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EXPANDING CITIES

Living, planning and governing uncertainty

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Uncertain cities

The twenty-first century is the urban century. Cities are heralded as the places that will address climate change, reinvent economic growth and create new forms of political and social inclusion. While the city has historically resolved key planning problematics through innovative social, political and technical arrangements, cities are increasingly challenged by the scale and intensity of contemporary planning conundrums. Contemporary cities are chronically underfunded and over burdened, home to deeply divided communities and decrepit infrastructure, and struggling with chaotic unplanned growth and chronic pollution. These divergent narratives of hope and despair spring from a deep uncertainty surrounding the future of humanity as an urbanised species. What will the megacities of the future look like and how will they cope with unprecedented scale and complexity? What new ways of governing, planning and living in cities will emerge to make us happier and healthier? Whose responsibility it is to even address these questions?

These debates brought the authors of this chapter together to question how uncertainty is orienting governments, planners, policy-makers, experts and urban residents to approach urban challenges. The outcome of our collaboration is a consideration of how different forms of uncertainty are experienced, determined and managed in cities, by whom and based on what types of knowledge and techniques of governance. We were interested in excavating the ways in which uncertainty stimulates experimental forms of urban development and governance, and what the political implications of this are.

The contributors to this chapter engage with the concept of uncertainty through the vantage point of their own engagements with cities and urbanism. They approach the problematic of uncertainty from different perspectives. For example, Sobia Kaker and James Evans review how uncertainty is lived, experienced and managed

through ordinary urban infrastructures and technologies. They engage with the 'street level' – a form of uncertainty that Sobia Kaker argues is 'ordinary'. Federico Cugurullo and Matthew Cook both focus on the techno-managerial aspects of urban governance. In particular, they engage with technological advancements and smart cities, and how these present uncertain futures (Federico Cugurullo), or how they may offer adaptive, inclusive and innovative solutions to age-old planning conundrums (Matthew Cook). Saska Petrova, on the other hand, crosses scales. She explores how the coming together of energy precarity – a lived condition of individualised suffering – is tied to the intersecting failures of urban planning and governance in light of climate change-related uncertainties.

The authors also recognise the temporal planes of uncertainty. James Evans focuses on the present of uncertainty as an existing condition, while Sobia Kaker speaks of uncertainty as an unfolding process that exists along a timeline. In her example from Karachi, Sobia Kaker discusses how uncertainty is almost made knowable by a forecasting of the future through an experience of the past. Similarly, Federico Cugurullo discusses the adoption of innovative yet uncertain transport technologies in the past to forecast how they may be adopted in the future.

And finally, in their engagement with these issues, each author brings to the fore questions around the politics and ethics of living, planning and managing urban uncertainty. Saska Petrova discusses how under neoliberal frameworks of governing energy deprivation and related uncertainties, the issue of responsibilisation and individualisation perpetuates precarity. Meanwhile, Sobia Kaker points out how the celebratory valorisation of people's anticipatory and speculative practices in response to ordinary uncertainty shifts attention away from the dismal performance of political authorities to ensure citizens' safety and care. Similarly, Federico Cugurullo highlights the political questions of who exerts influence in shaping the emergent city, and how far these voices are democratic, while Matthew Cook presents a more optimistic picture of technological adaptation as a participatory exercise.

The authors each use empirically rich case studies from their ongoing research on expanding cities to present five perspectives on urban uncertainties. In the first section Sobia Kaker presents her case study of ongoing uncertainty in Karachi in Pakistan. In doing so she distinguishes the lived and experienced forms of uncertainty in cities from the techno-scientific/managerial problematic of uncertainty. She terms this everyday form of uncertainty 'ordinary uncertainty'. By showcasing the ways in which everyday information exchange helps urban residents to understand events, speculate how they would unfold and act in the present keeping the unfolding future in mind, she illustrates how governing ordinary uncertainty is an everyday practice for the urban majority. However, she warns that this social practice of collaboratively navigating an uncertain future should not be celebrated as a triumphant moment of urban capabilities of adapting to chronic crisis, nor should it be romanticised as an ideal practice for ensuring urban resilience. She argues that it is important to be mindful of the political nature of information exchange within an environment of precarity and uncertainty, and to develop alternatives that are more grounded in feminist ethics of care.

