After Paris: transitions for sustainable consumption

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ABSTRACT

Consumption emissions-reduction measures based on an individualized model of consumption, marginal lifestyle changes, and technological innovation alone cannot meet the ambitions of the 2015 Paris Agreement to hold global temperature increases below 2 °C. Radical shifts in the societal organization of consumption and production are urgently required to address the scale of the global challenge. Policy for sustainable consumption must be understood in the context of the urgent need for demand-side emissions reductions to reach critical medium-term targets by 2030. Global sustainability policy has remained chiefly focused on technological innovation. Where consumption is recognized, policy approaches have been dominated by ‘behavior-change’ initiatives that frame the challenge as one of individual choices, usually in the context of markets. Social scientific approaches, by contrast, argue that consumption should be understood as instituted and embedded in wider systems – social, cultural, economic, and material. Escalating levels of environmental impact result from the bundle of goods and services taken for granted as necessities of everyday life by the growing global consumer class. Furthermore, sustainable consumption is fundamentally an issue of inequality. More equitable distribution of consumption-based emissions within and between societies is critical within the context of absolute emission reductions. The policies should address the social organization of consumption and the dynamic trajectories through which sociotechnical change takes place (the coevolution of technical systems and social practices). Policy integration regarding sustainable consumption that embraces reflexive governance and radical experimentation engaging with sociotechnical trajectories is critical to meet the ambitious goals of the Paris Agreement.

Introduction

The 2015 Paris Agreement (COP21) pledged to accelerate efforts to hold global average temperatures to below 2 °C above pre-industrial levels, with the ambition of a 1.5 °C limit, and recognized ‘that sustainable lifestyles and sustainable patterns of consumption and production … play an important role in addressing climate change’ (UNFCC 2015, p. 21). The Intergovernmental Panel on Climate Change’s (IPCC) Special Report on 1.5 °C has stressed that there is a significant risk that key tipping points in the climate system may be reached within 1.5–2 °C of global warming (IPCC 2018a). However, the IPCC has concluded that keeping global temperature increases to 1.5 °C is still possible with ‘rapid and far-reaching transitions’ in systems of consumption and production, as well as protection and restoration of ecosystems (IPCC 2018b, C2). The IPCC is unequivocal that changes in consumption patterns consistent with ‘low energy demand and low demand for land- and GHG-intensive consumption goods’ are critical components of 1.5 °C scenarios (IPCC 2018a, p. 4). In 2017, however, almost thirty years after the first IPPC report, global greenhouse-gas (GHG) emissions were 60% higher than in 1990. GHG releases continue to grow in lockstep with global economic growth.

According to scientists at the Tyndall Climate Change Centre, if we are to allow equitable near-term economic development of poorer nations, even a 50% chance of 2 °C implies near-term annual emissions cuts of 8–10% for the wealthy nations (Anderson and Bows 2011). The economist Nicholas Stern has noted that, thus far, annual reductions of greater than 1% have been associated only with economic recession or upheaval (Stern 2006). Clearly, nothing short of fundamental transformations of the production-consumption systems that drive emissions, and profound change in the socioeconomic system that underpins them, will be sufficient if we are to achieve anything near such targets.
The United Nations Environment Program (UNEP) has called the gap between the GHG emission reductions needed and the national pledges made in Paris ‘alarmingly high’ and has called for both ‘accelerated short-term action’ and enhanced long-term ambitions. Moreover, according to UNEP, if the emissions gap is not closed by 2030 it is extremely unlikely that holding global temperature increases to well below 2°C can still be achieved (UNEP 2017a). It is within this context – of the critical requirement for demand-side emissions reductions to meet medium-term emissions targets – that the urgent need for policy focus on sustainable consumption should be understood.

Given the long lead times necessary for large-scale changes toward both low-carbon energy-supply technologies and wider technological changes to reduce material use in economic activity, supply-side changes alone cannot deliver the near-term, deep cuts in emissions necessary for even a low probability of meeting the ambitions of Paris. Consequently, immediate reductions in energy demand and material consumption are essential (Anderson, Quéré, Mclachlan 2014; cf. Creutzig et al. 2018; IPCC 2018a). Furthermore, the transition to a low-carbon economy entails substantial upfront investments – for example in energy and transport systems – that will themselves require large amounts of energy to produce, and therefore, in the near term, that energy will be largely from fossil-fuel sources (Alfredsson et al. 2018). These necessary investments further constrain the remaining ‘carbon budget’ of cumulative emissions available for consumption. Allowing for equitable near-term economic development of poorer nations, where there is widespread lack of access to basic necessities, puts yet further constraints on the proportion of the ‘carbon budget’ available for consumption within the wealthier nations (Anderson and Bows 2011).

It is clear that the required reductions in consumption-related emissions cannot be achieved through the politically palatable options of focusing on marginal lifestyle changes and technical efficiencies. While the environmental impact of every dollar of economic output has been reduced in the advanced economies–known as the ‘relative decoupling’ of economic growth and environmental impact – the relationship between growth in per capita income and growth in per capita GHG emissions continues (Hubacek, Baiocchi, and Feng 2017). Technical improvements and increases in efficiency have only partially offset the global growth of high-consumption lifestyles (Schroeder and Anantharaman 2017) and the global consumer class is currently expanding by 140 million annually (Kharas 2017). ‘Absolute decoupling’ – in which economic growth continues but environmental impact decreases – is nowhere in sight (see Dittrich 2012; Hennicke and Haupstrock 2015; Jackson 2009; Schandl et al. 2016; Umpfenbach 2015; UNEP 2017b; van der Bergh 2017; Ward et al. 2016). It is therefore imperative that the urgent transformation of whole systems of consumption and production is placed on the global climate change-policy agenda.

