

Giulio Mattioli – “Car Dependence, Sustainability and the Transport Policy Stalemate: The Potential Trade-offs between Intra- and Inter-generational Equity”

Recommended citation: Mattioli, G. (2013). 'Car Dependence, Sustainability and the Transport Policy Stalemate: The Potential Trade-offs between Intra- and Inter-generational Equity'. *The International Journal of Sustainability Policy and Practice*, vol 8, no. 1, pp. 45-57. *Notice: readers must contact Common Ground Publishing for permission to reproduce.*

Abstract:

The sustainability concept, as originally defined, comprises three meta-goals: growth, intra-generational (social) equity and environmental protection (that is, inter-generational equity). In this context, while the potential trade-offs growth vs. environment and growth vs. intra-generational equity have been frequently addressed, the possible tensions between intra-generational and inter-generational equity have received only limited attention. This is true also for studies on “sustainable transport”, often concerned with the seemingly unstoppable rise of car ownership and use. This latter process is, on the one hand, a major determinant of environmental unsustainability; on the other hand, however, it entails a crucial intra-generational equity dimension, related to the differential in accessibility to services and opportunities between car users and non-car users. Accordingly, in this paper, I argue that the very nature of car dependence –defined as a dynamic and self-reinforcing macro-social process with systemic properties – urges scholars to focus on the trade-offs between intra- and inter-generational equity. Indeed, every increase in the level of car dependence widens the disadvantage gap between those who are part of the car system and those who are left out of it, but at the same time reduces the number of the latter. For this reason, its implications for intra-generational equity are very equivocal. On the other hand, most of the policies envisaged to fight car dependence are feared to have negative impacts on intra-generational equity, and thus often meet strong resistance. This is likely to bring to a “transport policy stalemate”, where no serious attempt is made to reduce car use and all hopes are concentrated on a “technological fix” to eventually solve all problems. In this scenario, inter-generational equity is likely to be sacrificed in favour of other goals.

Keywords: Car Dependence, Inter-generational Equity, Social Sustainability, Sustainable Transport, Car Use

Sustainable development and intergenerational equity

The sustainable development concept, as originally defined in the Brundtland Report (World Commission on Environment and Development, 1989), comprises three dimensions: economic growth, social inclusion and environmental balance¹. In this context, the major innovation brought about by the report was its focus on intergenerational equity, as shown by the title (“Our Common Future”) and the famous definition of sustainable development as “the development that meets the needs of the present without compromising the ability of the future generations to meet their own needs” (p.43).

Indeed, as argued by political theorists such as Gardiner (2008), global issues such as climate change and possible oil depletion represent a “perfect moral storm” that urges our societies to take into account the problematic issue of intergenerational equity. According to Vanderheiden, global climate change is best defined as a “massive negative environmental externality created by the world’s affluent to be disproportionately borne by those least responsible for it among the poor and future generations” (2008, pp.xiv-xv). In that sense, the negative effects of current emissions and resource depletion are likely to be felt mainly by posterity, whereas benefits are primarily felt by the present generation, mostly in the form of cheap energy. Thus, the global problems that lie at the basis of the concept of sustainability entail a crucial intergenerational social equity dimension: this latter, however, is often not recognized as such but hidden behind the label “environmental problems”.

Moreover, it has to be kept in mind that the roots of the sustainability concept “did not come so much from academic discussion as from a global political process” (Newman and Kenworthy, 1999, p.1). In that sense, it is probably better seen as comprising three *meta goals* (rather than *dimensions*): growth, intragenerational equity and intergenerational equity (environmental protection) (Feitelson, 2002, p.142). Accordingly, sustainable development that simultaneously achieves all three meta-goals seems to be more of a political goal than a scientific notion. In this context, the potential trade-offs between growth and environment and between growth and intragenerational equity have been frequently addressed; by contrast, the third potential trade-off, between intragenerational and intergenerational equity, has received only limited attention (Feitelson, 2002, p.142). In this article I address this subject by examining the latent tensions between the two kinds of equity in the domain of transport, trying to look beneath the surface of a narrative of sustainable transport that often seems to exclude a priori that such a trade-off could exist (Lucas et al. 2001, p.4).

Transport and environmental sustainability

Increasing car ownership and use have been a major trend all over the world for the past century, and are expected to continue their rise over the coming decades. Projections of past trends into the future (Schäfer et al., 2009) show that global demand for passenger travel (in terms of passenger kilometers travelled) will continue to rise, with this increase accompanied by a shift to faster modes, so that an increase in automobile use and ownership is expected. Even though most of this growth is expected to take place in the developing countries, developed countries are also likely to contribute to it, if current developments continue: as a matter of fact, in the last decades of the 20th century the trend towards seemingly endless growth in mobility and car use was similar in Europe and North America, despite differences in absolute levels of motorization (Wegener and Greene, 2002, p.39).

¹ Recently, many have called for the inclusion of a fourth “pillar” of sustainability: culture (see United Cities and Local Governments, 2011).

