Sharing Cities for energy demand reduction

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Abstract

Some claims regarding the energy benefits of sharing are noted and interrogated, to reveal important principles influencing the energy implications of sharing. It is suggested that particular attention should be given to the linked issues of economic rebound and behavioural norms. The potential for sharing to deliver environmental benefits through impacts on consumer identity is discussed. It is suggested that that coordinated city-scale interventions might more effectively shape norms in ways that enable sharing practices to reduce consumerism and thus cut energy use. Reference is made to emerging 'sharing cities' and the ways in which policy, practice and culture interact to produce diverse modes of engagement with sharing. A 'sharing paradigm' approach is proposed which maps the broad scope of sharing behaviours, enabling researchers and policy makers to engage effectively with all forms of sharing, not just those found in the commercial, intermediated, 'sharing economy'. Some conclusions are drawn for future research agendas.

1. Introduction

The emergence of a ‘sharing economy’ is often assumed to offer a means of reducing aggregate resource and energy use through efficiency benefits. A better environment is a standard element of the story of the growth of collaborative consumption. Commentators such as Botsman and Rogers (2010) see environmental awareness as a driver of sharing behavior, and more efficient use of resources – particularly those previously underutilized – as an essential outcome. Sharing economy companies such as Zipcar and Airbnb have facilitated or directly supported research to highlight the environmental benefits of their business models. According to such studies each shared car in a car-share club is estimated to replace 9 to 13 typically more-polluting private vehicles, and average users reduce their car miles travelled by 40 percent (Martin and Shaheen, 2011; Tapscott and Willams 2010). Research by the Cleantech Group of the relative performance of Airbnb (Airbnb, 2014) found that compared to hotel users, Airbnb guests say they are 10 to 15 percent more likely to use public transit, walk, or bicycle as their primary mode of transport; and estimated that US Airbnb guests use 63 percent less energy than hotel guests.

However, such claims are rarely subject to detailed life-cycle analysis, nor to a socio-technical systems appraisal of their implications. Such more sophisticated analysis would require that any benefits from efficiency were properly contrasted with direct and indirect rebound effects arising from changes in prices and consumer behaviours. In the absence of detailed evidence regarding such implications, this paper proceeds by discussing the theoretical scale and direction of these effects (section 2). It also attempts to disentangle some of the direct effects of sharing models from side-effects such as the reallocation of costs like insurance and maintenance from overheads to marginal prices. Noting that sharing behavior is not new, merely changing in form, it presents a broader categorization and analysis of sharing (section 3). It then discusses the implications of various forms sharing for consumer norms and consumer identities, arguing that the delivery of significant environmental and energy benefits is likely to depend on the successful generation of changes in consumer and behavioural norms related to the psychological identity-reshaping effects of sharing as opposed to ownership (section 4). It then turns to an exploration of the scope to deliver such cultural changes through the development of 'sharing cities', discussing emerging models of city-scale sharing within and beyond discourses of 'sharing' and the 'sharing economy' (section 5), before drawing conclusions and suggesting future research needs (section 6)

2. Interrogating the energy benefit claims of sharing advocates

In this suggestion we suggest [three] reasons why such claims might be misleading, and hypothesize regarding the scale and direction of these effects. First, the comparisons made are rarely like-for-like. Second, they ignore direct and structural rebound effects resulting for increased efficiency and/or redirected spending. Third they treat the sharing facility as an abstract object, rather than part of a socio-technical system in which the introduction of new options reshapes our choices (and our ethical engagement with them).

Comparisons of shared services and facilities with conventional ones are complicated. They are rarely like-for-like comparisons, because the disruptive economic nature of sharing economy approaches has effectively defined new categories and market segments. Even where the comparisons might appear straightforward, such as car ownership compared with membership of a carsharing club (eg Zipcar), there can be substantial confounding factors. For instance, the reduced consumption of travel in car-clubs likely arises as much from the more accurate marginal cost pricing (as overheads such as insurance and maintenance are paid for as part of the marginal fee for time and distance rather than as lump-sums), as from any inherent benefit of sharing models. Commercial ride-sharing in the standard Uber model may have a similar effect if it replaces car ownership, although it seeks primarily to compete with casual car or taxi use, and also with transit and walking.

