44. Sustainable transport: looking back – looking forward

Phil Goodwin and Carey Curtis

INTRODUCTION

In this chapter, we seek to position the sustainable transport paradigm by looking back at past experience and then looking forward to consider how to advance the practice. We do this by drawing on a synthesis of the book as a whole, noting that the 2020 citations here to chapters in the book also in turn cite source references to a literature, and personal experiences of practice spanning 40 and more years.

The common thread is the need for a paradigm shift, based on the transition in thinking about transport that has taken place broadly over the last half century. The common narrative is that the technologies of motoring and aviation have transformed travel patterns and land use, with huge increases in traffic volumes, car ownership and distances travelled. The construction of transport, housing and other infrastructure to provide for these trends also accelerated them. Initially public policy perceived this as a great improvement in mobility and economic welfare. However, it became increasingly apparent that there were unintended negative effects, on health, economic efficiency, air quality, local and global environment, quality of life and an inequitable distribution of impacts, in which increases in mobility for some resulted in decreases in accessibility for others. Therefore, the term ‘sustainable transport’ developed in both intellectual and political movements that sought to reverse these negative consequences, emphasising walking, cycling, public transport and land-use planning and enabling priority to local lifestyles and shorter travel distances. This sustainable approach became progressively more mainstream, and now represents the only way able to improve local accessibility at the same time as limiting or reversing global climate change. To that extent, the *Handbook* has the character of a Manifesto, albeit not one with a single, tightly defined party line.

LESSONS FROM AN EARLIER BATTLE OF THE PARADIGMS.

The report *Transport: The New Realism* (Goodwin et al. 1991, Rye 2020) was a critique in the UK of untenably high official road traffic forecasts and its associated road-building programme, intended to provide enough new road capacity to cope with and outpace forecast traffic growth (DfT 1989a, 1989b). The report itself was preceded by discussion papers commissioned from 34 eminent transport academics and professionals. These were discussed at a series of meetings with stakeholders, including local government, voluntary agencies and campaigning organisations. There was coverage of what was intended to be the most advanced thinking available at the time, and there are evident similarities in the coverage and some of the treatment of themes in this book. The main differences in emphasis between then and now

are that there was, at that time, less attention to issues of equity, and governance, and to the urgency of global dimensions of climate change, which we will come back to later. But note that even then, there was already recognition of the role of transport in climate-changing emissions, and a manifesto by the OECD agency European Conference of Ministers of Transport (1989), signed by the Ministers from all participating countries, advocating measures of mode shift and traffic reduction in order to address this threat. Current concerns were already being recognised 30 years ago.

The text of the New Realism report therefore sought to be quite broad in its coverage, with discussion of congestion, public transport, safety, local environment, global environmental issues, energy, social impacts of changes in accessibility, deprivation, personal security and ‘entrapment’, later called car dependence, and issues of attitudes and public opinion. Policy instruments discussed included road user charging, reallocation of road capacity between the contending claimants for it, with priority to be given to walking, public transport and cycling. Solutions based on building more road capacity were heavily critiqued, both in principle and for practical reasons.

Thus the reader from the 2020s, examining an old copy of that report, would find its production style old-fashioned but much of the content rather familiar. If there are surprises, it might be how much of what is known now was already known then. Even practical experience of the new approach – pioneered for example in town centre pedestrianisation in Germany, traffic calming of residential areas in the Netherlands and practical initiatives in traffic management in the 1930s and town planning even earlier – had already provided the beginnings of practical manuals. Owens (1995) crystallised the transition in the phrase ‘From “predict and provide” to “predict and prevent”’.

However, there were two sections of the report in particular that defined its influence on public policy, and these had a narrower focus. The first was a short, tightly written and much rehearsed argument about why the road-building approach would not work even in its own terms. This was based on a demonstration that if the high traffic forecasts were correct, the massive road capacity to be provided was not nearly enough to reduce congestion: rather, it would at best slow down the pace at which congestion got worse. This was particularly influential in local government in the South East of England (mostly led by Conservatives, the same political party that at national level had launched the roads programme), and it was for reasons of congestion, not wider social concerns, that demand management would become a cornerstone of their stated transport policy.

