

*Low-Carbon Transition as Vehicle of New Inequalities? Risk-Class, the Chinese Middle Class and the Moral Economy of Misrecognition*

**Introduction: Low-Carbon Innovation and Risk-Class through the Chinese Looking Glass**

Despite the growing awareness that near-irreversible damage is being done to the environment, environmental challenges, including climate change, continue to accumulate (IPCC, 2018). In this context, low-carbon innovation has caught the attention of policymakers around the world as the crucial means for reconciling (and reviving) economic growth and environmental sustainability. Attempts to kick-start mass low-carbon innovation are thus gaining importance both structurally and politically, equating low-carbon innovation with the pursuit of the (possibly global) common good. The massive level of investment in low-carbon innovation in China is often latched onto as a particularly important regarding both (state-sponsored) innovation and the pursuit of better environmental futures (Green and Stern, 2015; ClimateGroup, 2015) as well as a possible means of moving beyond neoliberal economic governance. Here a ‘triple win’ of environment, economy and society (i.e. inequality) benefits are often promised.

China is particularly interesting for several further reasons. China is both an increasingly central part of Euro-American capitalist modernity, while also being distinctive as both non-Western and undergoing a variegated but ‘compressed’ modernity (Chang, 2010).<sup>1</sup> The intense challenges of Chinese modernity are not only due to its massive scale. They are also facing *simultaneously* the problems of working through ‘first modernity’, associated with

industrialisation and the need to escape poverty, and those of ‘second modernity’, or ‘risk society’ – the intensification of global risks as the unintended consequences of others’ earlier industrialization (Beck 1999; Han and Shim, 2010).

China also has importance for global society as a whole. China is positioned as both increasingly influential within contemporary global capitalism while also conditioned by a political economic history that sets it apart. This presents it as the largest possible competitor to the continued geopolitical hegemony of the United States (Arrighi, 2009; *Cf* Hung, 2016; Fenby, 2014); indeed, more recently in the age of Trump, explicitly positioning itself as the global guardian of responsible globalization (Hilton, 2017). Here, Chinese success in low-carbon innovation co-emerging with a capitalist regime of accumulation that is distinctively *non*-neoliberal could entail massive changes in the global balance of political and economic power (Tyfield, 2018). Lastly, the massive size of China’s economy, scale of production, and population in relation to the global economy entail that national shifts in China in inequality, wealth, and pollution are *ipso facto* global changes as well (e.g. Milanovic, 2006). In short, low-carbon innovation in China sits at a nexus of central issues shaping the early 21<sup>st</sup> century.

Regarding low-carbon innovation specifically, the Chinese case also makes especially clear how this is not merely a techno-economic issue, but one imbued with political, social and cultural aspects (e.g. Jakobson, 2007; ). The common tendency to frame the issue of low-carbon innovation as a technical issue – a straightforward, neutral technological means of greater carbon-efficiency – is particularly problematic (Tyfield et al., 2015). The generation and reception of products, services or business forms that will experience significant take-up is thoroughly mediated by power/knowledge relations that embody a certain conception of low-carbon innovation and future society; in the context of a growing consumer society in China (Yu,

2014), of largely high-status and high-technology commodities. As a techno-nationalist project of geopolitical aggrandizement (Zhao, 2010), much of this ‘technology push’ in China – including examples of ambitious industrial policy – is also simply unintelligible absent a political lens.

The interaction of innovation with power and politics has recently emerged as key concern, specifically from discussions about system transition (e.g. Geels, 2014; Meadowcroft, 2009; Tyfield, 2014). This literature has arguably begun to bring power into transition studies. But how innovation and power together intersect with inequalities, and specifically *class* inequalities, has not been a primary focus to date, though this neglect of innovation studies and class analysis has tended to be mutual. ‘Power’ tends to be introduced in terms of accounting for persistent blockages to incipient and promising low-carbon ‘niches’ (Smith et al., 2010; Zuev et al., 2019). By contrast, a concern with class seeks to incorporate power in terms of how everyday life and socio-technical systems are actively conditioned, in both their reproduction and transformation, by differential capabilities and vulnerabilities. This thus affords ‘thick’ qualitative analysis, capable of normative complexity, of what social futures may actually be conditioned by specific low-carbon innovations, against a simple ‘good low-carbon’ vs. ‘bad incumbent’ binary (Bakker, 2014).

Here, recent explorations regarding how to integrate (re-)production of class inequalities (Bourdieu, 1984) with issues of climate change governance and *its* associated inequalities are promising. This approach focuses on the analysis of ‘risk-class’ (see Beck, 2013; Curran, 2013). Examining how the *distribution of bads* is shifting and intensifying existing logics of class, the concept of ‘risk-class’ helps illuminate the *systematic inequalities* emerging from the production and distribution of contemporary risks and the politics (of) governing these risks. Risk-class

analysis thus identifies systematic differentials in groups' distribution of socially produced risks, the uneven nature of benefits from these risks, and the interaction of these inequalities with existing inequalities such as class, race, and gender (Curran 2015, 2016, 2018).

This paper pushes this research agenda by investigating how this approach can illuminate the politics of socio-technical system transition (and, thence, vice versa). Specifically, we seek to utilize this conceptual tool, *risk-class*, to explore critically the various power dynamics of contemporary low-carbon innovation in China. While there has been significant critical attention regarding whether low-carbon innovation will be successful or not, the question that this paper seeks to address is different: what novel configurations of risk, power relations, and inequality are, in fact and tendentially, being generated from the particular ways in which low-carbon innovation is currently pursued, now with some apparent success, in China?

This paper argues that the institutional framework of competitive consumerism and stratification in contemporary China, in the context of continuing rising (global) inequalities (Goodman, 2014; Piketty, 2014) presents a possible configuration of risk-class and inequality that threatens to be particularly pernicious. The heightened sensitivities to pollution amongst Chinese elites and middle-class do not necessarily serve an emancipatory function, and a risk-class lens illuminates the pressing danger of this eventuality. Insofar as low-carbon innovations are exclusive and expensive there is the significant threat of low-carbon innovation reproducing, and even intensifying, existing risk-class inequalities, despite some of its other, more apparent and undoubtedly systemically significant advantages.

Contemporary risk – in particular, climate change and financial crises – have forced upon social science the need not to predict the future, but rather, as Beck (1992) insisted, to engage in projective social theory since the dangers from ignoring threatening new trends is too great (see

also Curran 2016, Urry 2016). In this vein, this paper seeks to explore these novel potential configurations of risk and inequality that are harboured within the benign exterior of contemporary modes of development and uptake of low-carbon innovation, so that sustainable transitions do not become just new dimensions of cycles of inequality, inter- and intra-nationally.

### **Rethorizing Systematic Inequalities in the Age of Global Risks**

The study of inequalities has recently been significantly revitalized. Not only are inequalities and increasing advantages of elites back on the top of the academic agenda, but they are also in mainstream political discussions (Wilkinson and Pickett, 2011). Surprisingly enough, it was economics, not the disciplines that have a generally critical orientation to contemporary capitalism such as sociology, that originally drove much of this research (Piketty, 2014).<sup>2</sup> Despite its innovations, this literature has significant limitations in terms of measuring inequality in terms of income and wealth differentials alone (see Piketty, 2014). This prism in turn overlooks questions of the distribution of socio-natural *bads*; including environmental risks that are so important to shaping contemporary global risk-society (Curran, 2013; 2016; Beck, 2013).

Sociological approaches to class may be expected to move beyond the economic approaches' over-reliance on income and wealth to broader, more adequate measures of differential advantage, as in Bourdieu's theory of multidimensional 'capitals' (Bourdieu, 2001). Additionally, the relational emphasis in class analysis of how the advantages of one group are often due to the disadvantages of others is important given the lack of this dimension in much of this economic analysis (Wright, 2015; see also Bourdieu 1984). However, despite these strengths, there is a reproductionist bent in much contemporary class analysis (Beck, 2013: 65 Cf Bourdieu 1984).<sup>3</sup> By focusing on the distribution of *goods* and being wedded to the goal of

developing mappings of individuals into relatively fixed groups based on these goods, class analysis has found it extremely difficult to integrate within their systemic frameworks fundamental *transformations* in inequality emerging from the growing distribution of bads (see Beck, 2013). Amid massive and ongoing socio-technical change and ‘disruption’ today, this shortcoming is particularly problematic.