In the Airbnb case, we might also ask whether the comparison with hotels is valid. In other respects Airbnb is at pains to emphasize that it is not a direct competitor with hotels, highlighting its origins in providing extra capacity for major events, as it tries to avoid both conflicts with the hotel sector, and hotel-oriented regulation. Evidence on the ground suggests that couchsurfing is a new category which competes directly only at the margins, and more generally enables travel for a group that might otherwise not afford it. However on the supply side, there is evidence of negative social effects where landlords remove property from long-term low-rent markets and offer it instead for higher value short-term rental on such platforms.

Such rebound effects have been explored in some depth in energy systems, and appear to typically offset a significant minority of the benefits of efficiency gains (Sorrell, 2007). Sometimes this is a clear social benefit, such as when those in fuel poverty are able to heat their home to a healthier level by using more efficient heating appliances more intensively. Car-sharing schemes also appear to offer benefits to those in travel poverty: one study suggested that the ability to afford a car by making it available for car- or ride-sharing, disproportionately benefited those on lower incomes in the USA (Fraiberger and Sundararajan 2015). Energy rebound is not necessarily just a negative. However rebound effects where efficiency drives down energy costs, enabling higher consumption of energy generally, or of other goods and services, can be problematic, and in the sharing sector may be very substantial in effect.

For example, the claimed energy benefits of Airbnb, even if credible within the limited context of the research, are likely secondary to the energy implications of additional travel enabled by the platform. If the availability of cheaper Airbnb options encourages users to take more long-distance trips, energy use is likely to increase on average: a single flight will far outweigh any difference in energy use in accommodation. Again this is a key example of a structural 'rebound effect', where a new technology or business model makes things cheaper for consumers, so they consume more – either of that commodity or service, or of something else, with the money they have saved.

Similarly, when sharing economy businesses say they increase the use of underutilized resources, that might increase the *efficiency* with which consumers get services and wellbeing from those resources, but not necessarily help deliver *sufficiency*. If sharing platform X adds to overall consumption, albeit in a more 'efficient' way, or substitutes for an environmentally friendlier option, then absolute environmental impacts will grow. So where previously separate drivers car-share, that's a win – but if Uber brings a new vehicle onto the streets to transport users who would otherwise cycle or take transit, it's an environmental loss. The environmental gain seems clearer with Repair Cafes or Freecycle, where the repaired or donated product gets an extended useful life. But even here a full account needs to consider what else the user spends money on that would otherwise have been spent on a new product.

Policy makers have generally yet to engage with rebound although regulatory models are emerging that might limit it: for example: to restrict couchsurfing rentals to a frequency that cannot cover all the costs of the unit; and to limit carsharing to expenses-only payment models. Then we won't see new vehicles brought on the road simply for ride-sharing; or scarce homes bought up simply for short-term letting.

3. Considering sharing in the round

In this section we explain that the economic implications of sharing, including rebound effects, offer only a partial explanation of its impacts and likely cultural trajectories. We set out a dynamic categorisation of contemporary sharing explained in terms of shifts from socio-cultural to mediated forms, and from communal to commercial.

In recent years, sharing has typically been perceived and understood as an economic activity (eg Belk 2010; Benkler 2004 and 2011; Botsman and Rogers 2010; Schor 2014). In this literature, economic utility provided is understood as the reason for sharing. Sharing is seen as a transactional process between individuals. As technology reduces the costs of organizing sharing, people share more. Sharing is also facilitated by the declining marginal costs of shareable products in a digital world. Most academic commentators acknowledge that there is much more to the sharing economy than the big commercial platforms, but few (even amongst those like Bardhi and Eckhardt (2012) who reject the term 'sharing economy') recognize the way in which economic framing potentially misses non-commercial forms of organization and motivations, such as community, connection and care, which arguably, are far more central to why humans share, than economic motives.