The second was a proposition that this shift in policy *had already* become a matter of consensus among a very broad range of representative bodies and transport planners, partly expressed in the seminars and meetings organised as part of the project itself, and partly as shown in a rather detailed account of policy statements at national and international level. Thus the thesis was not ‘there ought to be a new realism’, but ‘there is already a new realism’. For a period this found an unusual cross-party agreement, such that when the newly elected [Labour] Government issued its first transport White Paper in 1998, substantially informed by the New Realism exercise, the first sentences, written by the new Deputy Prime Minister, stated

There is now a consensus for a radical change in transport policy. The previous [Conservative] Government’s Green paper paved the way with recognition that we needed to improve public transport and reduce dependence on the car.

DETR 1998

COEXISTENCE OF TWO COMPETING PARADIGMS

Thus 30 years ago it already seemed that what was happening was the replacement of an old paradigm by a new one. The old one essentially saw cars as the near-universal transport mode of the future, and it was the task of planners and engineers to design transport networks and land uses which would accommodate those cars. The central analytical tool was the traffic forecast, and the central transport policy was the provision of road capacity. The new one saw the social consequences of that approach as being unacceptable and inefficient. Car use would need to be controlled, managed and reduced, with other, less damaging methods used to achieve access to goods, services and activities. This would require an integrated system approach to a wide variety of policy instruments, including pricing and the regulation of how road capacity is allocated between different claimants (which might be different in different locations), and land-use planning intended to reduce the need for travel, rather than to provide for its maximum extent.

However, in the event, the ‘new’ paradigm did not replace the ‘old’ one (Rye 2020, Whitlegg 2020). Rather they both continued to have a somewhat independent existence, each down-playing the importance of the other, more or less taking it in turns for influence (or running side-by-side), but lurking undefeated during periods when they were not in command (Isaksson 2020). This alternation did not correspond closely with the party political alignments in different countries: in some places the old was labelled ‘right’ and the new ‘left’, in others the old were ‘business as usual’ and the new was ‘green’. But even from a business point of view, the commercial advantages in cities of having low traffic centres and good light rail schemes was often associated with local business interests, while some left wing councils still thought that road expansion would be good for employment. The most successful examples of the new paradigm were often where local political control enabled cross-party initiatives (Isaksson 2020). There were also complications – surprisingly common – where the logic of political compromise meant that attempts were made to weld two incompatible strategies into ‘do-it-all’ programmes, but these tended to be unstable, since elements would be inconsistent, such as the provision of free parking in areas trying to reduce car use.

REVISING ‘SUSTAINABLE TRANSPORT’ FROM PRACTICAL EXPERIENCE

The chapters of the book interact across the parts (not only within the parts), and it is convenient to suggest a number of cross-cutting themes expressing this interaction. This recognises that the discussions now are not simply another phase in decades of repetition, but include some new elements which are different.

Broader Objectives

It is clear that the early discussions, largely dominated by congestion and its solutions, no longer capture the many different ways in which modern travel, especially the dominating role of private cars, affects the quality of life. These often appear in the discourses of public choice as separate, even competing, objectives such as ‘economy versus environment’ or ‘individual welfare versus social good’. A broader conception sees objectives of sustainable transport

relying on interactions between elements that can reinforce and support each other. Such co-benefits are especially seen in the new importance of objectives of *climate change*, *health and safety*, *economy* and *equity*, none of which were given sufficient importance in the classical tools of appraisal of transport projects.

Climate change

Transport is the largest sector whose carbon emissions are still increasing (Glover and Low 2020), and the climate emergency requires a policy to change the habits of the present generation. Declarations of an environmental ‘State of Emergency’ suggest that the next 10 years will be critical in physical impact, and therefore the next five years in terms of policy innovation. Calculations show that on the most optimistic assumptions about the role of electric vehicles, considerations of climate change as an emergency imply that we need to reduce the amount of car use by a minimum of approximately one-third in the next 10 years, and it may well be more.