In the second section James Evans analytically engages with the operation of informal motorcycle taxis in Kampala (*boda bodas*). He showcases how unplanned and self-built transport infrastructures offer a resilient mode of transportation in chaotic, uncertain cities. He explains how *boda bodas* are sustainable, resilient and adaptable modes of transportation which respond to the lived uncertainty that is characteristic of ever-expanding African cities. They are more 'sustainable' than cars, while being highly adaptable in terms of design and as modes of transport, and have the potential to reach places that are otherwise disconnected from the urban fabric due to badly constructed/non-existent road networks. He argues that, while *boda bodas* and similar informal modes of transport are being legislated against by municipalities that are keen to conform to an image of modernity and rational planning, the fact is that formal alternatives are simply not as responsive to the changing needs of people, or to the unplanned and uncertain urban landscape.

In the third section Federico Cugurullo discusses the technology of self-driving cars, and the layers of uncertainty that the adaptation of this new technology brings for urban governors. Not only is there uncertainty regarding the technology itself (whether it is reliable, effective and safe), but also in relation to the uncertain future of the cities within which such technologies will be used. How successful will they be and how well will they be integrated within the existing urban fabric? How can we plan for the uncertain future of these technologies in the present? He explains how, in the past, anxieties surrounding the adoption of new transport technologies were pushed aside by powerful actors who disregarded public concerns to implement their visions of the futuristic city. Presenting the example of self-driving/driverless cars, he argues that a key driver of these technologies is their promotion by companies that are invested in smart urbanism, and that these companies are already automating the management of urban transport infrastructure.

In the fourth section, Matthew Cook presents the case of smart city developments in Milton Keynes in the UK. He explains how a network of IT companies, local business leaders, the Milton Keynes Council, the Open University, Future Wolverton (a community benefit organisation) and other government agencies and bodies came together to develop a local vision of 'smart' for Milton Keynes. He positions the arrival of 'smart' in Milton Keynes in relation to growing worldwide trends in urban planning. Increasingly, big data is used by urban managers to provide agile planning responses to governance conundrums in unruly cities. He rejects critiques of smart city visions as being techno-centric and totalising, and argues that the development of smart city initiatives in Milton Keynes is consistent with the city's experimental and innovative planning history, and is a result of careful negotiation.

In the final section, Saska Petrova discusses energy deprivation and inequalities in the urban context. She foregrounds issues of ethics and politics as central to her discussion. She argues that it is important to use a framework of precarity to understand uncertainty tied to energy provision, especially for vulnerable populations

living on the urban margins. She argues that precarity defines the normalisation of contemporary energy uncertainty, especially as the issue of energy deprivation is increasingly understood to be a domestic and private issue, one that responsibilises the individual for their condition. Instead, she argues that urban environmental and ecological conditions, political deadlocks, material inequalities and failures in planning practices come together to marginalise vulnerable populations, whose experience of energy deprivation is magnified by climate change-related uncertainties. She places the responsibility for managing and governing these uncertainties squarely on the shoulders of intersecting political authorities that are implicated in its production.

Ordinary uncertainty and everyday knowledge: perspectives from Karachi

Karachi, the Pakistani port city, is a megacity of over 18 million residents. Everyday life in the city is prone to frequent disruption as a result of infrastructural breakdown, riots and protests, violent ethno-political/sectarian conflict, and insecurity events tied to criminal or terrorist activities. These events regularly interrupt the rhythm of people's everyday lives, disturb the trajectory of their movements across the city, and are generative of an environment of what can be referred to as 'ordinary uncertainty'.