These trends are increasingly seen as problematic in the light of major global concerns such as climate change and possible oil depletion, which in turn are at the basis of the notion of sustainability. As far as climate change is concerned, the transport sector today is already a major contributor to greenhouse gas emissions (GHG): as of 2009, it accounted for about 23% of the world's CO² (Schäfer et al., 2009, p.64), and passenger travel is the main component within this sector. Moreover, unlike other sectors, its impact is likely to increase rather than diminish over the next few decades: indeed, transport is the fastest-growing source of energy-related GHG emissions, increasing at such a rate that it will be difficult to reverse it by technological improvements alone (Schäfer et al., 2009, p.vii). With regard to the second issue, the transport sector has a 98 per cent dependency on oil, it is the only sector in which oil demand has been growing over the past decades, and demand for transport fuels worldwide is expected to continue to grow over the next thirty years (International Energy Agency, 2007). This is especially worrying in the light of the possible gap between increasing oil demand and gradually shrinking supply that might emerge over the coming decades and could bring about huge price volatility (Campbell and Laherrère, 1998; Deffeyes, 2005). This would be especially troubling for the transport sector, where alternative fuels are unlikely to have any substantial impact in the short-medium term. More generally, the trends illustrated above seriously threaten to offset any efficiency gain that might be attained with improved technologies and/or alternative fuels: indeed, even in a maximum technology scenario, global transport-related GHG emissions are likely to continue to increase “at least through midcentury” (Schäfer et al., 2009, pp.260-266).

Car dependence: increasing motorization as a macro-social process

Despite increasing recognition of the negative implications described above, the growth of motorization has proven extremely difficult to stop, let alone to reverse. Even at a local scale, examples of cities where car ownership and use have declined or lastingly stabilized are very rare, and for this reason regularly cited by literature on sustainable mobility: Zurich, Stockholm, Freiburg (Newman and Kenworthy, 1999, pp.204-209) and Hong Kong (Cullinane, 2003), among others. In this article I argue that this seemingly unstoppable rise in levels of car ownership and use is not only a transport issue, but also a macro-social process that calls for better understanding on the part of the social sciences. In this section then, I set out in detail the notion of car dependence, arguing that it is a suitable tool to analyze the processes described above.

Motorization has obviously attracted the attention of many scholars along the decades. Within transport research literature, car ownership modeling is one of the most popular and intensively researched areas of study: attempts to understand and predict the level of car ownership date as far back as the 1930s, with a variety of purposes and publics. Generally, these studies use a regression model to represent the relationship between car ownership and a series of factors: in this context, rising income is generally considered to be the main driving force behind car ownership growth, even if other factors such as motoring costs, population density in residential areas, road network density and size and composition of the household are often included as explanatory variables (see for example Dargay and Gately, 1999; Ingram and Liu, 1999; Goodwin et al., 2004; de Jong et al., 2004). In short then, mainstream approaches to the study of motorization have conceived the demand for cars as a particular case of demand for economic goods, in accordance with product life cycle and diffusion theories, and the atomistic paradigm of economic theory more generally speaking.

Although it has gathered a considerable body of knowledge, I argue here that this approach to motorization lacks a specific theoretical conceptualization of the process of car dependence and its systemic properties.

This is probably the result of the fact that the main goal of these studies has always been to predict the (ever increasing) levels of car ownership with greater accuracy, rather than achieving a thorough understanding of the macro-social process that brings about this seemingly endless growth. Accordingly, I am not entirely satisfied with this approach and I turn to the work of other scholars who, in the urban and social sciences have conceived motorization as a macro-social, systemic and self-reinforcing process.

In this contest, notions such as “car system” (Dennis and Urry, 2009), “automobilization” (Kuhm, 1997), “automobility” (Sheller and Urry, 2000; Urry, 2004; Böhm et al., 2006) and “automobile dependence” (Newman and Kenworthy, 1989; 1999; Dupuy, 1999a; Litman, 2002; Motte, 2006) have been put forward. In this article I will refer especially to the notion of “car dependence” and in this section I first briefly summarize three bodies of work that I consider relevant for the understanding of this notion: the works of urban planners Newman and Kenworthy, who popularized the term at the end of the 1980s (1989; 1999); the writings of British sociologist John Urry and his research team on “automobility”; and finally, the work of French scholar Gabriel Dupuy, who applied the concepts of club and network effects to the automobile sector (1999a; 1999b). Building on the basis of this short literature review, I then put forward my own definition of car dependence.