Health and safety

Effects on health are negative, for multiple reasons: traffic crashes leading to death or life-changing damage; reduced physical exercise leading to obesity, heart and circulatory conditions; increased stress; and effects of noxious emissions on air quality, especially particulates and nitrogen oxides (Davis 2020).

Economy

A rich car-producing industry is often considered an economic advantage. However, this is increasingly untrue in many countries where manufacturing is replaced by assembly of components made overseas. There are also negative economic impacts on reduced investment support for other more productive areas of the economy. In addition, excessive traffic makes urban life less pleasant and has an impact on the viability of local businesses and activities. There are economic distortions when there are large resource implications (on congestion, health, environment etc.) for which users are not charged (Whitelegg 2020). Cars are in unequal competition with other modes which are run on a commercial basis and charging full costs plus profit. Increasing car use undermines the commercial viability of more efficient bus services, which then require financial support for poorer services (Mulley and Yen 2020, Stone and Murphy 2020).

Equity

All these trends have complex distributional effects (Thomas 2020, Svensson 2020), but typically non-car users have been particularly badly affected, especially those who are also disadvantaged through income, disability, age, social exclusion and systemic prejudice. Even the majority of car users have had little net advantage, as ‘other people’s cars’ reduce the benefit. Investment in public transport has been ‘demand-driven’, resulting in areas already rich in supply improved (usually radial routes to central business districts to serve white-collar jobs) and more peripheral outer suburbs (more often inhabited by lower income groups) with limited supply. Investment in cycling infrastructure tends to favour the high-speed, longer-distance journeys – appealing to a particular cycling cohort (te Brömmelstroet et al. 2020) rather than those which serve short-distance local travel to serve everyday needs (Krizek and King 2020).

Policy

Allocation of space and resources

Underpinning the many different specific policy areas, there is an appreciation that cars represent a very inefficient use of space and resources, requiring excessive infrastructure ‘footprints’ for moving and parking (Clements 2020). On the other hand, a car is often seen as the most efficient form of transport for an individual, albeit limited by the annoying existence of traffic (i.e. other cars). Attempts to reconcile this conflict between individual efficiency and collective inefficiency by providing more and more road space and more and more parking space have not been (and will not be) successful. Attempts to reallocate road space to give more priority to public transport, walking and cycling (which are much more efficient) have been a significant part of policy implementation in many jurisdictions around the world. However, we are now seeing a reverse reallocation, as car drivers increasingly recapture this reserved space by parking on footpaths and driving in priority lanes for other modes. This has been made worse by a trend towards larger cars, which do not fit into conventional parking spaces, and sometimes not even into people’s own garages, so they ‘have to’ park on street instead. The problem is also compounded where agencies fail to enforce public transport and bicycle lanes for their proper purpose.

Planning

Longer-term trends in planning and development control often favour housing in locations distant from local services, poorly served by public transport, designed with more space given to parking than to pavements or cycle facilities, and locking people in to a car dependence that in many cases they are unable to counter (Bertolini 2020). Successful transport policies depend on giving emphasis in development to the co-location of homes and the places people want to travel to (workplaces, shopping, leisure facilities, hospitals, schools) (Handy 2020, Renne 2020, Chorus 2020, Biermann and Martinus 2020), most of which are planned quite separately. In general, denser development with close attention to local parks will be better than development in distant countryside areas that are currently pleasant (though may not continue to be) but distant from necessary facilities (Larsson 2020).

Public transport

There is an increasing focus on improved quality, frequency and reliability of service, at affordable prices, for both bus and local rail services (Scheurer 2020). But the focus has been limited, focused on small-scale change (an extra service here, slightly extend the network there) rather than being designed to serve attract new markets.