The conventional methods used to account for GHG emissions are production-based, estimating the emissions involved in the fabrication of goods and services within territories. Consumption-based emissions accounting, by contrast, measures the GHG emitted in the production of the goods consumed within a territory. This paints a somewhat different picture. Increases in production-based GHG emissions in much of the developed world have leveled off or decreased. However, this hides the ‘outsourcing’ of emissions, where consumption has come to increasingly depend on imported goods and services (see Barrett et al. 2013; Committee on Climate Change 2017; Spangenberg 2001; Wiebe, Gandy, and Lutz 2016). A recent analysis of 79 major cities worldwide revealed a 60% increase in those cities’ carbon footprints when using consumption as opposed to production-based accounting (C40 Cities 2018). Consumption-based emissions draw attention to the systemic connections between consumption and production.

When applied to clusters of goods and services in different locations, consumption-based emissions also demonstrate major variations in the sources of per capita GHG emissions. For example, in Latin America, GHG emissions per capita from meat consumption are twice that for meat consumption in France, the United States, Japan, and China. This reflects not industrial underdevelopment in the case of Brazil but rather a distinctive trajectory of development – including widespread use of biofuels for transport, pushing up agricultural emissions – as well as far larger proportions of GHG emissions from deforestation and peat destruction. It is in this sense that climate change is better understood not as anthropogenic but sociogenic: that is to say, climate change is caused by specific societies interacting with specific resources and environments (Harvey 2014). Policies for sustainable consumption must have
regard for such social, cultural, and economic variation.

The IPCC recognizes that ‘social justice and equity are core aspects of climate-resilient development pathways that aim to limit global warming to 1.5 °C’ (IPCC 2018b D6.1). Global inequalities map directly onto international disparities in consumption-related emissions (C40 Cities 2018). Approximately 50% of global GHG emissions can be attributed to the world’s richest 10%. The poorest 50%, by contrast, are responsible for ~10% of global emissions and yet, at the same time live largely in those countries most vulnerable to climate change (Oxfam 2015; cf. Chancel and Piketty 2015). If the top 10% of GHG emitters – those who have average carbon footprints 11 times as high as the poorest half of the global population – reduced their carbon footprints to that of the average European, this would bring about a 33% reduction in global emissions (Anderson 2016). There is also significant inequality within high-consumption societies: for example, the average annual carbon footprints of the highest-earning 10% of households in the United States are 59.4 metric tonnes of carbon dioxide (CO₂) compared with an average of 18.1 metric tonnes for the lowest 10% (Cohen, Brown, and Vergragt 2017). Furthermore, the IPCC has recognized that scenarios consistent with a 1.5 °C global temperature rise ‘include low energy demand… low material consumption, and low GHG-intensive food consumption have the most pronounced synergies and the lowest number of trade-offs with respect to sustainable development’ and the Sustainable Development Goals (IPCC 2018b, D4.2). Sustainable consumption is therefore fundamentally an issue of inequality.

This article synthesizes social scientific insights into the challenge of sustainable consumption and argues that such an understanding is critical for effective policies contributing to radical demand-side emissions reductions. Consumption is often understood as being in the private domain and therefore beyond the interference of the state, limiting the purview of policy. This is far from the case, however. Consumption is intensely political, with governments regularly and expansively intervening in consumption through regulation, prohibition, taxation, and the provisioning of infrastructures (such as transport infrastructures enabling particular types of retailing). Consumption is better understood as being instituted at a variety of scales. We need to formulate policies for sustainable consumption in this context.

The article proceeds by next providing a short summary of the policy framing of sustainable consumption and production. The third section provides a brief descriptive review of policy measures that have sought to achieve more sustainable forms of consumption. A key lesson is that policy measures that, firstly, seek to align multiple actors toward sustainability objectives and, secondly, take account of the trajectories and dynamics of sociocultural change, offer greater opportunities than interventions focused on individual behavior change. The fourth section develops the social scientific insights into understanding consumption. Central to these perspectives is an understanding of consumption as embedded in wider systems – social, cultural, economic, and material. The fifth section explores illustrative cases of societal trends and trajectories that demand systemic sustainability interventions. The final section suggests some of the implications of our analysis for policy.

**Sustainable consumption and production: development of the policy agenda**

The 1992 United Nations Conference on Environment and Development (Rio Earth Summit) called for ‘a better understanding of the role of consumption and how to bring about more sustainable consumption patterns’ (UNCED 1992). Ever since the conventional attribution of responsibility for environmental impacts to producers has increasingly been supplemented by a focus on the role of consumers. Accordingly, the Oslo Roundtable on Sustainable Consumption and Production in 1994 proposed a ‘working definition’ of sustainable consumption as:

> The use of services and related products which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of future generations.

Following the 2002 World Summit on Sustainable Development in Johannesburg, the environmental unsustainability of the economic system, and the systems of consumption and production that underpin everyday life, came to be framed ever more strongly as sustainable consumption. This growing emphasis on consumption can be seen in the context of the growth of consumer society and an increasing cultural emphasis on consumption activities. At the same time, a growing proportion of environmental impacts could be directly or indirectly related to the consumption activities of private households (Michaelis 2003).