These lacunae in both economic and sociological analyses of contemporary systemic inequalities have recently been addressed by the emerging research paradigm on risk-class (Beck 2013; Curran, 2013; 2015; 2016; Christophers 2015). Risk-classes may be studied as (emerging) systemic groups that either benefit or suffer disproportionately from contemporary risk processes—especially vis-à-vis the parallel distribution of system *goods* (the usual focus of class analysis) and the differential responsibility for *production* of these systemic bads (Curran, 2015). Beck declares that ‘risk-class’ provides conceptual resources with which ‘to radicalize the class distribution of risk’ and to chart ‘who will be able to occupy areas less exposed to risk and who will have little choice but to occupy areas that are exposed to the brunt of the fact of the risk society’ (Beck, 2013: 63, discussing Curran, 2013).

This analysis of risk-class thus identifies a key form of social power shaping and emerging from risks as systemic distributional positions. It echoes Beck’s suggestion two decades previously of thinking of risk positions as akin to class positions in their impact on social power (Beck, 1992: 26), without in turn acceding to his rejection of class. That is, as proposed here, risk-class analysis is not opposed to class analysis (see Curran, 2013; cf. Beck, 2013). Rather risk-class interacts with class inequalities without being reducible to them.

In thinking through the dynamics of risk-class (and class), it may be said that it involves one’s position vis-à-vis production and consumption of system bads and goods. As this paper

emphasises below, inequalities in both goods and bads are socio-technically mediated and a ‘legitimate’ stratification of differential ‘fair shares’ is continually being constructed into a new moral economy.<sup>4</sup> In contrast to the existing general analyses of risk and inequality, this paper explores how low-carbon innovation in contemporary China is evolving along trajectories that are increasingly co-produced with ways in which ‘class’ is being both reimagined and reformed in relation to ‘risk-class’.

Risk-class as an objective factor in social power and life-chances has been outlined regarding financial risk and environmental risk and its relation to the power of elites (Curran, 2015, 2016, 2018). Yet the literature remains at a preliminary stage with, in particular, little discussion of the lived reality of risk-class regarding environmental risks or how it functions in different social contexts. China serves as a key case through which to explore the impacts of risk differentials on different social groups. Moreover, a focus on China illuminates how in certain key, currently unrecognized ways the development and very success of low-carbon transition may *intensify*, not mitigate, inequalities even as it begins to address meaningfully key aspects and bases of global risks that are exacerbating contemporary inequality.

### **Theorizing Low-Carbon Innovation and Risk-Class**

Innovation – the ubiquitous buzzword of the day, usually used with an unquestionably positive valence (Godin, 2006) – and ‘low-carbon innovation’ specifically is not just an important issue to connect to contemporary and emerging inequalities. It is also a particularly insightful case for understanding the emergent shaping of global societies through and alongside that of risk-class. This is not least because innovation, considered as a process of power/knowledge, can be seen as simply the co-produced twin to the proliferation of global risk identified by Beck, as ‘process’ and ‘product’ respectively but with *both* conceptualized as relational, dynamic and situated.

Differential exposure to risks is necessarily mediated by prevailing power/knowledge relations and technologies. Political economies of knowledge affect differential ‘risk’ exposure through employment, expertise (accredited and/or embodied), income and assets; but also through the network capital, mobility (Urry, 2007) and ‘motility’ (the meta-capacity for mobility) (Kaufmann, 2010) and individualized capacities for resilience that are associated with contemporary knowledge-work. Different levels of education and thence understanding of risks and potential responses thereto, or connections to others with such capacities, also affect risk exposure (Kahn, 2002). What emerges, thus, are complex systems of reinforcing and antagonistic power/knowledge processes that generate systemically differential – and highly dynamic – positions, capabilities and power relations; and these new (relational) positions in turn condition the trajectories of further ‘innovation’ and associated strategic action (Tyfield et al., 2015).

Similarly, then, processes of (low-carbon) socio-technical ‘system transition’ (Smith et al., 2010) themselves may be conceptualized in terms of iterative feedback loops of growing ‘power momentum’ that *constitute*, and then privilege or newly encumber, (new) social groups and identities, not just rearranging ‘winners’ and ‘losers’ (Tyfield, 2014; 2018). In other words, we here conceive of (low-carbon) system transition *as* power transition.

Crucial to this whole process, however, is the permanent vista – as deepening common-sense to lay social agents, not just professional sociologists – of an uncertain but threatening array of global risks from which one must seek to secure oneself as well as possible, but never definitively. And, through the neoliberal period, this is to be done by increasingly individualized selves in increasingly individualized, ‘knowledge-based’ ways (Beck, 1992).

These considerations are generally overlooked regarding (low-carbon) system transition, as against focus on ‘carrots’ regarding advantages of adoption for (socially-bounded) *Homo*



*economicus*. ‘Sticks’, meanwhile, are generally considered only in terms of incorporating key abstract (if undeniably real) risks of GHG-induced-climate-change, or government-imposed regulation on that basis. Taking them into account, though, suggests a key but neglected dynamic capable of actually driving low-carbon transition in current socio-political conditions that is systematically neglected: the spontaneous, bottom-up mass adoption of, and demand for, innovations driven by the pragmatic individualized decision of *how to maximize one’s own escape from system bads*. This is arguably the key missing piece – of growing power momentum – in the currently dispiriting lack of progress in system transition(s) globally. Moreover, one can readily conceive that such dynamics will be most evident and productive in contexts where risks and opportunities are particularly intense, enduring and dynamic, e.g. as in contemporary China.

This lens on (low-carbon) innovation invites a rich qualitative analysis of the processes through which such coproduction of social-technological change takes place. Key here is how contemporary proliferation and overflow of many global risks mediates a deepening compulsion to re-establish a new moral economy attendant to systemic challenges. Together, this context of prevailing individualized ethos of (knowledge-based) ‘sink or swim’ amidst *collective* exigencies specifically conditions the emergence of risk-class as central issue.

Risk-class’, like ‘class’, as a lived and system-productive social category, must be actively adopted and developed by lay social agents in their everyday attempts to make sense of (the trajectory of) their lives. As such, a new discourse of class must not only be *meaningful* to those deploying, performing and entrenching it; it must, at least to some extent, speak to and practically illuminate the actual novel social challenges these agents face. *Risk-class* thus has the potential to be a rich sociological category allowing – indeed, prioritizing – exploration of the interaction of the moral-cultural-discursive and ‘economic’-material-technological (see Sayer

2005) in ways that resonate strongly with the qualitative, power-attendant investigation of socio-technical transition.

In particular, risk-class processes involve not only differential risk exposure and vulnerability, but also, in interactive parallel, differentiated cultural and material enablement. But, as just discussed, these new potentialities can shape not just the landscape of power relations emerging from efforts to mitigate global risk, but also the landscape of *novel global risks* that this in turn will shape into being and the productive, individualized responses to these in turn, and so on recursively.

In this way, then, power momentum for socio-technical system transition may actually emerge, and specifically in coproduction with new *risk-class* formations. The implications of this dynamic then, themselves demand critical attention. We explore them by focusing on a key case, namely the question of the parallel emergence of risk-class and urban mobility innovation in the Chinese context, especially in the more affluent and burgeoning megacities along the Eastern/Southern seaboard. First we consider the broader issue of risk-class in China, before turning to mobility innovation specifically.

### **Chinese Middle-Class as Risk-Class**

The ongoing emergence of the Chinese middle-class(es) since ‘Reform and Opening Up’ is widely celebrated as an incredible example of upward mobility in a previously poor country, and one of singular historical significance. Yet from being amongst the most equal societies in the world in 1978 – if unquestionably poor – China has also become a strikingly unequal society (Hung, 2016). This is especially stark when set against parallel processes of development elsewhere in East Asia (Hung, 2008). Indeed, for several years from 2009, official Gini coefficients were not published, such was the political sensitivity of the issue (Goodman, 2015).