Interaction of cars, pedestrians, public transport and cyclists

There are increasing problems of conflict, sometimes expressed in hostile behaviour, and breakdown of regulatory rules. Stricter enforcement is essential. Traffic policing is often not seen as as important as the higher-profile crime control. However, the problem is that if breach of rules on pavements, parking or speeding are relaxed, a dynamic is set up such that the rules are in effect overturned. Cycle lanes become overflow facilities for cars, and footpaths become overflow parking. In this connection it is notable that important trends at the moment are: (1) a breakdown of enforcement of footpath parking, violation of traffic signals, mobile phone use when driving, intrusion into bus lanes and cycle paths and in some places speed limits;

but (2) a rapidly growing use of ‘citizens’ enforcement’ methods, especially cameras mounted on vehicles and cycles, which where police resources are restricted can provide an evidence base to support legal action (and indeed in some jurisdictions such evidence is actually called for by the police). All too often walkers and cyclists are pitted against each other for space, or expected to share, and then both are pitted against space allocated for public transport.

Inter-generational travel

There is a need to recognise how travel patterns and habits differ by generational groups and design sustainable transport policies to reduce car travel while maintaining accessibility of opportunity (Ka Ho and Loo 2020, Musselwhite 2020). For children, there is a need to reduce the incidence of children needing to be driven to school, with negative effects on their health, experience of independent mobility, emissions near schools and the dangers caused by the vehicles used (Freeman 2020).

Trend to larger cars

SUVs are inappropriate for urban use, undermining carbon reduction and emissions control, and putting great stress on parking needs at home and elsewhere. In the UK in recent years very many more SUVs have been sold than electric vehicles, increasing carbon outputs.

Electric vehicles

It is right to phase out use of fossil fuels for travel, but this is not sufficient on its own due to (1) embedded carbon; (2) other emissions and particulates including tyres; (3) cheap untaxed electricity which causes an increase in the total number of vehicles and therefore increases all other problems of congestion etc. (and is negated where the source of electricity is from fossil fuels), (4) offset by bigger vehicles and (5) cheating and unintended effects of regulatory details. Electric vehicle conversion needs to be implemented in a way which does not have these unintended side effects. This can include greater use of non-privately owned hire formats (if it can replace a greater number of privately owned cars), encouragement for conversion of some existing cars to electricity, careful scrutiny and planning about what happens to the displaced fossil fuel cars: large-scale scrapping and selling off to other markets both have problematic environmental impacts. In this context we note that the augmentation of pedal bicycles by electric support has a much greater transformational potential than simply replacing fossil fuel cars by similar electric cars.

Autonomous vehicles

There have been some exaggerated claims for how swiftly and overwhelmingly autonomous cars will become the dominant mode of transport, displacing all privately owned cars and most public transport. There are important technical developments, and there are also serious policy issues which have not yet been resolved (Docherty 2020). In particular, there are claims that in order to get the benefits of autonomous cars, pedestrian freedom of movement should be seriously restricted. This should be rejected: we need to fit the vehicles to the towns, not the towns to the vehicles. In general, autonomous cars are still cars, and have all the other problems of widespread use discussed above. Implementation that implies a massive increase in the number of vehicles, or in vehicle miles/kilometres travelled through repositioning and empty running, thus adding to congestion, is not the way forward.

Rationing, carbon-related mileage budgets

In some cases, simple use of prices to manage demand can have unintended side effects. Great financial difficulty could be imposed on people who have previously established a lifestyle (through no fault of their own) relying on not paying the full costs of the congestion (Firth 2020), pollution and environmental damage their car use causes.

NEW ISSUES OF STRATEGY AND GOVERNANCE**Implications of Covid-19 for Transport Sustainability**

We write this chapter during a global pandemic of a scale and impact that we have never experienced in our lifetimes. The response to Covid-19 has been to require populations in almost every country to ‘lock down’ by only leaving the home for essential needs (buying food, medical needs, essential workers and brief exercise). International and (in many cases) domestic air travel all but ceased as countries closed their international borders, and in some cases introduced regional borders. When outside the home we are told we must practise ‘physical distancing’, defined variously as 1, 1.5 and 2 metres (and 6 feet) from other people, with a very wide range of different interpretations about what this means in terms of activities, and a correspondingly wide range of rates of infection and death.