While many observers welcomed the focus on the consumption practices of the global North as the central cause of the ecological crisis, this shift in
emphasized has been far from unproblematic. Sustainable consumption was defined as minimizing the environmental impacts of goods and services, as the Oslo definition above attests. Institutionally, the task of working on the new issue of sustainable consumption fell to national ministries that formerly dealt with ‘integrated product policy’ and thus sustainable consumption was generally subsumed to product policy instead of products or services being seen as a subset of sustainable consumption (Lorek 2010, p. 24). This emphasis on consumers and their purchase decisions mitigated toward a view of consumption as a purely economic activity that could be modified through top-down approaches.

This framing of sustainable consumption has often led to policy responses in which consumers are seen as the principal agents with interventions primarily focused on information provision, such as eco-labeling, and on prices and other incentives. Consequently, mainstream policy initiatives, such as the European Union’s 2008 Sustainable Consumption and Production Action Plan, have been framed in terms of improving the environmental impacts of products and increasing the demand for more efficient goods. The resultant dominant policy framing of sustainable consumption has come to present demand – ‘consumer choice’ – sending market signals for sustainable goods and services upstream to producers – as the motor of change.

While the IPCC’s Special Report on 1.5°C acknowledges the significance of issues related to social justice, inequality, and levels of material consumption, it fails to engage with understandings of consumption beyond the conventional reduction of consumption to demand being driven by individual lifestyle choices. If we are to take seriously the IPCC statement that ‘growing resource-intensive consumption is one of the key impediments for achieving 1.5°C-consistent pathways’ (IPCC 2018a, p. 2), then it is critical to consider wider understandings and explanations of consumption processes.

**Policy measures for sustainable consumption**

There has been no shortage of endeavor to translate and apply insights from research into policy measures. Broadly speaking, we can divide these interventions between those with a principal focus on individual behavior and those concerned with systemic change. As indicated above, policy makers have to date devoted greatest attention to the former, framed as ‘enabling’ consumers to make pro-environmental choices. This section summarizes policy measures for sustainable consumption, providing some examples that seek to illustrate and capture the range of initiatives that have been deployed.

**Policy focused on individual behaviors**

The mainstream approach to policy on sustainable consumption and behavior is usually understood in terms of addressing individual behavioral choices. This is presented largely as a matter of encouraging, facilitating, and incentivizing ‘good’ environmental consumer choices and restricting opportunities for making bad ones. Table 1 provides examples of four typical policy measures, which are often implemented in some combination: pricing, information provisioning, social marketing; and ‘nudging’ (Thaler and Sunstein 2009). These examples are illustrative of key policy approaches and not exhaustive (for a more detailed discussion of policies to promote sustainable consumption see Scholl et al. 2010).

**Table 1. Sustainable consumption policy approaches focused on individual behavior change.**

| Policy measure | Examples |
|---------------|----------|
| Pricing       | Deposit Return Systems: Norway’s bottle and containers return scheme incentivizes consumers to return plastic and glass bottles to the retailer for the return of a small deposit, leading to a 96% return of all bottles purchased. |
| Financial incentives or penalties directed at consumers | Plastic bags: Introduction of 5 pence charge for all single-use carrier bags in the UK retail sector lead to an 83% drop in single-use bags reported by large UK retailers from 2014 to 2016. The Casino Carbon Index: Carbon labeling of 200+ products in France – estimated to have saved a marginal 20 metric tonnes of CO₂ in its first two years. |
| Information   | TravelSmart: Personalized transportation planning offering individualized travel planning across public and private modes of transport in Australian urban areas – led to up to 18% reduction in private car use. Durham water: community-based social marketing campaign to reduce residential water use, included neighborhood pledges and adoption of water-restriction technologies led to a 17% reduction in peak water use (McKenzie-Mohr 2000). |
| To inform consumer choices, e.g. through product labeling | Quorn: 2016 rebranding to emphasize ‘meat free’ and health qualities, with a focus on products for different eating occasions. Follows success in Australia where the product was marketed as a new style of eating rather than as a meat substitute, 16% global growth was reported in 2017. Kenya water-borne diseases: Take-up and usage of water-purification solutions achieved by locating chlorine at water sources rather than within households, changing the context of daily water-collection habits. Over 50% of households utilize the system (Kremer et al. 2011). |
| Values and attitudes | Increasing fruit and vegetable consumption: Through the National School Lunch Program in the United States, ‘choice architecture’ implemented in cafeteria resulted in an average daily increase in consumption of fruit and vegetables of 15% (Hakim and Meissen 2013). |
| Use of social marketing campaigns | |
| Breaking habits | |
| ‘Nudge’ – seeking to intervene in ‘unsustainable’ habits and steering individuals toward more sustainable ones | |
Whether through providing economic incentives, correcting information deficits, seeking to re-frame attitudes, or removing ‘barriers,’ the initiatives outlined in Table 1 were each designed to change the behavior of the individual consumer. In their own terms, all of the examples listed report some success. However, micro-level behavior change initiatives alone cannot deliver the scale of the changes needed. Apart from any serious effects requiring literally billions of consumers to simultaneously adopt a wide range of pro-environmental behaviors on an unprecedented scale, these initiatives would need to offset the increasing level of GHG emissions associated with major trends of the 21st century, such as ubiquitous use of digital technologies or escalating levels of personal mobility (Repke and Christensen 2013; Elliott and Urry 2010). Furthermore, demand for western-style consumption far outstrips the modest scale of behavioral changes oriented by sustainable consumption among those joining the global consumer class (Schroeder and Anantharaman 2017).