In recent years, concerted policy drives, focusing on rural citizens and areas (Lin and Wong, 2012) have begun to reduce inequality as measured by these figures, but they remain comparatively high, while growth of a relatively affluent intermediate stratum has substantially stalled in terms of percentage of the population (Goodman, 2015).

Liberalization, both domestic and international, of the political economy has, of course, been crucial in creating such inequality. But the effects of this process have also been exacerbated by Chinese peculiarities. In particular, the Party-state regime and its continuing (and, if anything of late, tightening) control over the commanding heights of the political economy (e.g. major industries of national importance, heavy, hi-tech and financial) lead to at least two major aspects of Chinese inequality.

First, there is a cadre-capitalist elite at the top of society (Ho, 2013), privy to privileged access to both opportunities for money-making (legal, grey or simple corruption) and associated supportive ‘rule by law’ governmental decision-making.<sup>5</sup> Secondly, the household registration system (*hukou*) officially divides the population into two classes, of urban and rural, to the systematic disadvantage of the latter (Whyte, 2010a). This takes the form of differential access to public services of different quality (urban better than rural), as well as the permanent insecurity, regarding rights of abode in city areas, of the ‘rural’ workers who flock to cities in search of employment (Nyiri, 2010) – in factories, construction or forms of low-paid service work – on which the Chinese economic ‘miracle’ substantially depends.

Of crucial importance, however, is how this inequality has grown alongside a set of deepening socio-natural problems, risks and hazards under ‘compressed modernity’ (Han and Shim, 2010). China’s breakneck industrialization infamously has created a country for which, across almost any metric of environmental quality, the challenges are immense (Shapiro, 2012;

Kahn and Zheng, 2016): air quality, water quality and volumes (Li J, 2010); drought and/or flood risks (Khan et al., 2009); food safety and security (Yan, 2012; Lu et al., 2015a); soil pollution and preservation (against desertification, salinization or simple loss to urban sprawl) (Lu et al. 2015b); over-use of agricultural chemicals (fertilizers, pesticides etc...) (Li et al., 2014) etc...

Yet, while all denizens of Beijing are cloaked in its frequently hazardous smogs, even in this case exposure to these environmental risks are unevenly, and unequally, distributed, given differentiated access to expensive air filters, enclosed mobile environments (i.e. cars), foreign travel (to cleaner air) and private health care (Kahn and Zheng, 2016; Liu-Farrer, 2016). In short, therefore, understanding contemporary inequality in China clearly demands attention not only to class-as-goods, but also to the distribution of *bads* (Ren, 2013), and the interaction of both with distribution of the benefits that substantially drive the *production* of those system bads.

Contemporary China is thus characterized by massive socio-economic growth, opportunity and change alongside political stasis and deepening systemic risks. Generalized ontological insecurity emerging from the impacts of ‘compressed’ modernity, of both individuals and the government, is intensified by increasing inequalities, in terms of fears of social splintering and instability (Ren, 2013; *Cf* Whyte, 2010b). The discourse of the ‘Chinese middle class’ (Guo, 2008) has emerged in this context. Most familiar to Westerners as the business press imaginary of the ‘next billion customers’ (McGregor, 2007) who will yet save capitalism from the secular stagnation of its erstwhile core in the global North, in fact the ‘middle-class’ in China is a much more complicated and as-yet-uncertain social formation (Li Cheng, 2010). The Chinese middle-class brings out clearly the increasing importance of risk-classes to the cultural and political struggles, both latent and manifest, in contemporary China.

The discourse of ‘class’ (*jieji*) bears the scars of the heavy political and constitutional work it has had to do in the People’s Republic of China since 1949 (e.g. Guo, 2008). ‘Middle class’, and the definition thereof, in this context remains essentially uncertain and contested (e.g. Guo, 2008; Ravallion, 2010; Goodman, 2014: Table 4.1, p.102). A growing literature of critical analysis shows empirically how small and diverse any such ‘class’ actually is and thus its substantive emptiness, at least as a term of familiar, ‘rigorous’ (and Western-dominated) sociological analysis (e.g. Therborn, 2012; Goodman, 2014).

For instance, indicative of the impossibility of understanding the Chinese middle-class in conventional terms of class-as-goods and as settled social fact is that as much as two thirds of the population self-define as middle-class against a best estimate of at most (a steady, not rising) 12% who actually fulfil socio-economic criteria with which such achieved status could reasonably be associated (Goodman, 2015). As such, ‘middle-class’ in contemporary China can be understood as an ongoing *socio-political strategy*: a ‘prolepsis’ (Ren, 2013) and ‘anticipatory staging’ (Anagnost, 2004) in the ongoing, dynamic *construction* and *unification* of a national class of ‘responsible’, self-governing citizens from what remains a highly complex and diverse collection of agents (Li Chunling, 2010).

‘Middle-class’ thus emerges as unquestionably an issue of intense and vital discussion *in* China for multiple parties (Ren, 2013; Guo, 2008). For the Party-state government (Tomba, 2009; Ren, 2013; Goodman, 2015; Li Cheng, 2010), it is the supposed bulwark of social stability including against increasing popular distaste for the cadre-capitalist elite (regarding both their status and tastes in consumption (Yu, 2014: 22, 102)) and its corruption.<sup>6</sup> But also, most importantly, ‘middle-class’ is an intense concern for lay social agents themselves (Yu, 2014; Ren, 2013; Li Chunling 2010). In particular, it resonates with dynamics of comparative (and

hence exclusive) evaluation, mediated by the key discourse of ‘high’ vs. ‘low’ ‘quality’ (*suzhi*) persons (Anagnost, 2004; Jacka, 2009). Existing analysis of China has thus already noted the performative and dynamic power/knowledge process of middle-class formation in China. Yet turning from the usual focus on (undoubtedly crucial) issues of consumption of self-evident ‘assets’ and ‘goods’ to emerging issues of risk and innovation processes highlights a crucial missing piece; namely how this is a political process of the emergence of *risk-class*, even as this terminology is not used.

First, the specific intensity with which ‘middle-class’ status is pursued intersects powerfully with key risk-class considerations, including the exceptional and profound ontological anxiety of contemporary post-socialist China and its acute challenges of global risk-society. This generates an unequalled appreciation across the population of both exceptional opportunity for significantly improving quality of life (Tse, 2016; Kahn and Zheng, 2016) *but also* possibilities of ‘falling behind’, ‘losing out’ (to others) and even simply failing (Ren, 2013: 195), or ‘missing the boat’ of the one-off opportunity to be a beneficiary-cum-protagonist of China’s global rise. This situation conditions the extraordinary (self-)productive dynamism of the ‘middle-class’ orientation to the uniquely intense attention to (objectively severe, global) risks in China.

In part Chinese responses to intensifying global risks as they manifest in China, it is also a matter of specific developments within China itself. This includes growing public awareness, concern and scientific literacy (especially by way of social media and an emerging ‘green public sphere’ (Yang and Calhoun, 2007; Kahn and Zheng, 2016)) regarding environmental risks, including air pollution (e.g. ‘Under the Dome’, 2015) and food safety, as well as major industrial accidents (e.g. Tianjin, August 2015). The emerging governmental discourses of ‘ecological

civilization’ and ‘new normal’ in China (Green and Stern, 2015) also signify a new emphasis on quintessentially global risk issues such as ‘green growth’, ‘liveable’ urban environments and (low-carbon) innovation. In each case, however, these are the specific concerns of a ‘middle-class’: with aspirations now beyond socio-economic survival, but also specifically concerned by such environmental issues not in the abstract but as matters of unequal personal exposure to these risks as key aspects of ‘quality of life’.