In all cases the pandemic has seen a major shift in activity and travel patterns, and it is yet to be seen whether this will continue, reverse or transform as the emergency precautions evolve into an as-yet undefined ‘new normal’. Working from home has been experienced by many. Anecdotal reports, together with our observations, indicate that, for some employers, they have seen big increases in productivity as a result, and some workers have enjoyed not having to spend time commuting. There has been a big increase in active transport such that some cities have closed some streets and widened others to provide more room for walking and cycling. On the other hand, public transport use has plummeted in many cities, with concerns about how to maintain patronage (let alone increase it) given physical distancing requirements. Some employers and Governments have even recommended driving in place of public transport. Populations are experiencing shopping locally (and increased online shopping), and are being encouraged to holiday in their own country or region rather than fly elsewhere. There have been very widespread comments about clean air and quietness, experienced in a way that has been unknown to many. There have been a range of temporary policy arrangements for Government funding support for displaced employment.

It is too early to tell how these experiences will play out post-pandemic, but we note that some aspects of them have given great support for rapid delivery of sustainable transport, notably in the allocation of space and funds for local movement on foot and by cycling, while other aspects, especially in the effect of social distancing on public transport, have presented great problems. Economic stimulus packages have been designed to assist the recovery of industry and employment, but some of these have been favoured major road-building and aviation projects and others have chosen explicitly sustainable and green projects. In this context, the issue is not of the effects of the virus on sustainability, but clarity that it is the policy responses to it that can help or hinder. Responses to the pandemic reflect the same two paradigms that have already been discussed about sustainability.

The long-term behavioural impacts, therefore, are not a question of just waiting to see, but of deciding what can be done. One entirely new feature in those decisions is the proof that travel patterns and transport provision can change very quickly indeed – in weeks and months rather than years and decades – which runs counter to a long prevailing wisdom that ‘you can’t change people’s habits’.

Given the ‘state of climate emergency’, we now need the actions that bring about the speed and amount of behaviour change necessary. This is the new territory (but perhaps less difficult to conceive since the pandemic experience). It will surely inevitably be more disruptive, with less time for adaptation. This implies an accelerated timetable and a greater intensity of regulation and control. That in turn requires the support and active engagement of large majorities of the population, so that social pressure, as well as legal enforcement, are consistent and powerful. In this context, there will be a role for more radical policies, and faster implementation, than would normally be adopted.

Priorities, Governance, Control, Coordination and Funding

The most pressing issue – climate and carbon emissions – is of primary importance and demands that we act much more quickly than has been the experience to date. The question that arises is: can we use the same policy levers as the slow and steady approach we have experienced in the past decades, but apply them faster and more intensively? The initiatives that have been advanced show that we know how to start (Hopkins 2020).

Strategic policy balance

Even in areas where public transport, walking and cycling have been improved, this has often been more than offset by much greater public spending on road improvements, bypasses and parking, thus increasing reliance on private cars instead of reducing it. Because cars are inefficient in their use of space, it requires much greater spending to provide for extra roads and parking for cars than by alternative methods. This results in the frequent pattern that ‘sustainable transport policies’, intended to cover a whole area, are funded with much smaller budgets than a single road project confined to one small area. There are often significant disparities between these transport policies by urban geography, creating cities of two dimensions, where town centres and inner suburbs have rich travel choices given the investment in non-car modes, but outer suburbs are dominated by investment in car travel.

The *central* policy problem is the dominant role of private car use. If we do not tackle that, all other solutions will be partial, temporary or self-defeating. Reduced car use, better provision for alternatives (Babb 2020, Eildér 2020, Kent 2020, Pettersson-Löfstedt 2020, Pojani et al. 2020, Peters and Bhusal 2020, Milakis et al. 2020, Brown and McLeod 2020) and more sensible pricing, taxation, regulation, development and planning, can give better, cleaner, fairer and more comfortable conditions for nearly everybody. But there is great resistance to implementing necessary policies, and a credibility gap about whether they can work. This resistance is partly from politicians fearful they will not be supported, exacerbated by public servants who fail to advise them of the alternatives. It is also partly because there are still illusions about the possible success of failed predict-and-provide policies, and partly from vested interests in continuing and expanding the market for cars. Equally important, there is resistance from millions of people who are locked in to depending on their cars, and see no viable alternative allowing them to carry on their daily life (Bertolini 2020). This is especially the case when

public transport services are limited, or expensive, or declining, or crowded, and facilities for walking and cycling are underfunded, often of poor quality or non-existent, and continually made unsafe by excessive traffic.