Policy measures to foster systemic change

Societies and the everyday practices that underpin them are constantly in flux. Policy measures that recognize these circumstances, and which seek to address the systemic connections between consumption and production, present a different approach to interventions focused on individual behavioral choices. They often take greater account of production-side measures that interact and connect those agents involved in the production and delivery of goods and services with those that consume or seek to influence the consumption of those products. Table 2 highlights a range of policy measures, which have in common that they seek to reconfigure systems of consumption and production. As with Table 1, the approaches presented in Table 2 are illustrative and by no means exhaustive of existing or possible policy approaches for systemic change.14,15,16

The key feature of the examples showcased in Table 2 is that they recognize consumption is embedded in wider systems – social, cultural, economic, and material (Southerton, McMeekin, and Evans 2011). They feature multi-scalar and reflexive governance approaches. Multi-scalar means that the policy initiatives seek to align the interaction of agents delivering policy measures at different scales of intervention, such as the household, the city, or the production-consumption system. Reflexive governance approaches recognize ongoing sequences of intervention, monitoring, and adjustment, rather than focus on a single moment of intervention. Rebounds, reactions, and ripples of effect are always at work, meaning that monitoring positive and negative feedbacks and responding to them is always necessary to handle the interdependencies and unpredictabilities of systemic change (Voß and Bornemann 2011). Finally, some of the examples in Table 2 represent policy initiatives that work with sociocultural changes that were already in motion – such as informalization in Japan or the normalization of recycling in the UK – rendering vigorous and radical policy experimentation more likely to succeed. Because of their ambitious scale and the vested interests that can undermine the capacity for

| Table 2. Policy approaches fostering systemic change.                      | Examples                                                                 |
|-------------------------------------------------------------------------|--------------------------------------------------------------------------|
| Distributed responsibility and actor coalitions                          | In the UK avoidable household-food waste was reduced by 17% over the period 2007–2015 (WRAP 2017). While the impact of the recession on household income partly accounts for this outcome, significant reductions have been achieved through initiatives of a multi-stakeholder coalition involving retailers, trade associations, civil society organizations, policy makers, specialist consultancies, and academics. Initiatives of this coalition recognized that responsibility for food-waste reduction is distributed throughout the food production-consumption system. In the case of household-food waste, for example, retailers’ promotional practices, or the quantities in which the food industry makes ingredients available to consumers, may indirectly drive waste in the home (Welch, Evans, and Swaffield 2018; cf. Lebel and Lorek 2008). |
| Infrastructures for sustainable mobility                                 | Large-scale bicycle sharing schemes have taken off in many urban areas worldwide. They involve systemic interventions in public infrastructure, digital platforms to facilitate flexible bicycle use, and cultural shifts in modes of mobility. International bicycle-sharing provider Mobike reports that in China cycling has become twice as popular in the first year of the scheme’s introduction and those who use the scheme report a 50% reduction in car usage.14 |
| Regulation and standards                                                 | Following unsuccessful social marketing campaigns, the city of Berkeley (California) launched legal standards for residential energy and water efficiency, facilitated by finance arrangements to encourage compliance. Homeowners are required to meet the standards to sell a property. The Residential Energy Conservation Ordinance (RECO) is estimated to have led to a 13% reduction in residential energy consumption.15 |
| Changing cultural conventions and meanings                              | The Japanese Ministry of Environment initiated the CoolBiz campaign in 2005 to reduce electricity consumption by limiting the use of air conditioning in office buildings. Interventions to informalize dress codes changed the social norms surrounding workplace attire, which in turn enabled regulations that banned air conditioning below 28 °C. In 2006, a 1.14 million ton reduction of CO2 emissions was reported (Shove 2014). |
| Community equity                                                         | Middelgrunden Wind Cooperative (Denmark) established in 2000, consists of 20 turbines with a combined capacity of 40 MW, providing renewable energy to 40,000 homes. Ownership is divided between the utility company and 8552 members, which increased public acceptance of the investment and public support for renewable energy consumption. The cooperative annually save 81,000 tons of CO2.16 |
Social scientific approaches to sustainable consumption

Policy measures focused on systemic change are more consistent with the evidence from social scientific research that understands consumption and production as embedded within, and changing in relation to, sociotechnical systems. If we want to understand how to transition toward more sustainable production-consumption systems we need to understand why more resource-intensive patterns of consumption have become taken for granted as part of everyday life. In order to do so, we need to ask questions about the coevolution of technologies and infrastructures on the one hand and social practices, conventions, and norms on the other (Welch and Warde 2015). Therefore, we should think of such changes as constituting sociotechnical transitions.