'Ordinary uncertainty' is connected to the techno-scientific understanding of uncertainty as an unknowable future and, in relation to this, a domain of governmental knowledge production, anticipatory action and politics (Anderson, 2010; Callon *et al.* 2009; Adams *et al.* 2009). But it is also markedly different from such conceptions of uncertainty. Instead of understanding it as an exceptional condition that is articulated, managed and solved by policy-makers, governors and/or formal institutions, ordinary uncertainty shifts the perspective of uncertainty to an ordinarily prevailing condition that is at the heart of urban life, as outlined in recent debates in urban studies (Zeiderman *et al.* 2015; Simone 2013). To understand uncertainty as 'ordinary' we must recognise that the experiential domain of uncertainty is very much that of everyday urban life, and that the work of speculation, prediction and governance is an everyday practice for the urban majority.

In Karachi, for example, urban residents navigate uncertainty by applying their knowledge of a shifting future, learned from futures past. For example, news of low-intensity conflict between rival ethno-political parties localised in one part of Karachi may cause taxi drivers (particularly ethnically identifiable ones) to hesitate regarding taking on customers visiting other parts of the city. Karachiites who have experienced similar conflicts in the past know that the contours of security and insecurity are quick to shift in a city where ethno-political violence occurs in an orchestrated form of 'ordered-disorder' (Gayer 2014). Taxi drivers who refuse to take on customers may have experienced harassment first-hand, or may have heard enough stories of ethnically motivated killings of rickshaw and taxi drivers who 'trespass' into ethno-political strongholds to know which routes and places to avoid

at what times of day. They are willing to lose some income and a few customers, especially since they are able to predict accurately that things will return to normal within a couple of weeks.

Engagement with such forms of ordinary uncertainty in Karachi resonates with scholarship on crisis and uncertainty (McFarlane and Silver 2017; Newhouse 2017; Cooper and Pratten 2014; Vigh 2009), and reveals that the exchange of information is crucial to its navigation. City residents, police, government officials, private security actors, news reporters and analysts, and risk assessment officials all follow information relating to ongoing insecurity events. They exchange related updates either during casual personal interactions with each other, or with the help of digital and material technologies, such as social media apps, radios and televisions. The circulating information allows participating residents to 'read' disruptive situations, keeping in mind how similar events played out in the past. In doing so, Karachiites can speculate on the trajectory of particular events and manage the spatio-temporal uncertainties associated with them. This form of experiential risk assessment helps urban residents consider whether they should go out into the city, what modes of transport they should take, which places/routes should be avoided, how long to avoid them and at what times of day.

Although such practices of governing uncertainty mostly work in Karachi, we need to be cautious in our celebration of flexibility, adaptive capabilities, everyday forms of hedging, and successful cooperation (Newhouse 2017; Zeiderman *et al.* 2015; Simone 2013) as successful or ideal forms of management. It is important not to displace the responsibility for care in managing uncertainty to already stretched communities. Broader research by Kaker 2017 has carefully analysed relations and processes of information exchange in Karachi, and reveals the limits and politics of information exchange. By tracing the circulation of information around a particular insecurity event in Karachi, the research found that security-related information, which urban residents follow attentively, is often perpetuated with purpose. In its exchange, the information passes through official and unofficial channels, and may be exaggerated, flawed, biased or simply untrue. The socio-technical infrastructures of information exchange are unequally structured, and oftentimes information becomes a political resource that actors use to achieve personal/group advantages. In this context, the social relations of creating certainty themselves become a source of uncertainty.

Uncertainty and urban transport

Urban life is increasingly uncertain, and cities often look most chaotic at street level. Traffic congestion causes harm to billions and jeopardises the planet's sustainability. This is problematic as mobility is a key driver of economic and social development, determining access to jobs, goods and services (UN-Habitat 2010). In Africa alone, 350 million more people will live in cities by 2030 (Pieterse and Parnell 2014), but the region will receive less than 5 per cent of the global investment in transport

infrastructure (UN-Habitat 2013). In response, unregulated modes of transport with flexible fares, schedules and routes – like rickshaws, tuk-tuks, minibuses and motorbikes – characterise cities across Asia, Africa and South America (Cervero and Golub 2007). But, while the majority of city dwellers in the global South rely on informal modes of transport for their mobility, these modes of transport are being legislated against by municipalities, as they fail to fit frameworks of planning and investment. At root, informality – whether it is a rickshaw or a self-built house – fails to fit the image of a 'modern' city that is synonymous with both automobility and the ability to plan. As with slum clearance, banning informal modes of transport causes damage to lives and livelihoods, and the formal alternatives are less responsive to the needs of rapidly changing populations and urban landscapes.