Newman and Kenworthy define automobile dependence as “a situation in which a city develops on the assumption that automobile use will predominate” so that it is given priority in its design, infrastructure and operation (1999, p.xiii, 60); it is a pathological and addictive state that manifests itself as “a combination of high car use, high provision for automobiles, and scattered low-density use” (p.124). As a result “other modes (...) become increasingly marginal (...) until there are no real options for passenger travel other than the automobile” (p.334). Building on the famous Zahavi conjecture of (aggregate) travel time budget stability (Zahavi and Ryan, 1980; Mokhtarian and Chen, 2004), the authors argue that when travel speeds increase thanks to a new kind of transportation technology, travel distances tend to increase proportionally, while travel times remain constant, as people take advantage of the additional speed to travel further. As a consequence, each new mode of transport brings about a new (ideal)type of city, as shown by the historical superposition of the walking city (defined by small size, mixed land use and narrow streets), the transit city (where medium-density, mixed use nodes cluster around public transport routes) and the automobile city, that breaks down the historical connection between land use and transport, separates the urban functions, brings about a dispersed pattern of low-density (suburban) development and makes car use increasingly necessary in order to overcome the distances produced by this “ungluing” process. In this perspective, car dependence is also a self-reinforcing or spiraling process, because the “predict and provide” approach of transport planning, failure to recognize the phenomenon of induced traffic and “institutionalized automobile dependence” (pp.62-63, 138-139) set in motion “a vicious circle or self-fulfilling prophecy of congestion, road building, sprawl, congestion and more road building” (p.140). In short, then, for Newman and Kenworthy car dependence is primarily an urban (planning) issue that is the result of policies, planning actions and institutionalized praxis that encourage increasing car ownership and use.

Urry and his research team have put forward the concept of automobility (or “car system”), which in many ways can be equated to that of car dependence as a macro-social phenomenon (Urry, 2000; 2004; Sheller and Urry, 2000). In their recent book “After the Car” (2009), Dennis and Urry explicitly situate their approach at the intersection of complexity sciences, system thinking and path dependence theory: from this perspective, the car system is a paradigmatic example of a high-carbon, path-dependent socio-technical system that has become “locked-in” on a specific evolutionary pattern (implying ever increasing car ownership and use) as a result of a series of relatively minor and contingent events that occurred in the late nineteenth century. Three key features of the car system can account for its self-reinforcing dynamic: its many interlocking dimensions,

which touch most spheres of social life; its embeddedness in social life, now “irreversibly connected to the mode of mobility that automobility both generates and presupposes” (pp.57-58), notably due to the spatio-temporal effects of the automobile, which has brought about increasing fragmentation (or “disembedding”) of space, which in turn requires the use of a vehicle – and a much more reflexive organization of time – to be suitably re-embedded (see also Shove, 2002). Finally, the existence of positive-feedback loops that reinforce the car system’s tendency to expand, such as the above cited predict and provide approach, whereby the car “seems to provide the solution to the problems of congestion that it itself generates” (Dennis and Urry, 2009, p.59).

Dupuy has proposed an original explanatory model of car dependence, by adapting the concepts of club and network effects (usually applied to telecommunications) to the automobile sector (1999a, 1999b) and building on the basic idea that “to belong to the (automobile) system has become essential, and to a large extent it is the fact that many others are in the system that motivates us to enter it (or to remain in it)” (1999b, p.12). From this perspective, what makes automobile dependence strong and extremely difficult to overcome, despite its negative effects, is the cumulative interaction of a club effect (resulting from the direct relationship between the number of licensed drivers and the maximum speed authorized to them), a fleet effect (related to the fact that “the benefit of owning a car increases as the number of cars already on the road increases”) and a network effect (related to the predict and provide approach). Altogether, they produce considerable positive effects for the car driver in terms of accessibility (measured by comparing the situation of non-car users). This process thus results in a self-reinforcing dynamic whereby an increase in motorization gives the car driver a gain in accessibility, causing considerable pressure to enter the automobile system for those who are outside of it, which in turn increases as the number of members grows.

On the basis of these works we can sketch an integrated definition of car dependence: *it is a dynamic, unrelenting and self-reinforcing macro-social process with systemic properties, resulting in continually increasing levels of car ownership and use (in terms of distance covered), that strongly resists any deliberate attempt to induce change, despite increasing awareness of its negative externalities. It acts mainly through the restructuring of society, in the direction of spatial and temporal structures that tend to require car use for the access to services and opportunities. Accordingly, car dependence entails a fundamental equity dimension, because it tends to progressively widen the gap between the benefits of the automobile system for car users and the situation of non-car users, which in turn is a crucial driver of its spiraling dynamic.* This last point will be discussed in the next section.

Car dependence, social inclusion and intragenerational equity

The understanding of car dependence put forward in the previous section stresses how car dependence has serious implications for (intragenerational) social equity. Indeed, I argue here that an understanding of these implications is essential to fully understand the process of ever increasing motorization as such. Dupuy’s approach is the most interesting in this respect, because it shows how the existence of a fundamental gap between the benefits in term of accessibility of the automobile system for car users and the situation of non-car users creates an objective interest for outsiders to join the system; at the same time, this gap increases as new members join the “club”, leading to positive feedback on the system itself.