Our broader understanding of 'sharing' follows dictionary definitions in encompassing processes whereby we divide something between multiple users; or in which we use, occupy, or enjoy something jointly with one or more others. We recognize a broad spectrum of things that can be shared, ranging from material resources and production facilities, to services, experiences and capabilities. In this we echo real life practice and common usage of the terms 'share' and 'sharing' in which there is also a clear and intended moral undertone of fairness. Sharing is an evolved human behaviour found in all societies, and it is cultural and political in nature as much as economic.

Despite the rapid growth of web-based sharing intermediaries, such models do not even represent the whole of the sharing economy, never mind the potential for a sharing society. In McLaren and Agyeman (2015) the present authors propose a broader scope for analysis of sharing, offering a four-fold categorization of modes of sharing (distinguished on dimensions of 'socio-cultural' to 'mediated', and 'communal' to 'commercial') – shown in table 1.

The commercial mediated quadrant (lower left in the table) is dominated by modern sharing economy platforms such as Lyft, Airbnb and Kickstarter – principally web-based intermediaries' that, in one way or another, bring together people to facilitate collaborative consumption, more efficiently share resources, provide services or act collectively.

Mediated forms of sharing need not be commercial – governments, not-for-profits and communities can deliver them too. The communal mediated quadrant (upper left in the table) includes organisations such as Streetbank and Freecycle, timebanks that facilitate peer-to-peer sharing, and communal services such as libraries.

	(Inter)mediated sharing	*Sociocultural sharing*
Communal sharing	**Communal mediated** (learned, intrinsically motivated).	**Communal socio-cultural** (evolved, intrinsically motivated)
Commercial sharing	**Commercial mediated** (learned, extrinsically motivated)	**Commercial socio-cultural** (evolved, extrinsically motivated)

Table 1: Key Dimensions of the Sharing Paradigm

In contrast, commercially motivated sharing need not be formally mediated, but can instead emerge within real life or virtual communities of peers. Such commercial sociocultural approaches (lower right) include cooperatives, and novel forms of peer-production such as Linux, Enspiral and direct peer-to-peer collaboration using blockchain technology. This quadrant however has particularly blurred borders, as many of its occupants involve elements of intermediation, and their commercial goals are often secondary to social purposes.

The final quadrant (upper right) is where we find fewest formal organisations, and most traditional communal sociocultural sharing within families, traditional ethnic and religious groups, and close-knit geographic communities. Sharing here is often highly reciprocal, but rarely monetized. It includes lots of caring and domestic work, and the coproduction of community facilities and services, as well as the wider gift economy, and emanations such as co-housing and supper clubs. It also includes emergent forms of commoning, for the management of shared spaces and resources.

This categorization helps us understand and illustrate how sharing is changing in contemporary society. In the global North we see a tendency for socio-cultural sharing to erode, and mediated commercial sharing is growing particularly fast. The former was often communal - or even communitarian, within ethnic and kin groups - based on strong community level social capital and inter-personal trust. The new forms of sharing, by contrast, are typically web-based, and more cosmopolitan – based on weak links which cross community boundaries, backed by trust in the intermediary and its procedural tools such as rating systems, rather than by trust in the specific individuals involved.

We think it important to note that experience with the internet suggests *cycles* of disintermediation and reintermediation (Chircu and Kauffman 1999). We would not therefore expect the commercial models in which intermediaries reap profits from the labour of their participants to be the 'last-word' in sharing approaches marked by marginal costs which are (arguably) declining to zero (Rifkin 2014). New peer-to-peer models and post-commercial intermediaries (Bollier 2016), and user or provider-owned cooperative sharing platforms (Orsi et al 2013) can already be foreseen.

