

The Impact of Population Change and Demography on Future Infrastructure Demand

Response to Consultation for the National Infrastructure Commission

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This submission is developed through research collaboration at the DEMAND Centre. The Centre is part of a suite of investments by Research Councils UK into End Use Energy Demand reduction, grant reference number EP/K011723/1. See www.demand.ac.uk

Approach

In order to respond to the questions raised by the consultation, we set out some key propositions which guide our approach to understanding how demand changes. We then use these ideas to highlight areas of the consultation we support or challenge. Our aim is not to be comprehensive in answering every point or question raised but to identify the most important exemplars. We would be happy to meet with members of the NIC to discuss these ideas further.

Key Contentions

1. Demand for infrastructure can be understood as an outcome of people's participation in a variety of social practices (e.g. a train might contain groups of travellers en route to a Hen Party or business meeting and others on their way to visit friends and family; likewise the electricity infrastructure enables cooking, TV watching, heating, and more). The performance of social practices depends on conjunctions of materials (such as infrastructures, appliances, vehicles and devices), meanings (such as keeping fit or reciprocity) and competencies (such as know how to web search or ability to cook)(Shove, Pantzar et al. 2012). Practices relate to each other in various ways including in how they are sequenced and organised in time. Some practices are highly synchronised (e.g. evening meals) and others are highly synchronised and co-ordinated (e.g. working in a company or attending school).
2. Practices evolve over time in part because the populations of those who enact specific practices (the 'carriers' of the practice) change (Watson 2012). Changes in practices – and thus in the role of infrastructures – is the result of more, fewer or different performances of social practices over time.
3. When materials, meanings and competences change then practices do too. For example. on-line banking has been established through new digital infrastructures (web, mobile communications and mobile devices) and is becoming slowly more established as the meaning of money changes. However, there is no one form of on-line banking – different people do it in different ways (some only at home, only for certain functions and others via mobile phones). Engaging with these devices and infrastructures depends on a set of competencies which evolve over time and which are different across the population.
4. With relation to infrastructure more specifically, a focus on demand means a focus on the changing and varied characteristics of infrastructures in-use, and as integral to the conduct of multiple practices (Shove, Watson et al. 2015; Shove 2017).
5. Infrastructures support a diverse range of patterns of consumption but they are also integral to the conduct of practices (they figure as the materials of practice), meaning that they are part of the creation (and reduction) of demand. For example, it is uncontested that new roads generate additional (often referred to as 'induced') traffic (Goodwin, 1996) and that taking away capacity (either physically or via time of day restrictions) does not just lead to the redistribution of traffic but its reduction (Cairns et al., 2002) through activity reconfiguration (Marsden and Docherty, 2013).
6. A focus on infrastructures in-use also requires a rethinking of spatial scale. For example, an airport is physically located in some local authority boundary, but the infrastructures that are required to support this are multiple and at various spatial scales (airports elsewhere, air traffic control, food supplies, fuelling, link roads etc.)