Such an understanding has two corollaries, consistent with two basic tenets of car use research: firstly, as car ownership and use increase, so the opportunity gap between car drivers and non-car drivers widens, with the

latter increasingly disadvantaged and compelled to join the system. In that sense, as car dependence grows, the automobile becomes more and more necessary for social inclusion, a fact often acknowledged in the transport and social sciences. This happens because increasing motorization sets in motion a distinctive dynamic of diminishing accessibility for non car-users, which increases the pressure on them to own a car (Clifton and Lucas, 2004, p.16). In that sense, the dynamic of car dependence seems to have an ambiguous effect on social equity, since it contributes to the social exclusion of those who are outside the car system, while at the same time tending to reduce their number. On the other hand, it also raises the bar of transport inclusion, eventually making more than one car per household necessary for social inclusion (Nutley, 1996, p.97). Therefore, the net effects of growing car dependence on social equity are not easily discernible, because they depend on the relative weight of these contrasting processes. Secondly, non-car ownership is expected to be inversely related to income (a basic fact that has been extensively researched in transport studies: see for example Dargay and Gately, 1999; Storchmann, 2005), and thus highest among low income and disadvantaged sectors of the population (see Clifton and Lucas, 2004).

The intersection between transport and social equity is not an unexplored field: an increasing number of studies have in fact highlighted how mobility is a crucial factor for social inclusion, status and quality of life in contemporary societies. In this context, different concepts have been put forward, such as: accessibility (Uk Department for Transport, 2006), transport disadvantage (Dodson et al., 2004), socio-spatial exclusion (Cass et al., 2003), motility (Kaufmann et al., 2004) and others. In these studies carless people are generally seen as a prominent example of the “transport disadvantaged” and it is often argued that, in very car-dependent contexts the only means able to provide them with real “transport inclusion” is the car itself, rather than public transport (Taylor and Ong, 1995; Cervero et al., 2002; Lucas, 2004). In this paper, I argue that this kind of perspective on carless people is limited in two respects. First, it generally fails to situate the issue in the broader picture of ever increasing car dependence as a systemic macro-social process; in doing so, while scholars in this area of study have often correctly pointed out that increasing motorization and related land-use patterns bring about a dynamic of diminishing accessibility for non-motorized households (Clifton and Lucas, 2004), they have generally paid much less attention to the resulting increased pressure to own a car – and thus to the self-reinforcing dynamic of the process as a whole. Secondly, by focusing exclusively on intragenerational equity, this perspective usually fails to incorporate concerns about intergenerational equity that arise from the fundamental unsustainability of current trends in transport.

To summarize then, the unrelenting nature of car dependence is a major determinant of processes with serious implications for intergenerational equity (such as oil depletion and climate change). On the other hand, the nature of the car dependence dynamic is intimately associated with issues of intragenerational equity. However, these two dimensions of equity have rarely been studied in conjunction. In the next section, I address this subject by examining the latent tensions between the two in the domain of transport policy.

The transport policy stalemate

The diagram depicted in Fig.1 uses a bi-dimensional space to illustrate the tensions underlying transport policies with an impact on intra- and intergenerational equity. Axis x shows the expected impact of the depicted policies on intergenerational equity, ranging from very negative (that is, greater inequity between generations) to very positive (less inequity). Axis y does the same for intragenerational equity.

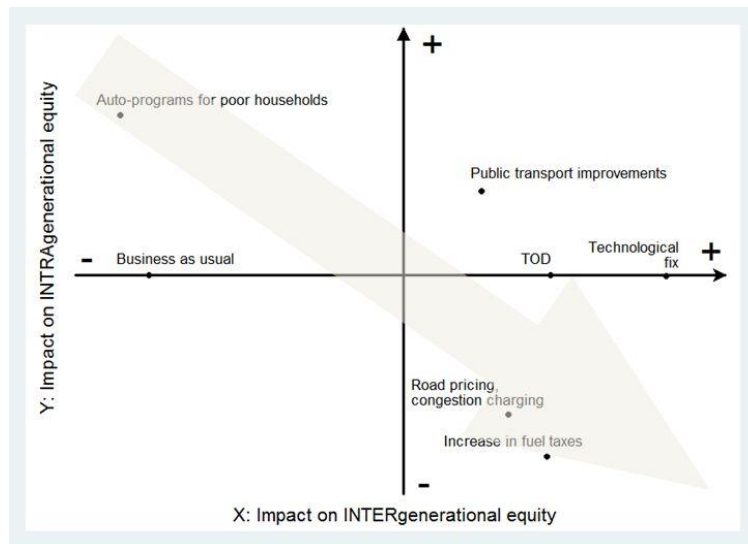


Fig. 1 Transport policies with an impact on intra- and intergenerational equity

Public aid programs to subsidize the automobility of poor households have been implemented on a small scale in countries such as the USA, France and the UK, with the aim of promoting the social inclusion of the carless poor (Fol et al., 2007). This has been strongly recommended by scholarly literature on transport and social exclusion, which has pointed out that in car-dependent areas, provision of (additional) public transport services is not enough to make up for the lack of private transport, as the only means able to provide real transport inclusion is actually the car itself (Taylor and Ong, 1995; Ong and Miller, 1995). Such schemes, however, have failed to proliferate, precisely because they would lead to further increases in car dependence thus going against the sustainable transport agenda (Fol et al., 2007). In short, these programs have a negative impact on intergenerational equity, but a positive one on intragenerational equity.