Nonetheless, our four-fold categorization of flavours of sharing also helps illustrate how a misplaced focus on sharing as an economic and transactional process inappropriately directs attention to primarily commercial mediated forms of sharing. In turn this fuels a polarized debate over whether sharing is a new disruptive domain of capitalist exploitation, or a post-capitalist form of economic organization; overlooking its multiple other forms.

4. Sharing and identity

This section begins the task of applying our broader undersatanding of sharing and its changing nature to the question of its implications for sustainability (both social and environmental). We argue that understanding sharing as a cultural and political phenomenon, as well as an economic one, allows us to identify a key potential for transformation.

Insofar as it can replace the reliance modern people place on consumption and possessions to shape our identities, sharing can shift norms and values away from consumerism – especially where sharing itself is more communal i.e. non-commercial. From libraries to street carnivals, and from fab-labs to cooperatives, sharing offers new models and norms for living – which resonate with our evolved nature as collaborative social animals. Even commercial sharing models can challenge our attachment to possessions and consumerism, but the example of toy libraries is perhaps most telling. Not only can toy libraries cut waste, research in the UK and New Zealand (Ozanne and Ballantine, 2010; Capacity and Play Matters, 2007) shows that they enhance social inclusion, help parents share values such as sustainability and frugality, and expose children to sharing norms; they allow children to experiment with different cultural identities – especially those attached to gendered toys.

However, some sharing models and platforms actively reinforce consumer norms in some respects (notably those which facilitate access to big-ticket, or fashionable consumer items: eg Rent-the-Runway which provides access to top-label fashion brands; and boat-sharing sites like Cruzin or Boatbound). These enable brand conscious individuals to borrow these valued brand identities. However they are somewhat self-defeating in this respect: as the sharing model becomes more popular and well-known, the cachet attached to previously exclusive expensive brands is inevitably diluted. This may offer benefits too: sharing products like boats, cars, or fashionable clothes and accessories widens choice and allows those on lower incomes to more rapidly change our image and status compared with ownership. Bruce Jeffreys of GoGet cars, an Australian carsharing company, lightheartedly contrasts the opportunity of "consumer philandering" with the monogamy of ownership, and the journalist Paul Boutin reportedly suggests that "carsharing turns members into automotive swingers, free from having to commit to one model" (Botsman and Rogers, 2010). In this respect sharing may be an ideal postmodern model, allowing people to change their image and identity swiftly to keep up with the rate of change in contemporary "liquid life" (Bauman, 2010).

But more generally, and more importantly, sharing approaches would appear to stimulate us to locate our identities in the community with whom we share (whether Freecyclers or Couchsurfers), in relationships, rather than in possessions; while the good or service becomes a utility or commodity. In some respects the 'brand' identity is being shifted to the intermediary rather than the product itself: but such brands are worth only what the peers involved bring to them. Sharing models also facilitate specifically anti-consumerist identities: sharing models such as toy libraries, but also squatting, skipping, edible forests, time-banks and Repair Cafes all carry with them resonances of the anti-consumerism found in studies of on-line file sharing of music and videos (Garcia-Bardida et al, 2011; Brewin, 2012; John, 2013).

More research will be needed to asses the power and scope of these effects, but it seems plausible to suggest that interventions which seek to support and facilitate these effects, while minimising economic rebound, would maximise the environmental benefits of sharing. This is not as simple as merely rejecting commercial sharing (or even commercial intermediated models). These have an important place in shifting norms in highly commercial and individualised societies and sectors, and bring a set of more cosmopolitan values to sharing than those found in traditional socio-cultural practices in tight local and ethnic communities. But it is arguable that with effective regulation of the sharing 'economy' and direct support and facilitation of communal, civic and charitable sharing activities, public authorities could harness the benefits of sharing for sustainability. In the next section, we argue that the city scale is the optimum for such endeavours, and explore some emerging models.