Of course, the actual realization of such dreams of ‘moderate prosperity’ (*xiaokang*) eludes the great majority of Chinese citizens. Given the current structure of China’s political economy, dependent upon a massive ‘reserve army’ of cheap labour (Hung, 2016) and the continuing centrality (if not veto) of the Party-state, and hence the importance of personalized connections to them, access to opportunities for ‘climbing the ladder’ are systematically exclusive and scarce – a fact exacerbated in turn by sheer demographic size.<sup>7</sup>

There is thus widespread recognition of the considerable stakes involved in differential risk exposure under the *status quo* (Yu, 2014; Ren, 2013; Anagnost, 2008). Yet this precipitates not rejection of the ‘China Dream’, but rather a renewed individualized determination to be amongst the ‘winners’ of the tussle, to avoid the risks that have been created with the unequal distribution of bads emerging from China’s galloping economic growth. The deepening importance, both subjectively and in terms of objective life-chances, of differential exposure to systemic bads is thus leading not only to *risk-class* as fundamental factor in life outcomes (Curran, 2016), but also to risk-class as a pivotal point of (self-)orientation for struggle in economic life, even as this terminology is not familiar or self-consciously deployed. Consequently, this competition is oriented not just to goods, like housing, education and other status-displaying commodities, including cars and ICT; but also to the unequal *distribution of*

*bads* (in part conditioned by those goods) that are both increasingly obvious and increasingly problematic topics of discussion, both publicly and privately over social media.

In sum, the animated, existential pursuit of Chinese ‘middle-class’ status is not only the seeking of a *class* status. Rather, it is also the intense pursuit of a certain *risk-class* position that promises to secure these individuals (and their families) from many of the worst cycles of compounding risk exposure emerging from China’s compressed industrial modernization alongside the development of global-risk-society (Ren, 2013). Our final concern, thus, is to explore how these dynamics are emerging interactively with broader efforts to tackle (one of the) major global risk(s), namely low-carbon innovation.

### **Low-Carbon Urban E-Mobility and Misrecognized Risk-Class**

Low-carbon transition remains elusive – at best embryonic, notwithstanding its active, massive pursuit (Green and Stern, 2015) – in China (as elsewhere). But the ongoing emergence of risk-class presents novel opportunities for innovation that is increasingly seen to deliver a *systemically* decarbonized China. Specifically, an emergent middle-class as risk-class augurs moralized and recursively *empowering* discourse in which desirable and quasi-exclusive low-carbon innovations – as *commodities* and thence as key elements of socio-technical systems – emerge as vehicles of a system transition that is understood to be better for (tacitly ‘middle-class’) consumers *and thus* for ‘everyone (else)’. Conceptualizing this as a transition in power/knowledge relations through pragmatic, strategic decisions of situated agents (Tyfield, 2014; 2018) allows investigation of this dynamic.

We illustrate this here through the key example of ongoing and high-profile attempts at urban e-mobility transition in China.<sup>8</sup> This is a key case study in its own right, regarding its potential global significance amidst the extraordinary growth of the car, and associated



emissions, in China in recent decades, which have intensified regional and global pollution (Altenburg et al., 2012). Our goal here, however, is simply to show how Chinese mobility innovation illustrates the co-production of low-carbon transition with the emergence and definition of risk-class.

Three issues set the scene for the importance of this intersection of mobilities innovation and the dynamics of risk-class. First, regarding risks and deepening ontological insecurities, urban mobility is central to intense citizen concerns (Kahn and Zheng, 2016): about issues of air pollution (Qin, 2015); congestion and associated stress and/or social isolation (Sandow, 2011); and physical injury from high rates of traffic accidents. Consumer decisions and demand, and subjectivities formed by changes thereof, are thus intimately tied to anxious pursuit of safety from system bads, not just pursuit of system goods. Moreover, where this is an individual, not a collective, project the result is sharp-elbowed competition to attempt to secure oneself (and one's family) from disproportionate risk exposure, as among those socially 'below' you.

Secondly, regarding producers, and resonating with the important role of government supporting discourses of the 'middle-class', e-mobility – and specifically the electric *car* – is interpreted by the central government as a unique opportunity for Chinese leadership in a global, hi-tech industry, synonymous with 'modernity' and 'development' while also cementing China's geopolitical credentials for greenery. Thirdly, regarding consumers, urban mobility sits at the very heart of ongoing development and substantive social definition of China's 'middle-class', with cars and their infrastructural corollary, dwellings and parking, the top consumer priorities (Zhou and Qin, 2010). As such, these forms of consumption are enabling specifically middle-class, if still constrained, political mobilization, regarding issues of urbanization, mobility, (often gated) residence and property, and parking (Tomba, 2009; Wang et al., 2013).

Yet these aspirations to modern middle-class urban lives and mobility are unfolding at a moment of significant turbulence for the incumbent, default model of twentieth century automobility, in the US image. Moreover, after many years of government-sponsored effort, China also now appears to be emerging as a possible global leader in this new ‘industrial revolution’. For instance, it has led the world in total electric vehicle (EV) sales in recent years, up to 1.1 million passenger electric cars (both plug-in and hybrid) in 2018 (ev-volumes.com 2018).

It is crucial to acknowledge, however, that it is still far from clear where this is leading in terms of the emergence of what remains at best a crystallizing socio-technical ‘low-carbon’ system transition, for even the increasing uptake of electric vehicles does not itself add up to this. We still genuinely *do not know* what a ‘post-transition’ ‘low-carbon’ mobility system will look like: what ‘technologies’, vehicles and infrastructures it will use; who it will primarily serve both as consumers and producers/service providers; how mobility will feature in ‘normal’ everyday life etc... (Sheller, 2013). While the medium-term socio-political character of an urban e-mobility system in China thus remains highly uncertain, we can say that risk-class is already playing a pivotal role in this transition, and existing tendencies augur its further intensification.

The ‘middle-class’ is a key aspect of current system transition dynamics at the basic level of choice of vehicle. The majority of the seemingly impressive electric vehicle sales in China consists of small, Chinese-branded/manufactured EVs, from (largely private, not SOE) companies (e.g. BYD and Geely). But there are two key points about this segment for our purposes. First, notwithstanding these ‘world beating’ sales, a meaningful system transition to e-mobility remains some way off in China, both qualitatively, regarding unresolved challenges of mass adoption to system level, and quantitatively. Quantitatively, these vehicles still constitute a

comparatively small, if now growing, percentage of total annual sales of cars (e.g. approximately 1.4% in 2016 up to over 4% in 2018 (ev-volumes.com, 2018)), as against the 28+ million internal-combustion engine (ICE) cars sold each year, let alone the total of such conventional vehicles on Chinese roads.

Moreover, qualitatively, there is no guarantee that electric vehicle growth will continue smoothly up extrapolated curves to eventual market dominance, especially once we consider the social profile of this market – our second point.<sup>9</sup> For this demand consists primarily of second cars (Yang et al., 2017), often gendered as ‘her car’, for small local trips of school runs and the weekly shop. Its effective demand is thus limited to households with incomes and housing capable of supporting two cars (let alone one). Furthermore, the ‘EV’ is also thereby defined as still second choice to the big ICE saloon as ‘first’ car, with associated concerns about status still significant and not dislodged, and while remaining comparatively expensive (Li et al., 2018).

In short, the electric vehicle is finally enjoying some success in China in ways that are co-producing the social meaning, and ‘normal’ consumer choices, of the urban ‘middle-class’, but also in ways that do not yet add up to systemic transition. Indeed, low-carbon credentials of EVs remain open to significant problematization. This is not just because of the largely coal-based electricity that runs them ; but also because in the majority of cases, electric vehicles have been purchased primarily to get quick, cheap access to licence plates limited by municipal policies (Yang et al., 2017) and then, for plug-in hybrids, many are run as ICEs (Xing et al., 2016). Altogether, then, the success of the EV to date seems to promise emergence of a limited niche within a still-robust ICE-based system.