Motorcycle taxis epitomise this tension. While unfamiliar in the West, they are used by billions of people across the global South for personal and business transport. For example, in 2010 there were upwards of 200,000 motorcycle taxis serving the Ugandan capital of Kampala, home to some 1.5 million people. Offering affordable transport to the poor, motorcycle taxis are more efficient in terms of fuel, space and maintenance than cars. The bikes themselves are adapted to the landscape, with extra seat padding cushioning against potholes and bumpy mud roads, and high ground clearance keeping passengers and cargo clear of rough surfaces. Motorcycle taxis provide access to peripheral informal settlements, especially during the rainy season, when poorer roads and paths often flood (Goodfellow 2015). Flexible and cheap, they contribute to the connectivity and resilience of the city, being used to run errands and to deliver both goods and information, in addition to providing personal transport. Motorcycle taxis play a major role servicing hard to reach areas, enabling disadvantaged groups to access work and healthcare that is too distant to walk (Porter 2014).

In this way, informal transport is both adapted and highly adaptable to the uncertain conditions that characterise life in informal and fast-growing urban areas. Manifesting what Abdoumaliq Simone terms the distinctive mobility of the African city, where movement is essential to daily survival, *boda bodas* support the 'thickening fields of social relations' (Simone and Abouhani 2005: 1) that city dwellers depend on. Because of this, motorcycle taxis reduce uncertainty for inhabitants, making otherwise impermeable urban landscapes permeable. They reflect the actually existing city – a highly uncertain and unplanned florescence of self-built (infra) structures and informal economic activities. Mobility is an emergent capacity that flows from the combination of motorbikes, drivers, support industries, topography and infrastructure. Understanding how to work with inherent uncertainty in ways that support, rather than undermine, livelihoods of both users and providers applies not just to transport and mobility, but to all aspects of urban informality. Transport is often where these tensions surface as – unlike slums, which are often out of sight – informal transportation permeates and defines the experience of an entire city.

The challenge of 'managing' uncertainty pertains to almost all urban planning. Cities are systems that generate uncertainty – like nuclear power plants or industrialised food production systems, but with two differences. First, urban

systems are organic in that they are at least partly designed from the bottom up, rather than by formal structures of control. Second, uncertainty is a permanent lived experience of inhabitants. Rather than an unintended consequence that is experienced acutely, but intermittently, uncertainty is a chronic condition in cities – distributed, pervasive and known. In this sense, the continuing inability of planners and policy-makers to engage meaningfully with uncertainty is particularly unfortunate. Population growth, chronic underfunding and lack of space make it unfeasible for cities to build their way out of trouble – they must work with what already exists.

Self-driving cars and uncertain urban designs

There is a lot of uncertainty surrounding the technology of self-driving. On 18 March 2018 a woman was crossing a road in Tempe, Arizona. A self-driving Uber car moving along the same road did not perceive her. The autonomous car ran over the woman, killing her. Since then, scepticism regarding self-driving cars has been voiced by many in the global media, and such scepticism has been confirmed in sociological studies looking at the attitudes that people have towards self-driving technologies (Cugurullo *et al.* 2020; Stilgoe 2018). Vulnerable road users in particular, such as pedestrians and cyclists, are afraid of this emerging form of urban transport, and these concerns will arguably not disappear until car manufactures like Tesla can demonstrate that a car controlled by artificial intelligence is as safe as one driven by a human being (Penmetsa *et al.* 2019; Taeihagh and Lim 2019).

