10.1177/0268580920915067

44 Gunningham N. Averting Climate Catastrophe: Environmental Activism, Extinction Rebellion and coalitions of Influence. *King's Law J.* 2019;30(2):194-202. doi:10.1080/09615768.2019.1645424

45 Centre for Alternative Technology. Zero Carbon Britain: Making It Happen.; 2017. Accessed December 14, 2020. <https://www.cat.org.uk/info-resources/zero-carbon-britain/research-reports/zero-carbon-britain-making-it-happen/>

46 Li FGN, Strachan N. Modelling energy transitions for climate targets under landscape and actor inertia. *Environ Innov Soc Transitions.* 2017;24:106-129. doi:10.1016/j.eist.2016.08.002

47 Bailey R, Preston F. Stuck in Transition: Managing the Political Economy of Low-Carbon Development.; 2014. Accessed December 14, 2020. http://www.climatechange2013.org/images/uploads/WGI_AR5_SPM_brochure.pdf.

48 Kattirtzi M, Ketsopoulou I, Watson J. Incumbents in transition? The role of the 'Big Six' energy companies in the UK. *Energy Policy.* 2021;148:111927. doi:10.1016/j.enpol.2020.111927

49 Fuhr H, Hickmann T, Kern K. The role of cities in multi-level climate governance: local climate policies and the 1.5 °C target. *Curr Opin Environ Sustain.* 2018;30:1-6. doi:10.1016/j.cosust.2017.10.006

50 Scott F. Is Localism Delivering for Climate Change? Is Localism Delivering for Climate Change? Emerging Responses from Local Authorities, Local Enterprise Partnerships and Neighbourhood Plans.; 2011. Accessed August 23, 2020. www.green-alliance.org.uk

REFERENCES CONTINUED

- 51 Walker BJ, Adger WN, Russel D. Institutional barriers to climate change adaptation in decentralised governance structures: Transport planning in England. *Urban Stud.* 2015;52(12):2250-2266. doi:10.1177/0042098014544759
- 52 Mandel K. How much does ExxonMobil spend on lobbying in Europe? . openDemocracy. <https://www.opendemocracy.net/en/opendemocracyuk/how-much-does-exxonmobil-spend-on-lobbying-in-europe/>. Published January 20, 2016. Accessed December 14, 2020.
- 53 European Commission. Energy Prices and Costs in Europe: Report from the Commission to the European Parliament, The Council, The European Economic and Social Committee and the Committee of the Regions.; 2019. Accessed December 15, 2020. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=COM:2019:1:FIN&from=EN>
- 54 Cave T, Rowell A. *A Quiet Word: Lobbying, Crony Capitalism and Broken Politics in Britain*. Random House; 2014. Accessed December 14, 2020. https://books.google.co.uk/books?id=xYtAAQAAQBAJ&lr=&source=gbs_navlinks_s
- 55 Sandler Clarke J, McClenaghan M. Revealed: How the gas industry spent tens of millions of pounds lobbying UK & EU policymakers. Greenpeace: Unearthed. Published February 25, 2016. Accessed December 14, 2020. <https://unearthed.greenpeace.org/2016/02/25/revealed-gas-industry-millions-pounds-lobbying-policymakers/>
- 56 Hestres LE, Hopke JE. Fossil fuel divestment: theories of change, goals, and strategies of a growing climate movement. *Env Polit.* 2020;29(3):371-389. doi:10.1080/09644016.2019.1632672
- 57 Bergman N. Impacts of the Fossil Fuel Divestment Movement: Effects on Finance, Policy and Public Discourse. *Sustainability.* 2018;10(7):2529. doi:10.3390/su10072529
- 58 Cave T. Political and Constitutional Reform Committee: Written Evidence Submitted by Tamasin Cave, SpinWatch.; 2013. Accessed December 17, 2020. <https://publications.parliament.uk/pa/cm201314/cmselect/cmpolcon/601/601vw09.htm>
- 59 Clayton H, Pidgeon NF, Whitby M. Is a Cross-Party Consensus on Climate Change Possible – or Desirable? Report of First Inquiry 2006. Westminster; 2006. Accessed January 18, 2021. http://www.gci.org.uk/Documents/Climate_Change_Consensus_Report_.pdf
- 60 Rickards L, Wiseman J, Kashima Y. Barriers to effective climate change mitigation: The case of senior government and business decision makers. *Wiley Interdiscip Rev Clim Chang.* 2014;5(6):753-773. doi:10.1002/wcc.305
- 61 Gunster S. Engaging climate communication: audiences, frames, values and norms. In: Hackett R, Forde S, Gunster S, Foxwell-Norton K, eds. *Journalism and Climate Crisis: Public Engagement, Media Alternatives*. Taylor and Francis; 2017. Accessed December 18, 2020. https://books.google.co.uk/books?id=LDolDwAAQBAJ&lr=&source=gbs_navlinks_s
- 62 Piggot G. The influence of social movements on policies that constrain fossil fuel supply. *Clim Policy.* 2018;18(7):942-954. doi:10.1080/14693062.2017.1394255
- 63 Gavin NT. Media definitely do matter: Brexit, immigration, climate change and beyond. *Br J Polit Int Relations.* 2018;20(4):827-845. doi:10.1177/1369148118799260

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