5. Sharing Cities

We have previously argued that the scale of the city is particularly appropriate (Agyeman et al 2013) for consideration of sharing. Cities have long experience in facilitating and managing communal forms of sharing, from public services to the processes of 'commoning' that shape the public realm. Many cities are already leveraging that experience and agency at the margins of the sharing economy, with sharing platforms such as bike-sharing schemes. Cities exhibit high density of networks and of population, and significant cosmopolitan social diversity and mixing, while typically having unitary political authorities: they therefore both facilitate significant levels of all varieties of sharing.

Dedicated research will be needed to fully compare sharing ecosystems in different cities and cultures. Here, however, we present some initial thinking based on secondary case studies of three contrasting cities that have all relatively enthusiastically adopted discourses of sharing: San Francisco, Seoul and Amsterdam. In all three the commercial sharing economy is flourishing, but in different ways; and the nature and extent of activity in the other quadrants is markedly different.

In San Francisco, facilitated by largely supportive regulation (or lack of), it is already beginning to disrupt conventional businesses in sectors such as travel and hotels. It is also having social impacts – notably on the availability of long-term rental property in an over-heated housing market - and broader concerns are emerging about the dominance of 'platform monopolies'. The influence of Silicon Valley technology and politics, and libertarian, individualist ideologies appears strong, as also seen in US 'maker' culture (Sadowski and Manson 2014). Whilst not limited to San Francisco it is also worth noting the emergence of a critique of Airbnb around the issue of racial discrimination: with evidence of black hosts earning less, and some white hosts screening out black users (Edelman and Luca 2014, Edelman et al 2016).

More generally, it appears that the poster-children of the commercial "sharing economy" are being co-opted by the interests of venture capital and its insatiable demands for rapid growth and high-value exit strategies. Taskrabbit, started to make it easier for neighbours to help each other out with errands and chores, is becoming a glorified temping agency, leaving its participants in the same precarious boat as those on zero-hour contracts. Uber, rather than enabling ride-sharing to cut congestion, is now little more than a luxury taxi company serving the global footloose elite. Lending Club has refocused on venture loans for entrepreneurs, rather than providing peer-to-peer loans for those otherwise excluded, or at risk of predatory money-sharks. And Airbnb looks the other way as landlords abuse its platform by buying up low-rent property for conversion into Airbnb rentals, thus enabling gentrification and displacement. The transitions emerging in San Francisco appear less than sustainable.

Yet even in San Francisco we can still find communal and purpose-led sharing - as illustrated by Loconomics, a cooperative style Taskrabbit - but in general the commercial model is dominant and is shaping the environment in ways that help it outcompete alternatives. San Francisco's associated smart-city projects – superficially efficient, largely privately funded – have similarly proved deficient in supporting service diversity and social welfare (Lee and Hancock, 2012).

In Amsterdam, the sharing ecosystem appears to be more diverse, with greater experimentation in non-profit and purpose driven business models, exemplified by organisations such as Peerby and Repair Cafes. Experimentation with such not-for-profit models, free at the point of use, offers much greater scope for social inclusion in sharing. Intriguingly, survey evidence hints that ethnic minority groups in Amsterdam are keener to engage in sharing behavior than the majority Dutch (van der Glind 2014).

The diversity in Amsterdam's sharing sector echoes the public-private partnership form of its 'smart city' programme which has helped provide the underlying infrastructure and facilities for sharing organisations, the enthusiasm and vigour of the ShareNL network, which takes a cross-sectoral approach to the collaborative economy, working with public and private sector partners, and the emerging principles of the 'experimental city' (Evans et al 2016). The globalized commercial models are not dominant. In Amsterdam neighbour car-sharing schemes such as WeGo and SnappCar appear more prevalent than ridesharing apps; and while Airbnb is present, the city has negotiated limits on rentals that largely eliminate any incentive for landlords to shift long-term rentals to Airbnb, instead encouraging home occupiers with spare space to make it available at times of peak demand.