Missing from this account of mobility transition thus far, however, are two key related issues brought out by the theoretical perspectives outlined above. First, a broader perspective is

needed that looks beyond the ‘obvious’ ‘low-carbon’ technology of the electric car to other domains of contemporary innovation affecting whole systems of mobilities (Sheller & Urry, 2006), especially those that are more dynamic, such as digital mobilities. This is particularly so given that digital innovation is increasingly the most challenging competitor to the automotive industry (Foroohar, 2018), while conversely, as *electric* artefacts, EVs are singularly adaptable to digital innovations (Moran et al., 2010).

With our gaze firmly set on how socio-technical *system* transition may come about, it thus makes no sense to exclude what superficially appears as parallel forms of innovation from interest in ‘low-carbon’ transition. And, conversely, it is appropriate and illuminating to treat digital innovation *as* potentially ‘low-carbon’, albeit provisionally and in ways yet to be established by ongoing empirical investigation. For the very dynamism of this sector means that such innovation will likely be of great significance regarding low-carbon mobilities system transition in the medium-term (positive or negative) and hence cannot be meaningfully analyzed separately (Sheller, 2013; Tyfield, 2018).

Moreover, secondly, turning to digital mobilities (as proto-low-carbon innovation) also brings out much more clearly the specific and crucial dynamics of *risk*-class at work in the contemporary dynamism of Chinese mobility innovation; dynamics that then can also be seen increasingly in the EV market too. In other words, what is missing in the central targeting of the ‘middle-class’ by EV innovation – conceptualized as a familiar class-as-goods in a narrative of economic-environment ‘win-win’, respectively – is precisely individual exposure to a whole range of *existing risks* of modern urban mobility as a *pragmatic individualized predicament*, thereby unleashing demonstrable self-propelling momentum.

Digital mobilities have proven much more successful in recent years than all the efforts regarding EVs, and spontaneously so, without massive government subsidy. This includes emergence of China's own highly competitive ride-hailing service, Didi Chuxing – having successfully seen off not only domestic rivals but also Uber, becoming the second largest 'unicorn' in the world (Economist, 2016). There has also been an ever-growing list of corporate tie-ups between all of China's digital giants – themselves much more high-profile success stories for Chinese innovation than any Chinese automotive or EV company – and various partners – national and international, established TNCs and start-ups – across the automotive-mobilities sectors. Much of this corporate activity has been stimulated by the emergence of, and then copycat competition with, Tesla in the Chinese EV market, as acme of Silicon Valley 'high-end' market cachet. More recently, there has been a similarly cut-throat boom-and-bust competition amongst QR code-enabled bike-sharing companies.

Yet the considerations propelling digital mobilities to such success are profoundly shaped by issues of risk-class. For the primary image in the contemporary Chinese imagination regarding urban mobility is no longer the open road of 20<sup>th</sup> century car mythology (Paterson, 2007), but challenges: air pollution and gridlocked congestion. Note first how the electric vehicle offers little to address either of these issues at present. Indeed, the EV adds its own catalogue of risks and novel system bads, including range anxiety (compounded by gridlocked traffic), poor and/or uncertain resale values, and even hazards of sitting on top of a massive battery, as per high-profile fires and a widespread unease at 'radiation' affecting one's health (Zuev et al., 2019). Conversely, digital mobilities directly address both of these clear-and-present risks – and in ways pragmatically conceivable to the individual given existing system constraints,

while thereby actually changing system dynamics, technologies and power relations, albeit not as their primary goal.

For while ride-hailing may not itself directly tackle *systemic* air pollution and congestion, it certainly does so at a personal level, i.e. the level of pragmatic calculation: in terms of enabling one both to seclude oneself in the cleaner, private air of a vehicle and/or temporally to dodge and/or reroute around congestion at one's maximum convenience, and all without the increasing expense and administrative hassle or delay – i.e. risk – of owning a licensed car. At least, it does so for those with the income and urban residence to be able to take up this option.

Moreover, it does so while also enacting and cementing one's status as middle-class and high *suzhi*. Digital mobility enables one to avail oneself of the 'venturesome consumption' (Bhidé, 2009) of digital services that are the very acme of modern urban life, while also distancing oneself from both (disdained) ends of the current social spectrum; the poor, 'uncultured' migrant worker (on an electric two-wheeler) or the dissolute cadre-capitalist elite (in their chauffeur-driven black luxury gas-guzzler). In this way, middle-class, as *risk*-class, and digital mobilities are profoundly shaping each other and in ways productive of continual innovation and a growing 'power momentum'.

In short, amidst the ongoing and as-yet-uncertain transition of whole systems of mobility, of which EVs will likely be simply but one (small?) part, urban mobility innovation in China is precisely a locus of dynamic socio-political co-production with risk-class, centred on the ongoing shaping of the 'middle-class'. Yet the broader adoption of, and ongoing 'disruption' of all socio-technical systems by, digital technologies is likely to prove definitive in shaping genuine system transitions –not merely increased efficiency of existing fossil-fueled systems – in the medium-term. Moreover, this is particularly likely since, as is increasingly clear in

widespread popular criticism ‘disruptive’ digital (mobilities) innovation *itself* generates multiple and complexly, unpredictably overlapping new system *bads*.

For instance, the spectacular rise of, and then clampdown on, unregulated online peer-to-peer debt, with some 8000 platforms by end 2017, has been a key factor in the recent turbulence of the Chinese market for cars (including EVs) (Yang, 2018). Or, in another instance, it has recently emerged that movements (indeed, more than 61 data points) for all Chinese EVs are tracked by the central government (Evarts, 2018). This both resonates with the political importance of policed circulation to market societies, as described by Foucault (Rajan, 2006), and, reciprocally, suggests significant issues of unpredictable political contestation to which digital mobility innovation may yet give rise, shaping this socio-technical trajectory in turn.

Such novel risks, however, simply call forth yet more socio-technical activity, hence generating an exploding, self-generating dynamic of innovation and associated socio-political change. The introduction and uncertain assemblage of other mobility(-related) innovations, e.g. automated driving, will surely only compound these dynamics of overspilling risk-cum-innovation. As such, while potentially exceptional vis-à-vis other elements of low-carbon transition (e.g. energy, heating, food...) and even the ‘hardest case’ of low-carbon transition (Geels et al., 2013), urban mobility can also be seen as particularly illuminating regarding the broader interaction of low-carbon transition and socio-politics, not just an outlier and/or special case.

What seems most clear at this early stage of embryonic transition is that mobility transition will likely emerge in China precisely to the extent it is systematically socially *exclusive*. For this would tap the immense consumer demand for individualized mobility options that can marry display (at least) of a ‘new’, ‘liveable’, ‘cosmopolitan’ mobile urban life *and*

pragmatic, ‘common-sense’ appeal of ‘convenience’ specifically for those able to pay for these services; services enabling both comparative benefits *and* escape from system bads. Risk-class analysis thus enables identification of novel dimensions and dynamics of inequality and social conflict emerging as seemingly *tightly coupled* with, and not contrary to, existing trajectories of low-carbon innovation in Chinese risk-society and consumer capitalism.

Yet these tendencies already in evidence augur an even more troublesome – as super-charged – dynamic, to the extent that trajectories of EVs and digital innovation do indeed ultimately converge upon a socio-technical proposition seeming to promise meaningful decarbonisation. For in these circumstances, the exclusive benefits regarding practical everyday life would likely be magnified by those of socio-political status regarding one’s green credentials. Here, Bourdieu’s discussion of inequalities in capital, distinction, and misrecognition is particularly relevant (see Bourdieu, 1977, 1984), read through risk-class rather than class-as-goods alone. As Bourdieu (1977: 164, emphasis added) highlighted: “Systems of classification which reproduce, in their own specific logic, the objective classes... make their specific contribution to the reproduction of the power relations of which they are the product, by securing the *misrecognition* of the power relations of which they are the product”.