Demonstration projects can be an effective way to overcome this resistance (Firth 2020, Gysels 2020). The opportunity to experience change in a real place is a way to gain support by demonstrating possibilities of success. This approach will need new sources of funding, and a very substantial change in the balance of spending, and more importantly attention. This approach ideally leads to a careful and far-sighted implementation strategy that makes the necessary improvements at the same time as any restrictions, and gives people time to adjust their life styles and choices. The results would be a greatly improved quality of life, and more efficient use of economic resources. By giving better accessibility for those without cars, and liberating car owners from the pressures to use cars for every trip, conditions can be better for a smaller volume of essential traffic, and better alternatives available for car owners and non-owners alike.

Approach to governance

Coping with an environmental emergency will require modes of political discourse and cooperation that are different in character from the discourse of recent years (although the pandemic has demonstrated that this is possible). The climate emergency itself has to give the incentive for doing so, and will mean that other disputes will remain to be argued and resolved. It will require cooperation between political parties who still do not agree with each other on important ideological and structural questions. This needs a consensus political sign-up at national level and local level. ‘Firm’ leadership is necessary but not sufficient, and we are aware that it can be used as a slogan to cover the worst abuses. Emergencies – genuine ones – require a different style of consensus formation and action: faster, clearer, more definite and less compromising. Governments, national and local, and stakeholders will need to be solidly in support, broadly based, with the science and policy thinking decisively in favour.

We will need to conceive a different governance model. There is more than one pathway (Imran 2020). Several chapters in this *Handbook* have outlined ways in which the community can lead (Legacy 2020), often ahead of their government in bringing about change. There are accounts of how governments have acted as facilitators to enable others to work through solutions to great effect (Gysels 2020). Where this occurs, government has been an effective leader.

Principle of strategic consistency

The key to successful sustainable transport policies is that regulation, pricing, new investment, parking control, priorities in road design, and enforcement must all pull together *in the same direction*, consistently enabling a better life with less car use. In general this will nearly always mean that ‘carrots’ and ‘sticks’ have to be used in parallel. Where car use is reduced by, for example, parking restrictions or higher prices, it will be desirable also, and at least at the same time if not before, to improve the pleasantness and efficiency of alternative methods of transport. In some cases the link is direct: reallocation of road space for bus lanes works, but only if the number of buses is increased to offer a more frequent, faster, better designed bus service, and this will be much more effective where a good network of public transport provides coverage. In other cases the link is indirect: the revenue from road user taxation and charges may not always be hypothecated to spending on transport (there are many other important areas of social expenditure), but a large proportion should always be spent on improving transport mode

choice. Transport budgets are still usually very imbalanced, with far more allocated to road expansion of little long-term advantage, and far less on improvements to the ordinary daily public transport and cycling that can be part of daily life. All can be supported by what used to be called ‘soft’ transport improvements: information systems and more attractive design.

Strategic consistency requires ways of working such that agencies responsible for implementation of transport policies do so in an integrated way. Chapters in the *Handbook* all too often have highlighted the lack of integration between agencies. Several chapters show how new planning tools assert new ways of working collaboratively to enhance integrated thinking and planning processes (Jones 2020, Næss 2020, Mella Lira and Hickman 2020, Papa 2020, Silva 2020, Musselwhite 2020, Ka Ho and Loo 2020, Legacy 2020).

Public revenue

Fuel taxation has been an important element of public finance, providing funds both for (good and bad) spending on transport and also spending on many other areas of national and local government activity. But two policies have undermined this: fuel taxation has not been increased in line with inflation, thereby making car use cheaper and Government income less; and in order to encourage transition to electric vehicles, electricity as a fuel has deliberately been kept tax-free and therefore does not produce income to offset the declining revenue from petrol and diesel. The tax base for local authorities can be broadened by a wider range of local sources of income which can be used for transport improvements (Mulley and Yen 2020, Stone and Murphy 2020, Firth 2020).