Improvement to public transport is the only win-win policy measure in the diagram. As a matter of fact, all policies that reduce the need for an automobile to access jobs and services by improving the effectiveness of other modes are generally seen as contributing to alleviating social exclusion, insofar as they improve the situation of households without a car (Shaw and Farrington, 2003, p.109). They should have a positive impact on environmental sustainability as well, insofar as they encourage a modal shift from the private car to less polluting means of transport. However, transport researchers generally agree that “pull” measures that encourage voluntary reductions of car use – or “carrots” – are unlikely to effectively bring about change at an adequate scale and speed (Huby and Burkitt, 2000, p.390); therefore it is generally pointed out that there is a need for complementary “push” measures, which aim to reduce car use in a more direct and coercive manner (“sticks”).

Pricing measures (such as road pricing, congestion pricing, emission charging and fuel or other motor-related taxes) are a prominent example of “sticks”. They can in fact be used to increase the perceived cost of car driving for users, bringing it closer to the price of other modes and thus reducing demand. However, they are often considered as potentially threatening to intragenerational equity, as they might be punitive and regressive towards low-income car-owning households (Newman and Kenworthy, 1999, pp.142-143; Huby and Burkitt, 2000; Lucas et al., 2001; Mo.Ve Association, 2008, p. 35; Berri and Dargay, 2010), especially in suburban and rural areas (Gray et al., 2001). The equity of transport pricing measures is a highly debated and controversial subject, which has produced a vast quantity of literature that it is impossible to expand on here. Let it just be stated that pricing measures have raised concerns about equity among both scholars and the general public, and these concerns may effectively hamper their implementation, as was the case in the UK

with the Fuel Tax Escalator on petrol². In that sense, economic instruments might seem to trade off intergenerational equity against intragenerational equity.

Urban planning policies that promote development of compact, dense neighborhoods with mixed land use and good public transport provision – such as Transit-Oriented Development (TOD), Smart Growth and New Urbanism – reduce the need for a car to access jobs and services and are thus potentially beneficial to both kinds of equity. However, their impact on intragenerational equity is somewhat controversial: indeed, TOD policy documents often include the promotion of mixed-income communities among their goals (Talen, 2002); yet, successful TODs are likely to result in increased land values and housing prices (Cervero, 2004), with potential knock-on effects in terms of gentrification (Kahn, 2007), displacement of poor households and segregation (Newman et al., 2009, pp.47-51). Theoretically, these negative impacts are not inevitable, as several strategies exist to reconcile TOD with social equity goals (Policy Link, 2008). However, in practice, such countervailing actions generally require high levels of effort and commitment on the part of the public sector (Downs, 2004). As a result, the impact of TOD on social equity is often controversial: to take into account this ambiguity, TOD is represented in Fig.1 as neutral with respect to intragenerational equity.

The “technological fix” strategy aims to achieve sustainable transport through improvements in road vehicle technology, rather than through reductions in the overall level of road traffic. This strategy is particularly attractive to governments because it promises a large, positive impact on intergenerational equity with no apparent consequence for intragenerational equity. However, this is likely to be wishful thinking since fuel taxes would probably be necessary in order to successfully introduce new vehicle technologies and alternative fuels with a substantial impact on CO² emissions. (Schäfer et al., 2009, p.236).

Finally, it is worth noting that the impacts of a “business as usual” policy on equity are highly equivocal and difficult to assess. As noted above, allowing car dependence to tighten its grip on society will arguably increase the degree of exclusion of those who are left out of the car system, but at the same time will reduce their number. On the other hand, this strategy would certainly bring about the worst impact on intergenerational equity. The unclear (and rather taken for granted) effects on intragenerational equity may nonetheless make it attractive for policy-makers.

In short, most of the illustrated transport policy strategies seem to trade off intra- and intergenerational equity against each other, as shown by the clustering of measures along the diagonal arrow in Fig.1: in fact, providing real social inclusion to the transport disadvantaged often means providing them with (more) cars, as they are the only viable means to access services and opportunities in car dependent contexts; on the other hand, most of the measures available to tackle car dependence seem to be inequitable from an intragenerational point of view, because “they effectively ‘pull the ladder up from the bottom’ (and) have a disproportionate negative impact on low-income car-owning households” (Lucas et al., 2001, p.38). This is probably related to the nature of car dependence, as defined in this article: indeed, this process makes car ownership and use a precondition for social inclusion, and at the same time makes measures to “push” drivers out of their cars appear inequitable.