This layer of uncertainty concerning the extent to which autonomous cars will be integrated within the transport portfolio of cities adds to the uncertainty of urban design. Historically, changes in urban transport have led to changes in the design of cities. In the modernist city of the 1920s, for instance, the popularisation of the car triggered the development of highways and arterial roads that revolutionised the built environment (Sheller and Urry 2000). In the near future, the urban changes that the diffusion of autonomous cars might trigger are uncertain. The future is still opaque, but there are two possible scenarios that are currently being discussed. On the one hand, there is a utopian scenario in which self-driving cars are employed via sharing services. Studies indicate that, especially in large metropolitan areas, people are open to the idea of sharing an autonomous car, instead of owing one (Haboucha *et al.* 2017; Firnkorn and Müller 2015; Fagnant and Kockelman 2014). This attitude could decrease car ownership, improve traffic and, overall, reduce the amount of space that is reserved for cars (Duarte and Ratti 2018). Many parking spaces and roads would become superfluous, and could morph, for example, into bike lanes, pedestrian streets or urban gardens: in essence, places for people, rather than spaces for cars.

On the other hand, the popularisation of autonomous cars could shape a dystopian urban future. Autonomous transport promises productive onboard activities: a promise that might lead to more and longer commutes (Hawkins and Nurul Habib 2019). Take the Volvo 360c model, for instance: an autonomous car that can become

a bed, a bar or a living room, depending on the needs of the owner. Such self-driving technologies could improve the experience of travelling in a car, to the point of increasing the demand for cars and for the urban space that they need in the city.

Overarching these uncertain urban designs there is arguably a bigger uncertainty: one that covers like a thick mist the politics of the city, where innovation in autonomous urban transport takes place. If we go back in time to look at urban history we can clearly see that, in the past, dangerous forms of urban transport were integrated into the built environment, regardless of the attitudes that people had towards them. In the Baroque city, for example, as Lewis Mumford (1961: 368, 370) remarks, the stagecoach 'killed more people annually than the railroad that followed it', and 'in France, parliament begged the king to prohibit vehicles from the streets'. In strongly undemocratic contexts, this dissent was not taken into account, and politically powerful actors imposed their urban visions.

What will happen in the future when autonomous cars are operational is an open question, but the present has already given us two important hints. First, with the automation of the management of urban infrastructure and services as one of its key foci, smart urbanism is the matrix through which autonomous urban transport unfolds (Batty 2018). Second, we know that current practices of smart urbanism are often top-down and driven by neoliberal rationales of economic growth (Cugurullo 2018; Karvonen *et al.* 2018; although see below). Therefore, while being important, people's feelings towards emerging autonomous technologies might, in the end, play only a marginal role in determining future urban designs (Acheampong and Cugurullo 2019). Whoever rules the city is likely to dictate its shape, and questions of technological innovation and urban design thus become questions of urban governance under conditions of uncertainty.

Uncertainty and the governance of smart city developments

Cities are viewed by many as having considerable agency to resolve key issues (such as climate change), stimulate new forms of economic development and foster innovative political and social arrangements (Rohracher and Späth 2017; EC 2012). However, at the same time, cities are suffering from the effects of over a decade of austerity, and are experiencing increasing income and social inequalities, poorly maintained infrastructure and significant pollution problems (North *et al.* 2017). Thus, while somewhat optimistic urban futures are often posited, their realisation may also be framed as uncertain. In many instances, ways to address these framings of urban futures involve knowledge of the city by collecting so-called 'big data' to inform city management responses. Indeed, sensors, big data hubs and apps have been built in many cities to form urban digital platforms under the auspices of the 'smart city' (Kitchin *et al.* 2019; Caprotti and Cowley 2019; Cowley and Caprotti 2019). Such development visions are spreading and, indeed, continue to spread across a field of actors, including IT companies and policy-makers, consultants and government institutions associated with cities (Bouzarovski and Haarstad 2019; Haarstad and Wathne 2018).