For example, how have commonplace domestic technologies, like the freezer – with significant resource and energy implications – become regarded as routinized necessities? In the UK, in 1970, only 3% of households owned a freezer. Twenty-five years later 97% of households owned one (Shove and Southerton 2000). The normalization of the domestic freezer is one part of the story of the escalating energy intensity of the food system, but a significant one nonetheless. It is critical to the development of the energy-intensive ‘cold chain’ that enables food to remain frozen from the factory to the household stove. What is the process behind the freezer becoming a ubiquitous domestic technology? It involves mutually influencing changes on a societal level and on the level of domestic practices and conventions, and developments in technology. With women entering the labor market in large numbers, working mothers increasingly came to use the freezer as a ‘time machine’ to cope with the scheduling of family meals. Technical developments saw the ‘chest freezer,’ often located in the garage, replaced with smaller kitchen versions (typically integrated into the refrigerator). Cooking and shopping practices coevolved with changes in retail and supply chains with the development of the frozen food market. Finally, the primary benefits of freezing were gradually redefined from dealing with seasonal gluts of produce to the convenience of frozen foods (Shove and Southerton 2000).

The story of the freezer provides an example of how changes in social practices (in this case related to household-food routines) are mutually conditioned with technological innovations (the freezer and its wider frozen food infrastructure) (see Shove 2003). It demonstrates that to understand how a resource-intensive technology becomes normalized requires attention to the interactions among multiple societal and technological processes of change. So it follows that if our objective is to influence patterns of consumption and production in ways that limit GHG emissions, we must focus on these processes of normalization and sociotechnical transition (Geels et al. 2015; McMeekin and Southerton 2012; cf. STRN 2017).

Critical here for sustainability is the ‘rebound effect,’ where wider societal changes undermine the gains of technological and energy efficiency. The most straightforward form of direct rebound effect is when efficiency increases consumption of the same service (e.g. the fuel cost savings of more efficient cars may encourage greater levels of car use). More complex are indirect rebound effects that occur when monetary savings from, for example, increased vehicle-fuel efficiency are recycled into spending on other consumer goods (see Chitnis et al. 2013; Sorrell 2009, 2010).

Most policy consideration in this area is directed to the marginal losses to otherwise overall efficiency gains. However, this predisposition misses the bigger issue of macro-level rebound effects across the entire economy, with societally significant effects. Efficiencies spur innovations in products and services, and the creation of entirely new markets, that themselves increase demand and thus drive increased environmental impact (Ayres and Voudouris 2014; Foxon 2018). Macro-effects are sometimes referred to as the ‘Jevons Paradox’. In 1865, in his book, The Coal Question, British economist William Stanley Jevons argued that more efficient steam engines stimulated expanded and novel
uses for steam power and so increased, rather than decreased, coal consumption. The centrality of steam power to the industrial revolution suggests how such effects are key drivers of economic growth. The expansion of information and communication technology, and the rapidly escalating energy demands of its use (particularly in the supporting infrastructures of server farms and other facilities), is perhaps the most pertinent contemporary example (Røpke and Christensen 2013).

The significance for sustainable consumption of the coevolution of technologies and social practices, however, exceeds self-reinforcing cycles of cost reduction and market expansion. Changes in socio-technical systems, driven by a range of factors, can normalize conventions, norms, expectations, and, in turn, needs, that drive increases in the resource-intensity of everyday life. A prominent example is the need for Internet access to participate fully in modern life. Concomitant to the ready availability of cheap fossil fuels in the modern era, expectations of comfort, convenience, connectivity, and mobility have been continually ratcheted up (Røpke and Christensen 2013; Shove 2003; Elliott and Urry 2010). Environmentally significant impacts occur through consuming resources as part of the practices that make up everyday life – like driving, cooking, or doing the laundry. Modern consumer societies have fostered, normalized, and institutionalized energy- and resource-intensive routines, habits, and practices that are deeply rooted in societal norms, expectations, and conventions. These profound societal changes are intimately tied up with the political economy of consumer society and with marketing, advertising, and media (Wilhite 2016).

As suggested above, policy approaches to sustainable consumption have increasingly recognized these impacts, and it is in this context that ‘behavior change’ has gained prominence in public and policy debate. However, mainstream behavior change approaches draw on an implicit model of human action that shares much with the economic model of consumption, in its emphasis on autonomous individuals exercising freedom of choice through voluntary decisions (Welch 2017). From a social scientific perspective, this implicit model fundamentally overestimates the role of deliberation and choice in routine behavior and underestimates the extent to which individuals’ autonomy is constrained by norms, infrastructures, institutions, and by access to resources – economic, social, and cultural (Southerton, Warde, and Hand 2004). Furthermore, such constraints operate not just at the level of the individual, but at the level of different production-consumption systems. For example, high levels of mobility have become normal in the everyday lives of affluent consumers – expectations of everyday life make it hard for individuals, even those who express ecological values, to significantly reduce their travel emissions. In the domain of food consumption, by contrast, various forms of ‘green’ consumption, whether eating organic, vegan, or local produce, have garnered social acceptability, and even distinction, among affluent consumers. The differences between these consumption domains demonstrate why values and attitudes cannot be simplistically understood as the primary drivers of individuals’ pro-environmental behavior.

Consumption needs to be regarded as embedded in wider systems – social, cultural, economic, and material. The dynamics underlying the consumption of food, for example, clearly cannot be understood outside of the context of family life, cultural conventions, global value chains, and ecosystems. Social scientific understandings of consumption draw attention to the institutional contexts through which the goods and services consumed are produced, distributed, and exchanged; the social practices in which consumption takes place; and the symbolic and communicative dimensions of consumption. A social scientific approach to sustainable consumption reframes the issue from one of individuals’ consumer choices to the social organization of consumption.