Responding to issues in the consultation

- a) We think it vitally important that you maintain the distinction between infrastructure and infrastructure services as set out on page 4. Related to this is a need to look beyond the familiar metrics of infrastructure use (e.g. kWh) which dominate reporting from infrastructure suppliers as you set out on p7. Metrics like these do not provide a picture of the *services* which infrastructures enable – yet that is where ‘demand’ lies. Other techniques are possible, including time use data (Torriti 2017).
- b) On page 12 the consultation states that the higher the population, the greater the demands placed on infrastructure will tend to be. Increased population is indeed likely to be associated with increased consumption but to assess the implications for infrastructure you need to go further. We think the questions that need to be asked are ‘consumption of what, when, where and how?’ Which infrastructures are implicated in those changes and precisely where and when are there capacity constraints? (see point j below on whether such ‘constraints’ are good or bad).
- c) The type of analysis you begin to develop on page 7 seems to us critical. We know that it is not necessarily the total demand for infrastructure-enabled-services that matters and that the synchronisation of demand at particular times of the day and on particular infrastructures is crucial in thinking about the future.
- d) We would also suggest the need for further development of your thinking around cohorts. As we set out in point 2 of our opening contentions, people are carriers of practices and for some practices, participation changes – either increasing or decreasing - significantly with age. This matters for the nature, timing and location of demand for infrastructure services. The consultation begins to elaborate this on page 13 but does not offer a consistent narrative. In your conclusion on page 24 you suggest it is a reasonable assumption that you should treat population as an entirely external driver of demand. We disagree for the reasons set out above. Exactly how age matters for the prevalence, or not, of different practices (and their infrastructural consequences) is itself dynamic. Just as important, such changes are, in turn, related to past and present forms of infrastructural investment, for instance in broadband, power supplies, road/rail provision etc.
- e) Your own analysis suggests the need for a much deeper understanding of the relationship between change in cohorts over time (point d) and change in timing of demand (point c). On Page 18, for example, you identify that “Whereas 59% of the increase in population over the last 25 years has been in the working age population, 63% of the projected increase for the next 35 years is in the over 65s. Even in the high migration variant this is still 50%. In the low net migration scenario, the total number of people of working age would be roughly constant. With zero net migration, the total number of people of working age would fall by 10%.” If you put this together with the figures on page 7 about how much and when older people travel then it may, for example, be possible to mount a case for very little increase in peak demand for road use because the sorts of things that the population are travelling for are not all around the 8-9am school and work related peak.
- f) As we set out in point 4 of the contentions, we would strongly support the argument that you put forward on page 14, that infrastructure provision is *part of* the generation of demand. Infrastructure is part of the materiality of practices and therefore changes to

infrastructure are part of changing (rather than simply responding to) the range of practices in society, and when, how, where, and by whom they are enacted.

- g) This points to the need for greater engagement with the ways in which infrastructures and sets of social practice shape each other. In some cases as a 'new' infrastructure comes into use it does so at the expense of another, or sets in train new combinations that enable new variants, forms or distributions of social practices. It is important to recognise that infrastructures are never 'used' in isolation. The challenge is to understand how demand is shaped by relations between infrastructures, as well as by the emergence or development of any one such system.
- h) In some parts of the report it is clear that demand and infrastructural provision shape each other. Elsewhere in the report and in representing the topics of demographics, technology and economy etc. as 'drivers of demand' the relationship between the 'driver' and the infrastructure is taken to be that of two independent variables – infrastructure need is seen as a response to rather than a part of demand. We support the former approach, which is incompatible with the latter.
- i) Your analysis examines population growth in different parts of the country and different cities (e.g. page 15) and you ask whether taking a sub-national approach is the right way forward for infrastructure demand forecasting. This must be part of the story –changes in population density are clearly relevant, but that is not at all the same as supposing that infrastructure 'needs' follow or are closely tied to population, or spatially bound to specific places.
- j) As we note in our propositions (point 5), different infrastructures have different spatial characteristics. The capacity to enact certain practices in certain locations depends on the conjunctions (or not) of relevant material arrangements and the possibilities they afford. At the same time, individual 'sites' of consumption (an airport lounge, part of a city) require, and are only made possible by much more extensive hinterlands and chains of provision, the qualities of which reflect the character and distribution of multiple other 'sites' of demand. Whilst infrastructure constraints might appear to be localised, they also reflect the coalescing of demand from seemingly unrelated geographical spaces and/or at particular points in time. Finally, and throughout, there is an assumption that 'constraints' should be overcome in order that 'needs' can be met. This overlooks two critical points. One is that 'needs' are in part outcomes of provision: they are not inherent, naturally occurring or to be taken-for-granted. Second, there may be good reasons for attempting to design forms of infrastructural provision which deliberately constrain rather than enable potentially escalating demands, and which help shape practices and sets of practices that are compatible with a lower carbon society.

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