1 Transitioning to Low Carbon Mobility

Debbie Hopkins

Transport Studies Unit, School of Geography and the Environment, University of Oxford, UK.

James Higham

Department of Tourism, University of Otago, NZ and University of Stavanger, Norway.

> *'The essence of Transition is in its name. It describes the era of change we are all living in''* (www.transitiontowntotnes.org)

Whether we are living in an era of change, or through the change of an era, since the turn of the century the world has experienced unprecedented economic, political, social and environmental transformation. The 21st Century has seen the rate and intensity of global environmental change surpass all but the most dire of expectations. Climatic events around the world have resulted in the loss of lives, livelihoods and habitats, and strained economies. And each year surpasses the last as 'the hottest year on record' (NOAA, 2016). The 'inconvenient truth' of climate change is now undeniable. At the same time, we[1] are becoming more mobile both domestically, and internationally (Sims *et al.,* 2014). The pace and frequency of corporeal travel is increasing, in order to reach everyday locations for employment, socialisation, recreation and education (Viry & Kaufmann, 2015; Cohen *et al.,* 2015), as well as international tourism destinations (UNWTO, 2016). These mobilities are often dependent on high carbon modes of transport, representing a substantial contribution to global greenhouse gas (GHG) emissions, the underlying cause of anthropogenic climate change.

Automobility is the dominant system of contemporary mobility (Urry, 2004; 2007); a system that supports, prioritises and rewards the hegemony of private, motorised transport. Automobility puts speed, privacy and autonomy at centre stage, and reinforces carbon-dependence (Urry, 2004). High-carbon practices of mobility, along with the technologies, policies, infrastructures and cultures that

1 Mobility is increasing, but it is important to note that it is a highly mobile minority.

facilitate them (Geels, 2012), are at odds with the pressing need for deep GHG emissions reductions in order to prevent the wide ranging impacts of unfettered climate change (Sims *et al.*, 2014) and this has led some to refer to transport as the 'roadblock to climate change mitigation' (Creutzig *et al.*, 2015: 912). As time has passed, the discourse has become more emphatic, with calls for 'deep decarbonisation' and 'radical emissions reductions' increasing in volume and intensity (e.g. Anderson *et al.*, 2014; Capstick *et al.*, 2014). Tackling the carbon-intensity of current systems of mobility is of critical importance to attaining low carbon economies and societies, and accomplishing meaningful reductions in GHG emissions on a global scale.

A weight of expectation fell on the 2015 climate negotiations to gain new global commitments to extend beyond 2020, in order to limit GHG emissions and global average temperature increase. The Paris Agreement may not have gone far enough for some (Clémençon, 2016), but it *was* successful in elevating global climate policy goals. The Paris negotiations exceeded the previously conceived target of limiting global temperature increases to 'well below 2°C above pre-industrial levels', and instead called for actions to limit increases to *1.5°C* above pre-industrial levels (UN, 2016, Article 2: 22), in order to prevent the more extreme projections of a 2°C warmer world. In any scenario to achieve less than 2°C of warming, transport will play a critical role (ITDP, 2015), and decarbonisation will need to occur in a world of relatively abundant fossil fuels (McGlade & Ekins, 2015). This sentiment was echoed by Sheikh Ahmed Zaki Yamani, former Oil Minister of Saudi Arabia who, in an interview in 2000, stated that: *'The stone age came to an end, not because we had a lack of stones, and the oil age will come to an end not because we have a lack of oil'* (Fagan, 2000). In order to enact a process of meaningful and long-lasting systemic change, engagement with a wide range of actors, across a range of spatial scales, is required. And this must include transport.

With growing demand and rising emissions, the transport sector has a critical role to play in achieving GHG emissions reductions, and stabilising the global climate. Transport-related GHG emissions have more than doubled since 1970 (Sims *et al.*, 2014). The majority of GHG emissions from transport are carbon dioxide (CO_2), and together with the generation of electricity and heat, transport accounts for nearly two-thirds of global CO_2 emissions (IEA, 2015). Alone, transport accounts for 23% of global CO_2 emissions, or just under 7.4 billion tonnes of CO_2 in 2013 (IEA, 2015). Emissions from the road sector account for three quarters of transport-related CO_2 emissions, and have increased by 68% since 1990 (IEA, 2015). Emissions are projected to double by 2050, as are the number of light-duty vehicles (Sperling & Gordon, 2009; Creutzig *et al.*, 2015) as demand for private mobility grows in emerging economies including China, India and Brazil (Sperling & Gordon, 2009; Jetin, 2015). Freight transport demand is also forecast to increase, albeit at a slower pace than passenger transport (Sims *et al.*, 2014) and passenger aviation is projected to grow at a rate of 5% per annum to the 2030s (Airbus, 2013; Boeing, 2013). Thus transport represents a growing concern in efforts to mitigate climate change. Opportunities to reduce direct GHG emissions include: (i)

continuing and extending efforts to increase vehicle efficiency, thereby lowering the energy intensity of travel, (ii) shifting to low carbon fuels, (iii) changing travel behaviour including the adoption of travel substitution, low carbon modal choice and purchasing behaviours (Sims *et al.*, 2014; Creutzig *et al.*, 2015). Individually, these efforts are unlikely to result in the required depth of reductions; a low carbon mobility transition requires multi-sectoral, multi-disciplinary efforts across scales.

(Mobility) transitions

The 21st Century has also seen a 'mobility-turn' across the social sciences (Sheller & Urry, 2006), through which processes and practices of mobility and immobility have been foregrounded. In a step away from traditional transport studies, mobilities scholars have highlighted the '*fragile entanglement of physical, movement, representations, and practices*' that constitute mobility (Cresswell, 2010: 18). Thus mobilities research has contributed new insights to traditional understandings of transport and travel, not least of which has been the centring of human experiences of travel. And while distinctions have been made between transport and mobilities studies, the complementarity of these lenses is now coming to the fore, with opportunities for the '*mobilising of transportation and transporting of mobilities*' (Sheller, 2015: 12).

Transport is a vast and complex socio-technical system (Rees *et al.*, 2016). The study of systemic transformations emerges from a range of academic traditions, which include: integrated assessment models, socio-technical transitions analysis and practice-based action research (Geels *et al.*, 2016). A socio-technical system denotes the range of technologies, markets, infrastructures, consumer practices, cultural meanings, policies and regulations, and scientific knowledges that come together to stabilise a particular [socio-technical] regime (Geels, 2004; Schwanen, 2013). Large-scale, complex change has been discussed in terms of 'transition', defined by the Oxford Dictionary as *'the process or a period of changing from one state or condition to another'*, and by socio-technical transitions scholars as *'changes from one sociotechnical regime to another'* (Geels & Schot, 2007: 399). The concept of transition provides a conceptual lens through which to examine change across temporal and spatial scales and from wide-ranging inter- and post-disciplinary positions. In its most basic sense, transition is the process of change from one state to another. This focus thereby calls for examinations of the processes of change; which can happen gradually, rapidly, or cumulatively. Transition studies also imply drastic changes to the technical, societal and cultural dimensions of the system of mobility (Elzen *et al.*, 2004), thus low carbon transitions need to incorporate behavioural, technological and policy approaches. Moreover, there is increasing evidence of the need to consider the specific, localised geographic contexts of transition, in which transition will be experienced. The value of adopting a transition lens is its focus on the procedural and systemic nature of the required change, thus it is specifically interested on the interactions between different (groups of) actors, and other aspects of the system.