In summary, core social scientific insights reveal that:

- Framing the complex issues of sustainability in terms of individuals’ choices limits the understanding of policymakers of the nature of social behavior and obscures systemic issues.
- The key issue for sustainable consumption is the interdependence of technical systems and social practices. These interdependencies have underpinned the rising GHG emissions that are highlighted by consumption-based emissions accounting data.
- Different production-consumption systems – such as mobility, food, water, housing, and energy-using products – involve different infrastructures, institutions, conventions, and norms. Accordingly, change in these systems involves different dynamics.
- Consumption needs to be understood as embedded in wider systems – social, cultural, economic, and material.

**Societal change and the dynamics of demand**

The overriding message from experiences of past policy measures for tackling sustainable
consumption, and from the insights of social scientific research, is that if we want to shift societies toward less resource-intensive patterns of consumption, then we need to understand and target the coevolution of technologies and infrastructures with social practices, conventions, and norms. This means understanding and addressing the sociotechnical trajectories in which societies are developing, and locating the possibilities for intervention within these trajectories. Critically, we also need to appreciate that those domains that exhibit less change are not static – rather they are systems in which components (eg markets, infrastructures, institutions, practices) interact in such a way to actively produce relative stability. We noted above the role of the domestic freezer in the historical trajectory of the development of today’s energy-intensive ‘cold chain,’ that provisions frozen and refrigerated foods, and the complex interconnections of technological innovation and social change typical of such examples. Critical insights into the nature of the dynamics of sociotechnical trajectories can be gleaned from the history of consumption (see e.g. Brewer and Trentmann 2006; Trentmann 2012).

Systems of consumption and production are ‘moving targets,’ not statically awaiting intervention. Interventions for purposeful change take place within the processes that they seek to change, rather than intervening from the outside. This basic insight suggests that we should look to societal scale trends for the novel dynamics and points of intervention they offer. Such large-scale trends are critical both for their potential to normalize more resource-intensive ways of life and for the latent opportunities they hold for more sustainable forms of consumption. Below we sketch three widely acknowledged major trends – automation, digital platforms, and dietary shifts – which can be understood from this perspective. We present these processes as three illustrative cases only – other examples of major societal trends should equally be the focus of attention.

Recognizing that societies are always ‘on the move’ makes ‘visions’ for societal level transitions particularly important vehicles for change. Three points are particularly salient. First, the visions and models of the future of consumption frame the kinds of problems that policies address, and the plausibility of solutions that are sought (Spurling et al. 2013). For example, the European Commission’s 2015 Circular Economy Action Plan begins its section on ‘Consumption’ by noting that ‘the choices made by millions of consumers can support or hamper the circular economy. These choices are shaped by the information to which consumers have access, the range and prices of existing products, and the regulatory framework’ (EC 2015). Consumption is framed here as the aggregate of consumer choices and rational behavior, reducing the vision of consumption in a future circular economy to purchasing and recycling, and thus not offering the full potential of policy interventions and business models that could conceivably be envisioned. In other words, the way we frame our understandings of the future today helps shape the future tomorrow. It is critical, therefore, that policy makers look beyond restrictive conceptualizations of consumption.

Second, there is a need for bold and radical experiments that embrace social change as the result of complex coevolution among technologies and infrastructures, cultural understandings and conventions, social relations, markets, and governance.

Finally, engaging with the novel dynamics and challenges that arise from major societal trends offers opportunities for such experimentation.

**Automation and unemployment**

A 2016 government report in the United States estimated that the average worker in the country earning less than US$20 an hour had an 83% chance of losing their job to automation (CEA 2016). Automation is not new, of course. John Meynard Keynes recognized the problem of ‘technological unemployment’ in 1928. What is novel about the current concerns of automation, however, is the capacity of machine learning and expert systems to replace a very large number of non-manual jobs and the speed with which this transition could take place. The current automation debate brings to the fore radical ‘work-time reduction’ and ‘basic income’ policies as possible ways to address mass unemployment. As productivity grows, social choices have to be made between how much productivity gains will be translated into higher consumption levels versus fewer work hours. Advocates claim ‘time affluence’ as an alternative to material affluence has significant possibilities for sustainability and well-being. A much shorter working week would reshape habits and conventions, and change the relationship between wage labor and unpaid labor. Releasing significantly more time may reduce consumption-intensive activities in favor of more time-consuming, but less resource-intensive activities, including care, education, and culture (see, e.g. Cohen 2017; Hayden 2000; Pullinger 2014; Rosnick 2013). Transformational policy options could include, for example, reducing the working week for all new jobs in the public sector or requiring companies over a certain size to offer employees reduced working weeks. Automation demonstrates how societal trends that are not self-evidently related to sustainability may open up space for imaginative policy
experiments with significant implications for reducing consumption-related impacts.

**Digital platforms and the future of ownership**

Digital platforms are radically reshaping the provision of goods and services – whether venture capital-driven giants such as Airbnb and Uber or grassroots initiatives enabling, for example, car sharing, or sharing tools at a neighborhood level. Digitally enabled enterprises are often problematically lumped together under the rubric of the ‘sharing economy,’ while pulling in quite different directions: intensified commodification on the one hand and decommodification on the other (see Arcidiacono, Gandini, and Pais 2018). These arrangements offer both possibilities for increases in the resource intensity of consumption (for instance through increased mobility) and innovations for sustainability. But what they do have in common is changes in the relationship between ownership and the provision of goods and services. They share this characteristic with circular economy business models that aim to realize sustainability benefits through leasing arrangements that turn the economics of ‘planned obsolescence’ on its head.