Smart city visions have inflected developments in many cities, including Milton Keynes (MK) in the United Kingdom. MK was developed in the late 1960s as part of a wave of new town developments to relieve post-war development pressures, mainly for housing. Situated some 60 miles north of London, it is the fastest growing UK city, with a population of 245,750, set to expand to 308,500 by 2026 (Destination MK 2019; MKI 2017). MK's development has been inflected by multiple global circulations. For example, the grid road system upon which it is based was exported from Los Angeles by Mervin Webber, 'applied' and 'adapted' in MK (Walker 1982). It also pioneered self-build housing and low-carbon housing developments (PRP Architects 2010). As such, MK is open to new ideas and 'smart' is the latest in a long line of socio-technical developments to inflect developments in the city (Valdez *et al.* 2018).

Smart 'arrived' in MK via a network of actors – not a city to city network, but a network of private and public bodies, including consultants, government agencies, land developers, business leaders and leaders of community organisations. Smart inflected MK developments via governance practices situated in the formal and informal institutional landscapes associated with MK. For example, in the city council; in public fora open to the public, but largely attended by a semi-regular group of elite actors, such as the events organised by the Fred Roche Foundation; in the meetings of community groups, such as the Future Wolverton association or on the doorsteps of the households surveyed by volunteer community engagement organisations, such as Community Action MK.

In such institutional spaces, actors such as MK Council and the Open University played a major role in making and curating relations to form the basis of smart city initiatives. Different versions of MK and different versions of 'smart' were co-constructed and responses to the uncertainty associated with such developments emerged. *Post hoc*, a step-wise engagement with 'smart' can be discerned. Initially, policy-makers met IT consultants to learn about their smart city offerings. Subsequently, the MK:Smart project was developed. Funded by the UK government, and led by the Open University and MK Council, this project focused on the development of an urban platform built around a data hub and various 'apps' to augment infrastructure, such as transport, energy and water infrastructure. Finally, informed by the outcomes of the MK:Smart project, 'smart' is now focused in MK on aspects of the city where it closely aligns with governance and policy rationalities, such as transport planning (Cook *et al.* 2018).

Here, such governance practices comprise a 'learning' journey: moving from the generic claims of smart visions to identifying specific outcomes and potentialities of 'smart' in MK. From the outset, MK policy-makers acknowledged the uncertainties associated with smart city claims; there was never an intention to make MK a 'smart city', but rather to explore the potentialities of 'smart' for MK, and to encourage this to influence developments. Within MK, this approach is entirely consistent with the historically contingent set of 'flexible' governance practices sedimented in the city since its inception. More generally, although smart city visions have been widely critiqued for their techno-centrism and seemingly totalising force (Luque-Ayala

and Marvin 2015; Greenfield 2013), actually existing smart city developments are often somewhat tentative and exhibit an experimental modality that valorises pragmatic learning over coordinated actions to realise specific goals, such as environmental sustainability (Caprotti and Cowley 2019; Cugurullo 2018; Caprotti and Cowley 2017).

Seen in this way, smart city initiatives are emblematic of growing trends in urban governance that have emerged in response to an increased awareness of the world as complex, uncertain and non-linear. Indeed, despite the rhetorical claims of various planning epochs, planning practice has perhaps never been a modern technocratic institution, but one mainly founded on negotiation, identifying and realising 'windows of opportunity', and, crucially here, embracing uncertainty.

Urban(ising) energy precarity: uncertainty and scales of action

Energy and fuel poverty have traditionally been explored as domestic issues, expressed by the inability to secure adequate levels of energy services in the indoor environment of the home (Bouzarovski and Petrova 2015). As such, they have been principally discussed in terms of vulnerabilities and uncertainties centring on the residential sector. However, energy deprivation principally occurs in an urban context.