² The UK Fuel Tax Escalator consisted of an additional annual increase in fuel duty of more than 5% in real terms, with the aim of reducing vehicle-kilometres travelled, encouraging manufacturers to improve the fuel efficiency of vehicles and drivers to trade down to more fuel-efficient cars (Lucas et al., 2001, p.5). In September 2000, after two weeks of demonstrations by farmers and truckers, the British Government abolished the escalator. In the meantime, scholars had observed that the impacts of the measure were particularly severe on low-income isolated rural dwellers (Gray et al., 2001) but also that the rate of traffic growth had stabilized for the first time under conditions of economic growth (Docherty, 2003, p.21).

This situation is likely to bring about a “stalemate situation” for policy makers interested in both kinds of equity: as any move seems to go against their declared political goals, immobility is likely to be the answer. In practice then, no serious attempt will be made to reduce car use and all hopes will be concentrated on a “technological fix” to eventually solve all problems. In this scenario, environmental sustainability and intergenerational equity are likely to be sacrificed in favor of other, more pressing goals. The UK experience provides a good case in point (Docherty and Shaw, 2003; 2008): having abandoned their radical sustainability agenda for transport put forward in 1998, Labour governments have subsequently adopted a “pragmatic multimodalism” approach, “where high(er) levels of road building are pursued alongside enhanced public transport investment to produce a policy compromise based on what it is politically realistic to deliver” (Docherty, 2003, p.19). It is probably not by chance that the only sustainable transport policy left in this new approach is improvement to public transport: that is, the only “win-win” strategy in terms of impacts on intra- and intergenerational equity.

Conclusion

“How to bring about sustainable development?” This question underlies most scholarly work on sustainability. Recently however, in the face of long-frustrated efforts to bring about sustainable development, some scholars in the social sciences have begun to put forward a different set of questions. Blüdhorn and Welsh for example have proposed a new, “post-ecologist” question: *“How do advanced modern capitalist consumer democracies try and manage to sustain what is known to be unsustainable?”* (2007, p.198). Similarly, Urry (2011) has recently urged sociologists to try to better understand how the remarkable path-dependence and resilience of high-carbon systems is actually realized in the social world. In this paper I have tried to answer this kind of question, with regard to the domain of transport, by arguing that the hidden tensions between environmental and social equity goals play a prominent role in hampering efforts to reverse the process of car dependence.

Indeed, the potential trade-offs between intra- and intergenerational equity goals have until now rarely been considered a subject worth studying in its own right, especially in the field of sustainable transport. However, as shown in this paper, taking them into account uncovers substantial barriers to the implementation of sustainable transport policies. It could even be argued that the tension between the two is an inherent feature of the car dependence process, and that the resulting policy stalemate is to be considered as a major contributing factor to the self-reinforcing nature of motorization, since it effectively hampers any serious attempt to reverse its course. In other words, I put forward the hypothesis that car dependence as a macro-social process tends to create a situation whereby, in order to increase the degree of social inclusion of transport disadvantaged households, it is necessary to increase their degree of motorization, and thus the car dependence of society as a whole. Ever-increasing motorization thus creates a situation where “more cars” is the only remedy to the inequity problems brought about by the car dependence process itself. As a consequence, every attempt to reduce motorization is likely to be met with opposition on the grounds of inequity.

The approach outlined in this article has proven useful therefore in analyzing how the path-dependence and resilience of the car system works in detail. Whether it would be pertinent to study the functioning of other high carbon systems is a question for future research.

References

- BERRI, A. and DARGAY, J. M. (2010) Transport consumption inequalities and redistributive effects of taxes: a comparison of France and the UK. *12th World Conference on Transport Research, Lisbon, July 11-15, 2010*. Available at <<http://intranet.imet.gr/Portals/0/UsefulDocuments/documents/02502.pdf>> [Accessed 14 September 2011].
- BLÜDHORN, I. and WELSH, I. (2007) Eco-politics beyond the Paradigm of Sustainability: A Conceptual Framework and Research Agenda. *Environmental Politics*, 16 (2), pp. 185-205.
- BÖHM, S. et al. (eds.) (2006) *Against automobility*. Oxford: Blackwell.
- CAMPBELL, C. J. and LAHERRÈRE, J. H. (1998) The end of cheap oil. *Scientific American*.
- CASS, N., SHOVE, E. and URRY, J. (2003) *Changing infrastructures, measuring socio-spatial inclusion/exclusion. Final Report*. [online] Lancaster: Department of Sociology, Lancaster University. Available at <<http://www.lancs.ac.uk/fass/centres/cemore/word%20docs/chime%20report%20dft.doc>> [Accessed 14 September 2011].
- CERVERO, R. (2004) *Transit-oriented development in the United States: Experiences, challenges, and prospects*. Washington: Transportation Research Board.
- CERVERO, R., SANDOVAL, O. and LANDIS, J. (2002) Transportation as a stimulus of welfare-to-work. Private versus public mobility. *Journal of Planning Education and Research*, 22, pp. 50-63.
- CLIFTON, K. and LUCAS, K. (2004) Examining the empirical evidence of transport inequality in the US and UK. In LUCAS, K. (ed.) *Running on empty. Transport, social exclusion and environmental injustice*. Bristol: The Policy Press, pp. 15-36.
- CULLINANE, S. (2003) Hong Kong's low car dependence: lessons and prospects. *Journal of Transport Geography*, 11, pp. 23-35.
- DARGAY, J. and GATELY, D. (1999) Income's effect on car and vehicle ownership, worldwide: 1960-2015. *Transportation Research Part A: Policy and Practice*, 33 (2), pp. 101-138.
- DE JONG et al. (2004) A comparison of car ownership models. *Transport Reviews*, 24 (4), pp. 379-408.
- DEFNEY, K. S. (2005) *Beyond oil: the view from Hubbert's peak*. New York: Hill and Wang.
- DENNIS, K. and URRY, J. (2009) *After the car*. Cambridge: Polity Press.
- DOCHERTY, I. (2003) Policy, politics and sustainable transport: the nature of Labour's dilemma. In DOCHERTY, I. and SHAW J. (eds.) *A new deal for transport?* Oxford: Blackwell, pp. 3-29.
- DOCHERTY, I. and SHAW, J. (eds.) (2003) *A new deal for transport?* Oxford: Blackwell.
- DOCHERTY, I. and SHAW, J. (eds.) (2008) *Traffic Jam. Ten years of 'sustainable' transport in the UK*. Bristol: The Policy Press.