Another type of digitally enabled platform involves the bundling of goods into service packages offering everything from media or grocery deliveries by the likes of Amazon. Here the reconfiguration is not around ownership but around how traditional consumption domains (e.g. media and groceries) are divided up and provisioned. Digital platforms portend huge changes in the provision of goods and services. The contradictory nature of this major societal trend draws into focus the importance of articulating visions of sustainable futures of consumption and elevated levels of CO2 reduce the nutritional content of grains, tubers, and legumes (Vermeulen, Campbell, and Ingram 2012). Food security – the provision of safe and nutritious foods for all to live a healthy life – represents a further major global challenge confounded by the paradox that almost three billion people face hunger and malnutrition while affluent societies experience obesity epidemics. The availability of land use for agriculture is under severe pressure from urbanization and non-food biomass products of the bioeconomy (especially bioenergy), compounded by population growth. Diets need to change – with an increased proportion of plant-based protein or alternative sources (such as insects or lab-based meats) widely regarded as essential.

While such changes appear a radical departure from the format of contemporary diets, it is important to recognize the existing dynamics of the ways in which and what we eat. The content of breakfast and lunchtime meals in the UK has changed significantly during the past fifty years (Yates and Warde 2015), while eating out and ‘take away’ food have witnessed considerable growth (Paddock, Warde, and Whillans 2017). Food tastes are also dynamic, with cuisines once considered unpalatable such as pink meat and raw foods (sushi) quickly being accepted as good taste. Furthermore, the rise of culinary culture represents an opportunity for experimentation in the kinds of diets that are not only deemed acceptable but also desirable: the recent dramatic rise in veganism is a case in point. Such dynamics open a wide range of opportunities for intervention including: the promotion of alternative culinary styles, such as the New Nordic Diet (Micheelsen, Holm, and O’Doherty Jensen 2014); instituting national level Sustainable Diet Agencies to coordinate multi-stakeholder coalitions; the development of kitchen-less homes (Paddock and Warde 2016); the re-institutionalisation of lunchtimes (Yates and Warde 2015); and the development of lab-created protein alternatives to meat.

**Conclusion**

Urgent and fundamental action on consumption is critical if the ambitious targets of the Paris Agreement are to have any chance of being realized. While sustainable consumption and production have long been recognized in the rubric of international policy debates, attention has been concentrated on production-side processes, with consumption (and demand reduction) largely presented as a matter of consumer adaptation to efficiency measures and new...
technologies. At the level of global environmental governance, documents such as IPCC assessment reports or UNEP Emissions Gap Reports have a critical role to play in recognizing the role of sustainable consumption in emission reductions – but need to look beyond an understanding of consumption as patterns of aggregate demand and individual behavior.

A more expansive understanding of consumption is necessary, one that recognizes that consumption is always integrated within production-consumption systems. These systems are always instituted – shaped, reproduced, and shifting in relation to infrastructures, governance structures, economy, and culture. Consequently, when it comes to sustainable consumption, the challenge for policy communities, businesses, civil society, and social movements is to open dialogue and identify ‘visions’ for sustainability transitions in production-consumption systems, in order to align the interests of multiple agents for consistent and coherent sustainability objectives. As we cannot know outcomes in advance, there is a need for flexible policy experimentation, including embracing radical options (see Schot and Steinmueller 2018; Sterling 2014).

It is beyond the scope of this article to recommend specific policy proposals. However, examples of inventive options might include experimenting with universal basic income and work-time reduction, harnessing public procurement, and promoting alternative forms of economic organization and business models such as B corporations and ‘product-service systems,’ and developing novel forms of provisioning institutions such as multi-stakeholder cooperatives and digital platforms (see e.g. Cohen 2017; Mylan 2015; Scholz 2016). Recognizing that consumption is instituted at a variety of scales draws attention to institutional possibilities afforded by agencies focused on innovation for sustainable consumption – whether national-level innovation agencies integrating the sustainable consumption agenda or specifically sustainability-focused organizations that produce evidence and expert guidance and facilitate action from multiple perspectives. 19 An open-ended approach to policy also suggests experimental enterprise zones and clusters and ‘living labs’ (Voytenko et al. 2016). However, where such policy strategies exist they are usually oriented toward sector-specific production and rarely focus on the broader relationships between production and consumption.

Patterns of consumption are dynamic, and change in complex relations to society, culture, economy, and technology. These dynamics and relations must be harnessed for transitions toward more sustainable production-consumption systems. The complexities of societal change demand reflexive governance approaches to sustainable consumption that intervene in sociotechnical trajectories that are already in motion – such as the examples suggested in the section on societal change and the dynamics of demand. Policy interventions take place within the processes that they seek to change, rather than intervening from the outside.

The positive message is that these processes represent opportunities for radical experimentation and leverage points to re-institute systems of consumption and production at a scale commensurate with the challenge to meet the ambitions of the Paris Agreement. Recognizing that patterns of consumption are always ‘on the move’ opens up the opportunity to align key institutional actors so that current trajectories of societal change can be harnessed to realize sustainability transitions.