Similarly, the development of a compelling model of low-carbon mobility in the context of heightened competitive, consumerist China threatens to generate a particularly pernicious nexus of inequality. The legitimacy of elite and middle-class lives would be newly secured in part by their more ‘green ways of life’, compounding their sheer material desirability with a positive *moral* association for their lifestyle. Refracted through emergent symbolic capital generated for elite and middle-classes in China from their ‘cleaner’ lifestyles, the grounding of these inequalities of public approbation or censure in sociomaterial class differentials can be



misrecognised. This in turn can fuel innovation feeding dynamics of risk-class stratification, generating a self-propelling self-righteousness of the enabled – and its converse of righteous, personalized condemnation of those unable to afford new ‘green’ services – while also thereby cultivating a deepening blindness to the non-volitional socio-economic sources of this differentiation.

Moreover, these inequalities are even more problematic when the inequalities of class intersect with those of risk-class. For here the ability to buy private mitigation from the distribution of *bads* sits alongside the differential ability to benefit from the production of many of these risks (Curran, 2016) – a live issue regarding low-carbon mobility, for instance, for as long as seclusion in the ‘green’ vehicle is attractive shelter from the poor air outside, to which it may well be hypocritically contributing.

The threat of reproductive positive feedback loops is particularly exigent, insofar as the existing institutional configurations of market management of production and consumption continue to dominate social and material life. This cycle of misrecognition of the moral economy of risk-class is not inevitable. Nevertheless, the stigmatization of the already-disadvantaged due to the materially and symbolically ‘polluting products’ they employ is already palpable, particularly in the national discourse of *suzhi*, or personal character, which in turn is structurally co-produced with rigid one-party rule over an increasingly dynamic market economy. Based in existing, profound divisions in urban society between the relatively privileged urbanites and resident migrant workers – in construction, service and domestic work – mobility also provides an important site of ongoing performance and construction of these social divisions (Zuev et al., 2019).

In a country where pollution of many kinds is a serious and persistent issue and is increasingly associated in the public imagination with early disease and death, the immediate affective response to old, polluting automobiles affordable to those outside the middle-class could readily condition a powerful and deep-seated aesthetic and/or phenomenological response, verging on moral disgust (*Cf* Saito 2004, Yan 2012). Such disgust would be similar to, but even more evocative than, Bourdieusian examples of diets and table-manners (Bourdieu, 1984) – precisely as cultural responses to issues of class-as-*bads* and class-as-*goods* respectively, with the former even more visceral – and would serve to misrecognize and naturalize existing inequalities as personalized moral differences not economic power.

In short, synthesizing the conceptual tools of risk-class with those of power-knowledge relations in contemporary low-carbon innovation enables us to move beyond projected images of the pursuit of the common good and ‘win-win’ through consumerist innovation. Instead, we can identify the dangers of existing trends yielding a frightening moral economy of risk-class in contemporary China. This would not only cement social divisions of winners/losers, but do so in large part through newly *justifying* – not reversing – such stratification in terms of personalized low-carbon (publicly-displayed) ‘virtue’ as a middle-class characteristic. In short, illuminating more substantively the process of low-carbon transition as socio-political process, it becomes inseparable from power, risk, and inequality in contemporary prosperous urban areas in China that are the primary target of these innovations.

## **Conclusion**

This paper has investigated what novel configurations of risk, power/knowledge relations and inequality are being co-produced with contemporary low-carbon innovation in China, illustrated

by the systemically crucial case of urban mobility. Tying the variety of different inequalities facing rich and moderately prosperous members of Chinese society to the distribution of risks, as both differential vulnerabilities and capabilities, illuminates how the emerging Chinese ‘middle-class’ can be understood as *risk-class*. Exploring low-carbon innovation as a process of changing and complex, reinforcing power relations then reveals this latter dynamic to be forming in tight interactive parallel with that group’s emergence and its ongoing self-definition.

A key aspect of this process may arise from the dual character of low-carbon innovation through personal consumption of relatively hi-tech commodities. For this means it both signifies a morally superior “green consumerism” while also being expensive consumer practices that only some can access. Placed atop existing profound social inequalities of risk-class in China, this augurs potentially environmentally productive innovations that may also be intimately interlinked with inequality-generating cycles of misrecognition. That is, the intersection of class and risk-class politics threatens especially pernicious, *as* socially legitimated, relations of inequality that cannot be perceived either through the prism of class or risk-class analysis alone.

The intention of this paper is, of course, not to reject low-carbon innovation, nor even electric vehicles, in principle. Rather our goal is to illuminate how risk-class analysis can question critically the potential and tendential, though contingent, implications of processes that seek to address domestic and global risk-society problems. As such, viewing system transitions as power transitions through the prism of class and risk-class analysis combines in ways that both profoundly problematize and illuminate low-carbon innovation as an irreducibly messy socio-political process. Indeed, low-carbon transition, insofar as it may actually emerge as a process of power momentum, will likely perpetually elude the rational control of policy that is

foundationally presumed to be possible by much of the sustainable transitions literature (*Cf* Hajer, 2000 on ‘cockpitness’).

In particular, emerging low-carbon innovations offer new and particularly potent materialized moral discourses that could endow middle-class (and elite) groups with a self-reinforcing power momentum of enablement. This would include a particular self-righteousness of ‘hard-earned’ just deserts that feeds (off) their indignation; dynamics already observable in Chinese urban ‘middle-class’ discourse (Osnos, 2015). And this in turn could drive ‘low-carbon innovation’ that *serves and enables them specifically*, in positive feedback loops characteristic of an accelerating power momentum.

On the one hand, such a process would fill the yawning gap in sustainable transitions literature regarding identification of the specific and novel power constituencies (not just protest groups) that could actually drive low-carbon transition today; and do so successfully in the face of the hugely powerful interest groups that entrench and profit from current high-carbon lock-in (Urry, 2013). Yet, on the other, this process would also reproduce, and even newly *legitimate* in pernicious ways, inequalities under the continual empty promise of ‘open’, ‘meritocratic’ membership of those benefitting from distribution of both goods *and* *bads*. Indeed, as the middle-class as risk-class thus becomes increasingly empowered and self-assured, it is likely to become increasingly not just a risk-class in-itself but also *for-itself* (*Cf* Tse, 2016). Yet this titanic political economic development – arguably the most significant in the world today for global capitalism – would likely further strengthen dynamics that tie the trajectory of low-carbon innovation to the rise of this specific class, and for its primary advantage.

Nevertheless, we write not merely to highlight the underside of widely celebrated means of pursuing green growth, but to forewarn that these futures are possible; ‘plausible’ (Wilkinson

et al., 2013), but not pre-ordained. Insofar as increasingly large parts of social and government policy across the world, not least in China, are oriented to addressing complex global risks, it is necessary to develop new theoretical tools that can illuminate neglected power/knowledge relations emerging from these transformations and the ensuing responses to them in turn. Despite the limitations of existing risk literatures, contemporary societies, with Chinese society arguably at the forefront, are increasingly concerned about complex system *risk* – and increasingly obsessed with the innovation that is in many ways its obverse, complement and source. But exploring and conceptualizing novel dimensions of risk, changing power/knowledge and inequality through risk-class and low-carbon innovation-as-power-transition (not least in China) and how these are together actively *constructing* qualitative, normative socio-technical and political futures can also open up strategic, situated reflection and intervention in productive new ways and in real-time on unfolding trajectories of the key global challenge of transition to environmental sustainability (Tyfield, 2018; Flyvbjerg et al., 2012).

In short, a key question for future research becomes “How can the emergence of risk-class(-for-itself) be *harnessed* to more progressive global low-carbon transition?” And, whether or not these progressive potential transitions are realized, Chinese socio-political dynamics, both in themselves and played out in its increasing global presence,<sup>10</sup> are likely to be an increasingly influential arena in this global-risk problematic of the Anthropocene and attempted solutions through low-carbon innovation.

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## References

- Altenburg Tilman, Bhasin Shikha, Fischer Doris (2012) Sustainability-oriented innovation in the automobile industry: advancing electromobility in China, France, Germany and India. *Innovation and Development* 2(1): 67-85.
- Anagnost Ann (2004) The corporeal politics of quality (*suzhi*). *Public Culture* 16(2): 189-208
- Anagnost Ann (2008) From 'class' to 'social strata': grasping the social totality in reform-era China. *Third World Quarterly* 29(3):497-519
- Arrighi, Giovanni (2009) *Adam Smith in Beijing*. London: Verso.