One of the characteristic features of road traffic, developed in traffic science since the 1950s, is the speed-flow curve showing that more traffic causes slower speeds, this being more intense in conditions of high congestion. Drivers take decisions in response to the costs and times facing themselves, without consideration of the additional costs and delays each imposes on others. Therefore, a form of road user charging including the costs of congestion would improve economic efficiency and (subject to spending the revenues on appropriate policies) increase overall welfare. There has been a recurrent thread in policy discussion since the early 1960s. The London and Stockholm road pricing schemes demonstrate the technical feasibility of charging, and the potential for traffic benefits (Firth 2020). An important policy lesson from London is that the revenue was mostly applied to improving the quality of public transport services, necessary for public acceptability. An important lesson on implementation from Stockholm was that the scheme was initially implemented on an experimental basis for a limited period, so that the public decision on whether to make it permanent was made after real experience of its operation – and the benefits it brought – rather than abstract principles and promises in advance (Isaksson 2020). This is widely thought to be a good idea.

The traditional policy discussions on road pricing, seen mostly in terms of relief of congestion on the demand side, and often on raising funds for road schemes on the supply side, no longer correspond with the terms of transport policy generally. New principles should apply to road user charging – with the primary environmental imperative of carbon reduction, and also air quality, health, efficiency, sustainable planning, accessibility and equity. This will affect design, level of charges, etc. Charges will need to be related to kilometres driven, distinguished by vehicle type, energy source, size and weight, as well as location and time of day, and they will need to reinforce and be supported by consistent regulation covering each of these aspects. Attention should be paid to the sequence and timing of implementation, in order to build

support. When there is doubt about public support, experimental or trial systems should be used to give experience before relying on opinion polls.

Dissatisfaction with the tools of forecasting and appraisal

There is a widespread view that the analytical tools of transport science and economics are failing. This is either because of what they omit (Næss 2020), which, claim their custodians, should surely be solvable (albeit sometimes only by indefinitely long research programmes), or because of inbuilt cultural and behavioural assumptions (Delbosc 2020, Imran 2020) that tend to exclude key elements of the sustainable transport solutions (which naturally leads to a need for more fundamental reconstruction). New tools and techniques offer the means to overcome these problems and also improve decision processes (touched on above) – chapters in this *Handbook* discuss accessibility tools (Silva 2020, Papa 2020) and multi-criteria assessment (Mella Lira and Hickman 2020).

IMPLEMENTATION AND TIMING

All of the argument above is based on benefits that can realistically be provided by a careful, steady, long-term commitment to consistently changing the direction of past policy priorities. There is sufficient experience of the separate components of such a strategy to be confident that it will work. The problem now, however, is to carry out the same logic in a time scale which is compatible with climate objectives, as well as giving priority to people with the worst current accessibility opportunities. This means that from year one, every initiative must be tested for consistency with the long-term goals. It requires a coherent vision, and a consistency between separate initiatives, which has rarely been applied. Of course, there will still be a need to provide for correction and amendment as experience of the effects evolves. But the overall message is that consistently sustainable transport is an urgent short-term priority, not just a vague long-term vision.

REFERENCES

- Babb, C. (2020), 'What of a walkable urban future? Towards sustainable institutional design for walking', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Bertolini, L. (2020), 'Beyond the dilemma: questioning the links between human prosperity and mobility growth', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Biermann, S. and K. Martinus (2020), 'Reducing the need to travel: the challenge of employment self-containment', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Brown, M. and S. McLeod (2020), 'The sustainability of last-mile freight in cities', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Chorus, P. (2020), 'Making places with transit-oriented development: the case of North Holland', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Clements, R. (2020), 'Parking: An opportunity to deliver sustainable transport', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Davis, A. (2020), 'Transport and health: A personal and UK perspective', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.