The concept of policy integration is an important starting point for transitioning consumption and production systems (Koide and Akenji 2017). Reflexive, distributed, and multi-scalar approaches demand a degree of direction and consistency across organizational, sectoral, and institutional boundaries. There are two key dimensions. First, when developing policy initiatives it is important that policy objects, goals, actors, structures, and procedures are all oriented toward, or at least take account of, the implications for wider issues of sustainable consumption in production-consumption systems. The second is that integration must operate both horizontally (across sectors) and vertically (eg from local to national to international governance). Understanding consumption and production systems needs to be embedded in the policy process so that ‘consumption’ encompasses more than individual behavior change and adaptation to technological innovation.

Openness to radical policy experimentation, in turn, demands a new evidence base in order to assess such interventions. Currently, we keep asking the same questions about sustainable consumption – in terms of individual behavior change, incentives and ‘barriers’ – rather than asking different questions about the dynamic interactions between systems of consumption and production, and identifying the possibilities that arise from them.

Radical shifts in the societal organization of consumption and production are urgently required to meet the goals of the Paris Agreement. Policy for sustainable consumption should be understood in the context of the critical need for demand-side emissions reductions to meet medium-term targets. Consumption should be regarded as instituted and embedded in wider systems – social, cultural,
economic, and material. Policy must address the social organization of consumption.

The escalating environmental and social impacts of consumption are the outcomes of the coevolution of technical systems and infrastructures on the one hand and social practices, conventions, and norms on the other. Central to the challenge of sustainable consumption are the escalating levels of resource and energy use tied up in the bundle of goods and services increasingly taken for granted as necessities of everyday life by the rapidly growing global consumer class. Critical here is recognition that sustainable consumption is fundamentally an issue of inequality and of the need for more equitable distribution of consumption-based emissions within and between societies. Reframing the debate to acknowledge the social organization of consumption and production opens up space for constructive dialogue that considers futures of equitable and sustainable ways of consuming.

Notes

1. The IPCC (2018b, C1) assesses that in “model pathways with no or limited overshoot of 1.5°C, global net anthropogenic CO₂ emissions decline by about 45% from 2010 levels by 2030…reaching net zero around 2050” as against “limiting global warming to below 2°C CO₂ [where] emissions are projected to decline by about 20% by 2030 in most pathways… and reach net zero around 2075.”
2. Our term “global consumer class” is used as equivalent to “the global middle class” in Kharas (2017), defined as having income per person US$10–100 per day; spending of the global middle class (US$35 trillion in 2015) is now roughly divided equally between developed world and emerging economies, with fastest growth in emerging economies (Kharas 2017).
3. Production-based emission accounting may also be applied across sectors, however, so-called nationally determined contributions to GHG-emission reduction under the UNFCCC are territorially bounded.
4. For an analysis of global carbon flows between regions, see Peters, Davis, and Andrew (2012).
5. For the diversity of economic dependencies on material use internationally, see Steinberger et al. (2013).
6. Of the 79 cities noted, 16 (20%) of the sample located in Southeast Asia and Africa showed reduced emissions when using a consumption-based methodology, underscoring the relationship to inequality (C40 2018).
7. Section 1.2 “Defining Sustainable Consumption,” for the full text see http://enb.iisd.org/consume/oslo04.html.
8. http://ec.europa.eu/environment/eussd/escp_en.htm.
9. http://sustainable-event-alliance.org/norway/about/norwegian-bottle-and-tin-deposit-system/ and https://www.thisiseco.co.uk/news_and_blog/should-the-uk-introduce-a-bottle-deposit-scheme.html.
10. https://www.gov.uk/government/publications/cARRIER-bag-charge-summary-of-data-in-england/single-use-plastic-carrier-bags-charge-data-in-england-for-2016-to-2017.
11. https://www.csreurope.org/casino-casino-carbon-index#.Wuc9JC-ZPBI.
12. http://www.travelsmart.gov.au/about.html.
13. For a discussion of the Quorn re-branding see: http://www.thedrum.com/profile/project/260649/quorn and https://www.quorn.co.uk/company/press/quorn-foods-global-growth-in-2017 for reported sales growth.
14. http://mobile.com/global/blog/post/mobile-unep.
15. http://www.c40.org/case_studies/berkeleys-building-standards-mandate-increases-efficiency-and-pays-back-householders-in-two-years.
16. http://www.middelgrunden.dk/middelgrunden/?q=en/node/35.
17. For an example of innovative social scientific thinking around ownership issues, see Mylan (2015) and for a critical account, see Srnicek (2017).
18. For a full discussion, see: https://www.foodsecurity.ac.uk/challenge.
19. Existing examples include the UK’s Waste and Resources Action Programme (www.wrap.org.uk; see Welch, Evans, and Swaffield 2018) and the Finnish national innovation agency, Vinnova (www.vinnova.se/en/).

Acknowledgements

We thank the Stanley Foundation for its support. The views expressed in this article are those of the authors and not necessarily those of the Stanley Foundation. We also thank two anonymous reviewers as well as Maurie Cohen, Sylvia Lorek, Gert Spaargaren, Mark Conway, and Rei Tang for comments on earlier drafts. Walter Fraanje provided valuable research assistance for which we are grateful.

Disclosure statement

No potential conflict of interest was reported by the authors.

Funding

This article is adapted from a “Policy Analysis Brief” sponsored by the Stanley Foundation entitled “Transitions for sustainable consumption after the Paris Agreement” (https://www.stanleyfoundation.org/policyanalysis.cfm).

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