DODSON, J., GLEESON, B. and SIPE, N. (2004) *Transport Disadvantage and Social Status: A review of literature and methods*. [online] Brisbane: Griffith University. Available at <http://www.griffith.edu.au/__data/assets/pdf_file/0006/48642/urp-rm05-dodson-et-al-2004.pdf > [Accessed 14 September 2011].

DOWNS, A. (ed.) (2004) *Growth management and affordable housing: do they conflict?* Washington DC: The Brookings Institution.

DUPUY, G. (1999a) *La dépendance automobile. Symptomes, analyses, diagnostic, traitements*. Paris: Anthropos.

DUPUY, G. (1999b) From the "magic circle" to "automobile dependence": measurements and political implications. *Transport Policy*, 6, pp. 1-17.

FEITELSON, E. (2002) Introducing environmental equity concerns into the discourse on sustainable transport: a research agenda. In BLACK, W. R. and NIJKAMP P. (eds.) *Social change and sustainable transport*. Bloomington, Indiana: Indiana University Press.

FOL, S., DUPUY, G. and COUTARD, O. (2007) Transport policy and the car divide in the UK, the US and France: beyond the environmental debate. *International Journal of Urban and Regional Research*, 31 (4), pp. 802-818.

GARDINER, S. (2008) A perfect moral storm: climate change, intergenerational ethics, and the problem of corruption. In VANDERHEIDEN S. (ed.) *Political theory and global climate change*. Cambridge, Massachusetts; London, England: The MIT Press, pp. 25-42.

GOODWIN, P., DARGAY, J. and HANLY, M. (2004) Elasticities of road traffic and fuel consumption with respect to price and income: a review. *Transport Reviews*, 24 (3), pp. 275-292.

GRAY, D. et al. (2001) Car dependence in rural Scotland: transport policy, devolution and the impact of the fuel duty escalator. *Journal of Rural Studies*, 17, pp. 113-125.

HUBY, M. and BURKITT, N. (2000) Is the new deal for transport really better for everyone? The social policy implications of the UK 1998 White Paper on transport. *Environment and Planning C: Government and Policy*, 18, pp. 379-392.

INGRAM, G. K. and LIU, Z. (1999) *Determinants of motorization and road provision*. [online] The World Bank research advisory staff and transport, water, and urban development department, Transport Division. Available at <<http://elibrary.worldbank.org/docserver/download/2042.pdf?expires=1315997783&id=id&acname=guest&checksum=407000197F3CF26311C17DD18AFA0CE8>> [Accessed 14 September 2011].

INTERNATIONAL ENERGY AGENCY (2007) *Oil Supply Security: Emergency Response Of IEA Countries 2007*. [online] International Energy Agency (IEA). Available at <http://www.iea.org/textbase/nppdf/free/2007/oil_security.pdf> [Accessed 14 September 2011].

KAHN, M. E. (2007) Gentrification Trends in New Transit-Oriented Communities: Evidence from 14 Cities That Expanded and Built Rail Transit Systems. *Real Estate Economics*, 35 (2), pp. 155-182.

KAUFMANN, V., BERGMAN, M. M. and JOYE, D. (2004) Motility: Mobility as Capital. *International Journal of Urban and Regional Research*, 28 (4), pp. 745-756.