- Delbosc, A. (2020), 'Experts and bias: the impact on sustainable transport', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Department for Transport (1989a), *National Road Traffic Forecasts (Great Britain) 1989*, London: HMSO.
- Department for Transport (1989b), *Roads for Prosperity*, Cmnd 693, London: HMSO.
- Department of the Environment, Transport and the Regions (1998), *New Deal for Transport: Better for Everyone*, Cm 3950, London: TSO.
- Docherty, I. (2020), 'The transition to automated mobility: how well do connected and autonomous vehicles really fit into a sustainable transport future?' in C. Curtis (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Eldér, E. (2020), 'To travel, or not to travel? Telecommuting, teleshopping, and avoiding the need to travel', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Firth, D. (2020), 'Congestion charging/mobility pricing', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Freeman, C. (2020), 'Children and sustainable transport', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Glover, L. and N. Low (2020), 'Unsustainable transport', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Goodwin P., S. Hallett, F. Kenny and G. Stokes (1991), *Transport: The New Realism*, Oxford: Transport Studies Unit, University of Oxford.
- Gysels, D. (2020), 'The Ghent Living Streets: experiencing a sustainable and social future', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Handy, S. (2020), 'Why sustainable transport cannot ignore land use', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Hopkins, D. (2020), 'Low carbon mobility transitions', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Imran, M. (2020), 'Institutional path dependence', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Isaksson, K. (2020), 'Politics of paradigm shift: a story from Stockholm', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Jones, P.M. (2020), 'Rethinking the urban arterial: from car mobility to urban liveability', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Ka Ho, T. and B.P.Y. Loo (2020), 'Generational change and travel', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Kent, J.K. (2020), 'The role of car sharing in sustainable transport systems', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Krizek, K.J. and D.A. King (2020), 'Making space for bicycling', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Larsson, A. (2020), 'Integrating land use and transport: understanding the dynamics of proximity', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Legacy, C. (2020), 'Educators as advocates in transport politics', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Mella Lira B. and R. Hickman (2020), 'A multi-actor multi-criteria exercise in transport planning: the case of the Nueva Alameda Providencia project', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Milakis, D., L. Gebhardt, D. Ehebrecth and B. Lenz (2020), 'Is micro-mobility sustainable? An overview of implications for accessibility, air pollution, safety, physical activity and subjective wellbeing', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Mulley, C. and B.T.H. Yen (2020), 'Financing public transport through land use and value capture', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Musselwhite, C. (2020), 'Keeping older people mobile through a new philosophy for a new ageing population', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Næss, P. (2020), 'CBA legitimizes unsustainable transportation outcomes', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Owens S (1995), 'From "predict and provide" to "predict and prevent"? Pricing and planning in transport policy', *Transport Policy*, 2 (1) 43–9.
- Papa, E. (2020), 'Using accessibility metrics and tools to deliver sustainable mobility', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Peters, D. and S. Bhusal (2020), 'Paratransit', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.

- Pettersson-Löfstedt, F. (2020), 'On-demand public transport – the future of public transport or the emperor's new clothes?' in C. Curtis (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Pojani, D., J. Chen, I. Mateo-Babiano, R. Bean and J. Corcoran (2020), 'Docked and dockless public bike-sharing schemes: Research, practice, and discourse', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Renne, J.L. (2020), 'Transit oriented development and sustainable transportation', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Rye, T. (2020), 'Paradigm shift?' in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Scheurer, J. (2020), 'Public transport network planning', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Silva, C. (2020), 'Accessibility at the local scale: how its constrains our ability to "live locally"', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Stone, J. and J.C. Murphy (2020), 'Financing the expansion of mass transit services', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Svensson, H. (2020), 'Universal design – universal access: Sweden as leaders in the built environment and transport', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- te Brömmelstroet, M., W. Boterman and G. Kuipers (2020), 'How culture shapes – and is shaped by – mobility: cycling transitions in The Netherlands', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Thomas, R. (2020), 'Social equity and disadvantage', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.
- Whitelegg, J. (2020), 'Economic inefficiency of the car-based paradigm', in C. Curtis, (ed.), *Handbook of Sustainable Transport*, Cheltenham UK and Northampton MA, USA: Edward Elgar Publishing.