In Seoul, the sector appears to be growing more slowly than in either San Francisco or Amsterdam. The commercial segment is predominantly composed of local Korean platforms: and the city has actively encouraged this approach in its Sharing City project - even banning Uber. This appears to be partly a consequence of a greater emphasis on social inclusion and on co-production between citizens and the public sector in Seoul's approach – both reflecting a stronger cultural communitarianism. The Sharing City project actively supports platforms with a social purpose: such as apartment sharing designed to pair students in need of accommodation with seniors in need of company. As with its smart city projects, Seoul directly invests public money in the sharing sector, and also makes some of its own resources – such as meeting spaces (outside office hours) - available to share. However it must be acknowledged that the Korean approach to economic development in recent decades has focused on supporting development of 'national champions' behind trade barriers – and there are echoes of this strategy in how Seoul is engaging with the sharing economy too.

Overall we see, even within this small sample of cities, that distinct modalities of sharing – supporting different directions or forms of transition - are emerging from their different political and cultural foundations, and that the urban scale seems critical to their expression, rather than the national. We also see, even amongst cities actively pursuing smart goals and enabling commercial sharing, a much wider diversity of sharing behaviours than can be accounted for purely in economic terms. And the environmental and energy implications are interesting: for the *city authorities* in such 'smart' sharing cities the key drivers for sharing (alongside shrinking financial resources) might include efficient resource use (especially of constrained housing stock); and growing recognition of the impacts of environmental problems (especially air pollution) on the urban economy. But these are actively hitched to visions of economic growth and increased consumer activity, rather than to understanding s of sufficiency, sustainability and social inclusion.

However we also find sharing practices (under other names) promoted in cities where social inclusion is the key goal. Such places pursue visions of cities as shared public spaces; and of cities as cosmopolitan social spaces. In such spaces intercultural and countercultural movements can establish themselves and even transform mainstream systems. Such visions can be explicit – especially in the global South – yet they are rarely presented or understood as forms of sharing, and are typically very differently motivated. In contrast to the drivers noted above in 'smart' sharing cities, in these models, social inclusion is more typically the inspiration and motivation, while efficiency and even environmental goals are more incidental. And although financial resources are scarce, reducing expenditure is rarely an ideological objective of policy, where it exists.

More often than not, such alternative visions arise outside of existing power structures, in citizens' movements, counter-cultural spaces and protest. But they can be state-led. For example, in Colombia's second city Medellín '*urbanismo sociale'*: - social inclusion in a shared public realm - has been the critical driving factor. From the mid 1990s Medellín has focused on empowering citizens, beginning in the poorest neighborhoods. Library parks such as Parque Biblioteca España have been constructed in marginalized parts of the city, providing free access to computer and information technology, and educational classes, as well as space for cultural activities and recreation. The city has invested heavily in shared public transit and infrastructure – including bus rapid transit, nine cable car links and a huge outdoor escalator - to connect the poor hillside comunas with the centre. Public facilities such as health centers and schools have been developed at the cable-car stations. The major projects have been funded with revenue from the city's public services company, Empresas Públicas de Medellín (EPM) and developed through a participatory planning process with the community.

What we see in Medellín is a particularly developed and coordinated process of building (or rebuilding) the urban commons of public spaces, facilities and culture that underlie the possibilities for sharing and cooperation in all cities. Such a process suggests a transformational path ripe with sustainability. As David Harvey (2012) reminds us, the city is produced by commoning, undertaken by citizens as much, or more than it is created by the commercial development industry. Economic framings of sharing, focused on commercial intermediaries, tend to overlook urban commons as shared spaces and commoning as a sharing practice.

Yet amongst urbanists and city planners variants of urban commoning, such as place-making and tactical urbanism, are popular goals (Kent 2008; Lydon and Garcia, 2015). These implicit visions embedded in urban design and practice for the creation of inclusive, liveable spaces are as important to sharing cities as the sharing economy. Moreover, shared inclusive public spaces (real and online) both underpin civic and moral community and help build the trust that underlies markets and sharing enterprises.