- Bakker, Sjoerd (2014) Actor rationales in sustainability transitions – interests and expectations regarding electric vehicle recharging. *Environmental Innovation and Sustainable Transitions* 13: 60-74
- Beck, Ulrich (1992) *Risk Society: Towards a New Modernity*. London: Sage.
- Beck, Ulrich (1999) *World Risk Society*. Malden, MA: Polity.
- Beck, Ulrich (2013) Why ‘class’ is too soft a category to capture the explosiveness of social inequality at the beginning of the twenty-first century. *British Journal of Sociology* 64(1): 63–74
- Bourdieu, Pierre (1977) *Outline of a Theory of Practice*. Cambridge: Cambridge University Press.
- Bourdieu, Pierre (1984) *Distinction: a Social Critique of the Judgement of Taste*. Cambridge, MA.: Harvard University Press.
- Bourdieu, Pierre (2001 [1983]) The Forms of Capital. In: Granovetter, Mark and Swedberg, Richard (eds) *The Sociology of Economic Life*, 2nd Edition. Boulder, CO: Westview Press, pp. 96–111.
- Chang, Kyung-Sup (2010) The second modern condition? Compressed modernity as internalized reflexive cosmopolitization. *British Journal of Sociology* 61(3): 444-464.
- Christophers, Brett (2015) Value models: Finance, risk, and political economy. *Finance and Society* 1(2): 1–22.
- ClimateGroup (2015) *Inside China*. Beijing: ClimateGroup.
- Curran, Dean (2013) Risk society and the distribution of bads: theorizing class in the risk society. *British Journal of Sociology* 64(1): 44-62.

- Curran, Dean (2015) Risk illusion and organized irresponsibility in contemporary finance: rethinking class and risk society. *Economy and Society* 44(3): 392-417.
- Curran, Dean (2016) *Risk, Power, and Inequality in the 21<sup>st</sup> Century*. Basingstoke: Palgrave Macmillan.
- Curran, Dean (2018) Environmental justice meets risk-class: The relational distribution of environmental bads. *Antipode* 50(2): 298–318.
- The Economist* (2016) ‘Uber gives app’, 6<sup>th</sup> August.
- Evarts, Eric (2018, November 30) In the red: Electric cars share location data and more with Chinese, *Green Car Reports*.
- Fenby, Jonathan (2014) *Will China Dominate the 21<sup>st</sup> Century?* Cambridge: Polity.
- Flyvbjerg, Bent, Landmann, Todd, and Schram, Sanford (eds) (2012) *Real Social Science*. Cambridge: Cambridge University Press.
- Foroohar, Rana (2018) Tech companies tinker under the hood of the automobile industry, *Financial Times*, 2<sup>nd</sup> December.
- Geels, Frank W. (2014) Regime resistance against low-carbon transitions: Introducing politics and power into the multi-level perspective. *Theory, Culture and Society* 31(2): 21-40.
- Geels, Frank, Kemp, René, Dudley, Geoff and Lyons, Glenn (2013) Preface. In: Geels, Frank, Kemp, René, Dudley, and Lyons Glenn (eds) *Automobility in Transition?* Abingdon: Routledge.
- Godin, Benoît (2006) The Knowledge-Based Economy: Conceptual framework or buzzword? *Journal of Technology Transfer* 31(1):17-30
- Goodman, David (2014) *Class in Contemporary China*. Cambridge: Polity



- Goodman, David (2015) Locating China's middle classes: social intermediaries and the Party-state. *Journal of Contemporary China* 25(97): 1-13.
- Green, Fergus and Stern Nicholas (2015) China's 'new normal': structural change, better growth, and peak emissions. London: Centre for Climate Change Economics and Policy.
- Guo, Yingjie (2009) Farewell to class, except the middle class: The politics of class analysis in contemporary China. *Asia-Pacific Journal, Japan Focus* 26(2): 1-16.
- Hajer, Marten (2000) *The Politics of Environmental Discourse: Ecological Modernization and the Policy Process.*, Oxford: Clarendon.
- Han, Sang-Jin and Shim, Yong-Hee (2010) Redefining second modernity for East Asia: a critical assessment. *British Journal of Sociology* 61(3): 465-488.
- Hilton, Isabel (2017) How China can win as America turns inward. *Newsweek*, 31<sup>st</sup> January  
<http://europe.newsweek.com/beijing-global-champion-free-trade-us-trump-tpp-550502>
- Ho, Wing-Chung (2013) The new 'comprador class': the re-emergence of bureaucratic capitalists in post-Deng China. *Journal of Contemporary China* 22(83): 812-827.
- Hung, Ho-Fung (2008) Rise of China and the global overaccumulation crisis. *Review of International Political Economy* 15(2): 149-179.
- Hung, Ho-Fung (2016) *The China Boom*. New York: Columbia University Press.
- IPCC (2018) *Global Warming of 1.5°C, Summary for Policymakers*, IPCC: Switzerland.
- Jacka, Tamara (2009) Cultivating citizens: *Suzhi* (quality) discourse in the PRC. *Positions* 17(3): 523-535.
- Jakobson, Linda (ed.) (2007) *Innovation with Chinese Characteristics*. Basingstoke: Palgrave Macmillan.

- Kahn, Matthew E. (2002) Demographic change and the demand for environmental regulation. *Journal of Policy Analysis and Management* 21(2): 45-62.
- Kahn, Matthew E and Zheng, Siqi (2016) *Blue Skies over Beijing*. Princeton, NJ: Princeton University Press.
- Kaufmann, Vincent (2010) *Rethinking the City*. London: Routledge.
- Khan, Shahbaz, Hanjra, Munir A and Mu, Jianxin (2009) Water management and crop production for food security in China: A review, *Agricultural Water Management* 96(3) : 349–360.
- Li, Cheng (ed) (2010) *China's Emerging Middle Class* Washington DC: Brookings.
- Li, Chunling (2010) Characterizing China's middle class: Heterogeneous composition and multiple identities. In: Li, Cheng (ed) *China's Emerging Middle Class* Washington DC: Brookings, pp. 135-156.
- Li, Huizhen, Zeng, Eddy and You, Jing (2014) Mitigating pesticide pollution in China requires law enforcement, farmer training, and technological innovation. *Environmental Toxicology and Chemistry* 33(5): 963-971.
- Li, Jiao (2010) Food security water shortages loom as northern China's aquifers are sucked dry. *Science* 328: 1462–1463.
- Lin, WanLong and Wong, Christine (2012) Are Beijing's equalization policies reaching the poor? An analysis of direct subsidies under the Three Rurals (*San Nong*), *China Journal* 67:
- Liu-Farrer, Gracia (2016) Migration as class-based consumption: the emigration of the rich in contemporary China. *The China Quarterly* 226: 499-518.