- KUHM, K. (1997) *Moderne und Asphalt: Die Automobilisierung als Prozess technologischer Integration und sozialer Vernetzung*. Pfaffenweiler: Centaurus.
- LITMAN, T. (2002) *The costs of automobile dependency and the benefits of balanced transportation*. [online] Victoria, BC, Canada: Victoria Transport Policy Institute. Available at <<http://www.vtpi.org/autodep.pdf>> [Accessed 14 September 2011].
- LUCAS, K. (ed.) (2004) *Running on empty. Transport, social exclusion and environmental justice*. Bristol: The Policy Press.
- LUCAS, K., GROSVENOR, T. and SIMPSON, R. (2001). *Transport, the environment and social exclusion*. [online] Joseph Rowntree Foundation. Available at <<http://www.jrf.org.uk/sites/files/jrf/1859352936.pdf>> [Accessed 14 September 2011].
- MOKHTARIAN, P. L. and CHEN, C. (2004) TTB or not TTB, that is the question: a review and analysis of the empirical literature on travel time (and money) budgets. *Transportation Research Part A*, 38, pp. 643-675.
- MOTTE, B. (2006) *La dependance automobile pour l'accès aux services aux ménages en grande couronne francilienne*. Ph.D thesis, Université de Paris I.
- MO.VE. ASSOCIATION (2008). *Car Dependence within City Regions*. Venice: Mo.Ve. Association.
- NEWMAN, P. and KENWORTHY, J. (1989) *Cities and Automobile Dependence. An International Sourcebook*. Sidney: Gower Technical.
- NEWMAN, P. and KENWORTHY, J. (1999). *Sustainability and Cities. Overcoming Automobile Dependence*. Washington, DC; Covelo, California: Island Press.
- NEWMAN, P., BEATLEY, T. and BOYER, H. (2009) *Resilient cities. Responding to peak oil and climate change*. Washington DC: Island Press.
- NUTLEY, S. D. (1996) Rural transport problems and non-car populations in the USA. *Journal of Transport Geography*, 4 (2), pp. 93-106.
- ONG, P. M. and MILLER, D. (2005) Spatial and transportation mismatch in Los Angeles. *Journal of Planning Education and Research*, 25, pp. 43-56.
- POLICY LINK (2008) *Equitable development toolkit: Transit-oriented development*. [online] Oakland, CA: Policy Link. Available at <http://www.policylink.org/atf/cf/%7B97c6d565-bb43-406d-a6d5-eca3bbf35af0%7D/TODTOOL_FINAL.PDF> [Accessed 14 September 2011].
- SCHÄFER, A. et al. (2009) *Transportation in a climate-constrained world*. Cambridge, Massachusetts: The MIT Press.
- SHAW, J. and FARRINGTON, J. (2003) A railway renaissance? In DOCHERTY I., & SHAW, J. (eds.) *A New Deal for Transport?* Oxford: Blackwell.
- SHELLER, M. and URRY, J. (2000) The city and the car. *International Journal of Urban and Regional Research*, 24 (4), pp. 737-757.

- SHOVE, E. (2002) *Rushing around: coordination, mobility and inequality*. [online] Lancaster: Department of Sociology, Lancaster University. Available at <<http://www.lancs.ac.uk/staff/shove/choreography/rushingaround.pdf>> [Accessed 14 September 2011].
- STORCHMANN, K. (2005) Long-run gasoline demand for passenger cars: the role of income distribution. *Energy Economics*, 27, pp. 25-58.
- TALEN, E. (2002) The social goals of new urbanism. *Housing Policy Debate*, 13 (1), pp. 165-188.
- TAYLOR, B. D. and ONG, P. D. (1995) Spatial mismatch or automobile mismatch? An examination of race, residence and commuting in US metropolitan areas. *Urban studies*, 32 (9), pp. 1453-1473.
- UNITED CITIES AND LOCAL GOVERNMENTS (2011) *Culture: Fourth Pillar of Sustainable Development*. [online] Barcelona: United Cities and Local Governments. Available at <http://agenda21culture.net/index.php?option=com_docman&task=doc_download&gid=393&Itemid=86&lang=en> [Accessed 14 September 2011].
- URRY, J. (2000) *Sociology beyond societies. Mobilities for the twenty-first century*. London: Routledge.
- URRY, J. (2004) The 'system' of automobility. *Theory, Culture & Society*, 21 (4/5), pp. 25-39.
- URRY, J. (2011) *Climate Change & Society*. Cambridge: Polity Press.
- UK. DEPARTMENT FOR TRANSPORT (2006) *Accessibility Planning Guidance: Full Guidance*. [online] London: Department for Transport . Available at < <http://assets.dft.gov.uk/publications/accessibility-planning-guidance/accessibility-planning-guidance-full-guidance.pdf>> [Accessed 14 September 2011].
- VANDERHEIDEN, S. (2008) Introduction. In VANDERHEIDEN S. (ed.) *Political theory and global climate change*. Cambridge, Massachusetts; London, England: The MIT Press, pp.vii-x.
- WEGENER, M. and GREENE, D. L. (2002) Sustainable transport. In BLACK, W. R. and NIJKAMP, P. (eds.) *Social change and sustainable transport*. Bloomington, Indiana: Indiana University Press, pp. 35-41.
- WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT (1989) *Our common future*. Oxford: Oxford University Press.
- ZAHAVI, Y. and RYAN, Y. (1980) Stability of travel components over time. *Transportation Research Record*, 750, pp. 19-26.