Medellín offers a notably coordinated example, but in many cities practices of urban commoning are led and coordinated by communities, sometimes even in the face of opposition from the state. The development and improvement of squats and slums through informal and even illegal land-seizure and installation of sewerage, water and power is central to urban development, and indeed to future wellbeing for a huge slice of the world's population. In cities both North and South squatting offers not only a way to meet critical needs, but a way in which either underused, or otherwise segregated urban sites can be brought into the urban commons.

Like music piracy and online file-sharing, such behaviours can be a critical part of establishing non-commercial identities, and suggest ways in which counter-cultures can shift mainstream norms and values. For sharing cities to achieve their potential, the emerging discourses of urban commons need to be embraced and indeed broadened to include informal and illegal practices such as squatting and urban protest as well as the legitimate and mainstream versions of civic engagement seen in initiatives such as the Bologna regulation for the urban commons.

We believe that such models and comparators offer more scope for sharing to facilitate a normative transformation and deliver social and environmental benefits, than those rooted in the venture-funded, capitalist models of Silicon Valley. Of course sharing has economic outcomes and functions. Sharing can deliver utility. But this is only a first step in understanding the possible contribution of sharing to human flourishing. Without the capabilities to transform them, neither materials nor goods nor services will necessarily deliver wellbeing or meet our needs (Sen 2001). So, we argue that a *sharing paradigm* should begin from the question of how sharing approaches and shared resources can more directly enhance capabilities for all.

A social, cultural and political discourse, as proposed in the sharing paradigm enables discussion of different modes and motivations of sharing that better reflect the rich diversity of sharing activity in the modern world. It also allows us to question whether a particular form of sharing – taken in context –

ought to be managed as an economic practice; and to transcend debates over whether sharing economy models should or should not be considered as sharing at all.

6. Conclusions and new directions

Our aim here was to open up discussion and analysis of the changing nature of sharing in modern society and to focus on the ways in which 'sharing cities' might influence culture and norms, drawing on their experience with sharing of public spaces, services etc, so that new technologically intermediated sharing might be harnessed for social and environmental sustainability benefits.

We have seen that simplistic analysis is leading to naïve (or 'interested') claims of environmental and energy benefits that are probably exaggerated in contrast with rebound effects. However we have also seen the potential for interventions to facilitate shifts in consumer norms and behaviours which could have far-reaching impacts on overall consumption levels as part of broader cultural change. Both of these mechanisms also have implications for social inclusion and justice.

If sharing is to flourish, and support both solidarity and sustainability, research agendas therefore need to both broaden and deepen. The diversity of cultural and political approaches to sharing sketched out above suggests a need for new trans-disciplinary agendas for research and inquiry.

Of course, empirical work is needed to better describe and understand the variation of sharing behaviours across cultures and cities, and their changes over time, and to unpack the extent and mechanisms of their impacts on energy and resource consumption. But to do this well, work is also needed to integrate evolutionary and behavioural approaches to human practices of collaboration and sharing, bringing together culture, biology, economics, psychology and more. In particular there is a strong case for much more research to explore the cultural, psychological and identity impacts on individuals and collectives arising from participation in different kinds of sharing. This is essential if the potential of sharing to transform identity and culture is to be realized.

Political action and interventions in sharing also merit more detailed research – both empirical and theoretical: exploring how cities and other actors (from citizens to intergovernmental bodies) deliver policies for sharing and the urban commons in practice; and – building on lessons from inter-culturalism and contact theory - how sharing organisations can design models and platforms for social inclusion, and diversity.

In conclusion, the social and political potential of sharing to contribute to sustainability and justice is huge, and transformative. Researchers investigating sharing can play a critical role in realizing this potential, and contributing to a sustainability transformation – but only if they place existing and emerging work on the 'sharing economy' within a broader, richer, inter- and trans-disciplinary research agenda.

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