- Lu, Yonglong et al. (2015a) Impacts of soil and water pollution on food safety and health risks in China. *Environment International* 77: 5-15.
- Lu, Yonglong et al. (2015b) Addressing China's grand challenge of achieving food security while ensuring environmental sustainability. *Science Advances* 1(1): <http://advances.sciencemag.org/content/1/1/e1400039>
- McGregor, James (2007) *One Billion Customers*. New York: Simon and Schuster.
- Meadowcroft, James (2009) What about the politics? Sustainable development, transition management and long-term energy transitions. *Policy Sciences* 42(4): 323-340.
- Milanovic, Branko (2006) Global income inequality: what it is and why it matters. *World Bank Policy Research Working Papers* 3865.
- Moran, K., Foley, B., Fastenrath, U. and Raimo, J., (2010) Digital Maps, Connectivity and Electric Vehicles -Enhancing the EV/PHEV Ownership Experience.  
<<http://www.fujitsu.com/downloads/MICRO/fma/marcom/convergence/data/papers/2010-01-2316.pdf>>
- Nyiri, Pál (2010) *Mobility and Cultural Authority in Contemporary China*. Seattle: University of Washington Press.
- Osnos, Evan (2015) *Age of Ambition: Chasing Fortune, Truth and Faith in the New China*. New York: Vintage.
- Piketty, Thomas (2014) *Capital in the Twenty-First Century*. Cambridge, MA: Harvard University Press.
- Qin, Liu (2015, April 2) Cars the main culprit for Beijing's smog: govt figures. *Chinadialogue*. Available at: <https://www.chinadialogue.net/blog/7829-Cars-the-main-culprit-for-Beijing-s-smog-govt-figures/en> (accessed 3/2/16)

- Rajan, Sudhir Chella (2006) Automobility and the liberal disposition. *Sociological Review* 54(1): 113-129.
- Ravallion, Martin (2010) The developing world's bulging (but vulnerable) middle class. *World Development* 38(4): 445-454.
- Ren, Hai (2013) *The Middle Class in Neoliberal China: Governing Risk, Life-building, and Themed Spaces*. Abingdon and New York: Routledge.
- Saito, Yuriko (2004) Machines in the ocean: The aesthetics of wind farms *Contemporary Aesthetics* 2. Available at:  
<http://quod.lib.umich.edu/c/ca/7523862.0002.006?rgn=main;view=fulltext>
- Sandow, Erika (2011) *On the road. Social aspects of commuting long distances to work*. PhD dissertation, Umea University, Sweden.
- Savage, Michael (2000) *Class Analysis and Social Transformation*. Buckingham: Open University Press.
- Sayer, Andrew (2005) Class, moral worth and recognition. *Sociology* 39(5): 947-963.
- Shapiro, Judith (2012) *China's Environmental Challenges*. Cambridge: Polity.
- Sheller, Mimi (2013) The emergence of new cultures of mobility: Stability, openings and prospects. In: Geels, Frank, Kemp, René, Dudley, and Lyons Glenn (eds) *Automobility in Transition?* Abingdon: Routledge. pp.180-201.
- Sheller, Mimi, and Urry, John (2006) The new mobilities paradigm. *Environment and Planning A* 38(2): 207-226.
- Smith, Adrian, Voß, Jan-Peter and Grin John (2010) Innovation studies and sustainability transitions: the allure of the multi-level perspective and its challenges. *Research Policy* 39(4): 435-448.

- Therborn, Göran (2012) Class in the 21st century. *New Left Review* 78: 5-29.
- Tomba, Luigi (2009) Of quality, harmony, and community: civilization and the middle class in urban China. *Positions* 17(3): 591-616.
- Tse, Edward (2016) *China's Disruptors*. London: Portfolio Penguin.
- Tyfield, David (2014) Putting the power in 'socio-technical regimes': E-mobility transition in China as political process. *Mobilities* 9(4): 585-603.
- Tyfield, David (2018) *Liberalism 2.0 and the Rise of China: Global Crisis, Innovation, Urban Mobility*, London & New York: Routledge.
- Tyfield, David, Ely, Adrian and Geall, Sam (2015) Low Carbon Innovation in China: From Overlooked Opportunities and Challenges to Transitions in Power Relations and Practices, *Sustainable Development* 23(4): 206-216
- 'Under the Dome' (2015) <https://www.youtube.com/watch?v=T6X2uwlQGQM>
- Urry, John (2007) *Mobilities*. Cambridge: Polity
- Urry, John (2013) *Societies Beyond Oil..* London: Zed.
- Urry, John (2016) *What is the Future?* Cambridge: Polity
- Wang, Zhengxu, Sun, Long, Xu, Liuqing and Pavlicevic Dragan (2013) Leadership in China's urban middle class protest: The movement to protect homeowners' rights in Beijing. *The China Quarterly* (214): 411-431.
- Whyte, Martin King (2010a) *One Country, Two Societies: Rural-Urban Inequality in Contemporary China*. Cambridge: Harvard University Press.
- Whyte, Martin King (2010b) *Myth of the Social Volcano*. Palo Alto: Stanford University Press
- Wilkinson, Richard and Pickett, Katie (2011) *The Spirit Level*. London: Tantor Media.

- Wilkinson, Angela, Kupers, Roland and Mangalagiu, Diana (2013) How plausibility-based scenario practices are grappling with complexity to appreciate and address 21st century challenges. *Technological Forecasting and Social Change* 80: 699-710.
- Wright, Erik Olin (2015) Class and Inequality in Piketty. *Contexts* 14(1): 58–61.
- Xing, M., Bao, J., and Chen, H. (2016) Policy Details in 11 Cities: Guide to Buy EVs in 2016. Accessed July 20, 2018, from <<http://www.autohome.com.cn/news/201605/888319-all.html>>.
- Yan, Yunxiang (2012) Food safety and social risk in contemporary China. *The Journal of Asian Studies* 71(3): 705-729.
- Yang, Guobin and Calhoun, Craig (2007) Media, civil society, and the rise of a green public sphere in China. *China Information* 21(2): 211-236.
- Yang, Jian (2018, September 7) Behind the sudden decline in China's auto sales. Available at: <http://www.autonewschina.com/en/article.asp?id=18072>
- Yang, X., Jin, W., Jiang, H., Xie, Q., Shen, W., and Han, W. (2017). Car ownership policies in China: Preferences of residents and influence on the choice of electric cars. *Transport Policy*, 58, 62-71.
- Yu, LiAnne (2014) *Consumption in China*. Cambridge: Polity.
- Zheng, Yuanyuan (1999) From rule by law to rule of law? A realistic view of China's legal development. *China Perspectives* 25: 31-43.
- Zhao, Yuezhi (2010) China's pursuits of indigenous innovations in information technology developments: hopes, follies and uncertainties. *Chinese Journal of Communication* 3(3): 266-289.

Zhou, Xiaohong and Chen, Qin (2010) Globalization, social transformation and the construction of China's middle class. In: Li, Cheng (ed) *China's Emerging Middle Class* Washington DC: Brookings pp.84-103

Zuev, Dennis, Tyfield, David and Urry, John (2019) Where is the politics?: E-bike mobility in urban China and civilizational government, *Environmental Innovation and Societal Transitions* 30:19-32.

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<sup>1</sup> As Chang (2010) argues China's modernity exhibits significant differences from previous forms, while also proceeding through modernity at a much more rapid pace than did Western countries.

<sup>2</sup> For an important discussion and exception to this trend, see Savage, 2000).

<sup>3</sup> We note that class analysis is, of course, an enormous sub-discipline and literature that we can only introduce here in the briefest terms given constraints of space. For more on this argument, see (Curran, 2016).

<sup>4</sup> For moral economy, see Sayer (2005).

<sup>5</sup> "Rule by law" connotes a formalistic mediation of decision-making by legal instruments, but falling short of "rule of law" in that personal connections and political hierarchy still hold considerable sway over individual judgements; see e.g. Zheng (1999).

<sup>6</sup> Of course, many 'middle-class' citizens will themselves be members of the Party. This, in itself, does not entail that they do not share the popular distaste for corruption enabled by the one-party system. Indeed, recent evidence suggests that Party members are amongst the most strident and public in their criticisms, especially where they have one foot in other camps (e.g. as entrepreneurs) or overseas (Huang and Chen, 2016).

<sup>7</sup> Consider the incredible competition amongst approximately 10 million citizens each year taking the high-school *gaokao* exams, who could apply to what remains a self-conscious and formally recognised elite of just two top national universities, both in Beijing.

<sup>8</sup> This section builds on research on the practices and power relations of low-carbon innovation in China conducted within the ESRC Project 'Low Carbon Innovation in China' [ES/K0006002/1], focusing on the Eastern seaboard. We thank colleagues on that project, especially Dennis Zuev, for findings alluded to here, though the interpretation in terms of risk-class is the work of this paper. For more details, see Tyfield (2018).

<sup>9</sup> We thus here leave aside multiple technical, infrastructural and regulatory challenges ahead for the EV if it is to become the default – and low-carbon – vehicle of choice.

<sup>10</sup> E.g. through its massive global 'New Silk Roads' infrastructure project of the 'Belt Road Initiative'.