With their specific material and environmental circumstances (green areas, air pollution, the effect of heat islands) cities are directly implicated in how energy deprivation is produced, experienced and addressed. What is more, cities are political entities where multiple practices and relations of power, authority and governance are intertwined across a multiplicity of regulatory arenas. All of this points to the need for an integrated perspective to understand the nexus between energy inequality and the urban.

The 'energy precarity' framework provides a stepping-stone for understanding how energy deprivation is articulated and conditioned beyond the home. It develops conceptual tools to examine the everyday experiences associated with uncertain energy infrastructures in urban geographies. Energy precarity also draws attention to the multiple ways in which domestic energy deprivation is politically induced as a lack of 'rights to the city'. This approach has been employed as a means of uncovering the spaces where energy deprivation is produced, experienced and contested. It has highlighted the inherently relational nature of energy demand, through which energy deprivation metaphorically and physically overflows the limits of the home, creating multiple modalities of injustice and deprivation (Petrova 2018).

There are strong links between energy precarity and uncertainty. In a broader sense, precarity, precariousness and precarisation have been used as signifiers of uncertainties, risks and vulnerabilities (Thieme 2017). Precarity has come to define the normalisation of uncertainty and anxiety under a neoliberal capitalist regime that promotes individuality and self-responsibility. Energy deprivation has also been approached in this very manner – as a domestic and private issue. In dominant framings, energy and fuel poverty are burdened with stigma and social exclusion (Hards 2013; Day

and Hitchings 2011), rather than being seen as the consequence of inadequate and exclusive urban planning and governance practices that produce unequal spatialities. People who live in energy deprivation tend to be presented in a trivialised and stylised manner: an elderly lady covered in a blanket in front of a radiator or electric heater; a miserable-looking child in a dark, damp room. The wider story of who these people are is often missing, even if their domestic vulnerability remains personified and exposed to the public. The urban settings that they inhabit remain erased and ignored. This is despite the fact that most vulnerable people tend to inhabit marginalised urban areas, with poor-quality housing and a lack of environmental amenities (such as poor access to green areas), in addition to experiencing elevated levels of air pollution as well as limited or expensive public transport connections.

Climate change-related uncertainties are likely to lead to further pressures on energy deprivation, due to the increased prevalence of summertime cooling challenges stemming from the overheating of homes and cities. This is precisely why solutions to the multiple political and spatial uncertainties that underpin energy precarity cannot be found solely in the domain of socio-technical and spatial fixes. Instead, they require more radical thinking in terms of how cities construct and govern their energy systems, taking into account the rising tide of decentralised and citizen-led efforts to govern energy flows.

Conclusion

The five perspectives on urban uncertainties presented above are drawn from the authors' extended research on urban challenges in expanding cities. Taken together, they broaden our understanding and conceptualisation of uncertainty. Through their rich, empirical examples on how present and future uncertainties link to the past, the authors showcase that uncertainty exits along a temporal continuum. In addition to this, by focusing on the range of actors collaborating to plan for and govern uncertainty (informal, formal, government, communities, corporations) over extended periods of time, the authors present a picture of uncertainty as an ongoing process – one that is lived, experienced, planned, negotiated and governed by a multiplicity of actors, operating across variegated space and time. Through their discussion of ordinary uncertainties tied to insecurity in Karachi, informal negotiations of urban circulation in Kampala, technology adaptation in the futuristic city, smart city developments in Milton Keynes and climate change-related precarity and energy deprivation, the authors assemble an understanding of uncertainty as an ongoing temporal, experiential and political process.

Yet the authors' focus on expanding cities also opens up a debate on the politics of uncertainty, and, more importantly, on the ethics of governing uncertainty. As cities become more informal, demands on services more acute and environmental conditions more extreme, it becomes evident that neoliberal governance settings often fail urban majorities. Kaker, Evans and Petrova warn that uncertainty and precarity are often co-constructed, and reproduce urban inequalities. However, as long as these concerns are recognised and taken seriously, and urban residents,

governors and corporations collaborate to foster a progressive socio-political milieu, then perhaps it could be possible to find flexible, innovative and equitable solutions to governing uncertainty.

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