An anthropologist among the transport specialists

Social science insights on the political-economy barriers to the implementation of low-carbon transport in urban South Asia and Africa

Edward Simpson

Contents

Acknowledgements

Matteo Rizzo drafted Section 3 on BRT. His path through the literature is strongly informed by his own primary research on the subject. Serene Duff drafted the text that forms Appendix 1: Global Overview from a mass of unwieldy literature and ideas. I am grateful to Srinivas Chokkakula for guidance and Zoe Goodman and Niamh Collard for assistance. Comments from John Hine, Bernard Obika, Andrew Newsham, Stephen Newport and Bruce Thompson and discussion with Liz Jones and Mark Harvey improved the text. Colin Gourley strongly encouraged the project and the engagement of anthropologists with those in the transport sector. Each of the main five sections of the document could have been a standalone book-length project. Given limitations of time and space, omissions not already picked-up by generous peer reviewers are my responsibility.

Edward Simpson, London, March 2018.

This material has been funded by UK aid from the UK government; however, the views expressed do not necessarily reflect the UK government's official policies.

Preface

This document is an experiment in clashing disciplines together and seeing if anything useful survives. This is not the same as working in an inter-disciplinary manner, although that is a key recommendation, but rather using the tools and assumptions of one discipline to offer empathetic critique of those in another.

> … one could see place-based approaches as Copernican-welfarist (Copernican in their inductive nature, based on observation; welfarist in their implicit assumptions to 'know' how a better place looks like); and the global models as Promethean-liberal (Promethean in their understanding that technology can solve the climate change problem; and liberal in relying on revealed preference approach) (Creutzig 2016: 354-355).[1]

This complex provocation from one of the leading voices on low-carbon transport thinking allows us to clarify the starting point of this report and to point to current short-comings in the literature. This document is an outsider's reaction to literature produced by transport specialists. Anthropologists traditionally studied the exotic, rendering 'foreign' knowledge comprehensible. The exotic in this document is select literature on transport, primarily literatures where strategic transport thinking and planning acknowledges that people are subject to and use the end products of such plans. The purpose is to point to some, and only some, of the assumptions on which this literature rests.

The approach is firmly 'place-based' and sees opportunity in exploring 'local knowledge', not to only to understand what a better place might look like, but also to understand barriers to change. Social science literature contains little evidence that the technology producers (read car manufacturers and enormous complex of allied productive agents) who have promoted auto-mobility are also likely to be key to the reduction of carbon emissions or more sustainable patterns of mobility, as they themselves now proclaim.

Searches of the literature revealed no clear picture of what current projections of increased private vehicle ownership will do

[1] Creutzig, F. 2015. Evolving Narratives of Low-Carbon Futures in Transportation. *Transport Reviews*, 36(3): 341-360.

to carbon emissions or levels of congestion; neither is there a clear picture of the consequences of plugging in millions of new electric cars into national grids nor for what such a new mobility regime will do for tax generation or, significantly, for carbon emissions. This is a moment of uncertainty for global transport – and arguably thus opportunity.

Finally, although Creutizig's division of the literature into these approaches conveniently illustrates some of the existing chasms across the literature it also seems to gloss all disciplines as branches of economics. Such bias - whether from economics or engineering, the disciplines leading the debate – tends to lead to the dismissal of the contribution that social science can make to complex urban transport decision making.

Policy recommendations and questions

Premise: In the same period that climate change has emerged as a cause for concerted global policy action, the intensity of mobility and the number of vehicles on the world's roads has increased dramatically. It took a century to get the first billion vehicles on the road, the second billion will take a decade. Low carbon and infrastructure policy (often branded as co- or mutual-benefit) may serve the needs of local carbon and sustainable development goals; however, increased mobility, and the concomitant claims for economic growth, continue to be the taken-for-granted aims of such activity. Given the current technology available, this approach can only lead to ever-greater emissions from the transport and allied sectors. These sectors are motivated to increase mobility, decrease journey time, and ease congestion. Such goals without end in a finite world. The premises of these motivations need to be questioned as climate change and the conditions of the global transport scenario continue to diverge in fundamentally unsustainable ways.

This document makes a small step to influence the environment in which future transport thinking might take place. Social science methodologies, and those from social anthropology in particular, are used to challenge some of the underlying assumptions in the current literature as well as to show that there is more to be done to understand context, people and the factors behind the adoption or abandonment of urban transport schemes. In transport thinking, some ideas are fetishized and unquestioned. Social science can help denaturalise the mystification of mobility, just as engineers and economists can guide social scientists to refine and redirect their questions.

Inter-disciplinarity has long been recognised as important. In transport thinking, however, the potential co-benefits of inter-disciplinary research have not always been integrated into core aims and objectives. Transport needs more and better inter-disciplinary work and to acknowledge that transport is connected to other development and cultural domains.

Recommendations and observations are divided into three convergent points of intervention: 'out there in the world', 'in there among the transport professionals' and 'knowledge politics'.

'Out there in the world'

Climate and transport policy have converged over the last three decades but there remains a chasm in popular thought and action on the ground between climate concern and the actual aspirations people have for themselves and their families.

Anthropological and other types of social science research can be productively integrated into transport thinking to understand different contexts, aspirations, knowledge practices and motivations of people 'out there in the world'. Such 'soft' factors are perhaps the key to engineering a low carbon and mobility future in which the premises of ever-increasing mobility are questioned as the central component of national and international development paradigms.

Social science research consistently shows that the presentation of 'science' and 'facts' do not change people's minds about climate change or their transport aspirations. Ideas about progress and development are not natural facts but political and cultural ideas about the world. These are also questions of emotion and subjectivity – and when understood as such become a creative resource for policy makers to work with:

- Understand cultural conditions that influence attitudes and capacities towards low carbon transport and ideas of development are key to working across boundaries and to building a truly global agenda for transport thinking.
- Engage with the aspirations and cultural conditions of people through opinion formers and networks of influence.

'In there among the transport professionals'

In a professional community, the norms of knowledge and practice typically develop in silos. It is hard to look outside disciplinary comfort zones and ideas from other domains can appear awkward. However,

Recommendations:

- Social science knowledge can be communicated to encourage transport professionals to think positively about the insights derived from qualitative research.
- Reflexive social science techniques can make professionals aware of the assumptions that underpin and drive their own policy and practice.
- Build skills and capacity in inter-disciplinary and cross-disciplinary thinking (to erode the unhelpful division between 'hard' and 'soft' solutions)
- Integrate social science perspectives within transport programmes from inception rather than as afterthoughts or 'add ons'
- Promote and advocate frameworks for thinking through social science questions in infrastructural programmes.
- Develop toolkits and resources for mutual learning and support between social scientists and the transport community.

Knowledge politics

The premise of this project has been to look at the politics of big knowledge in transport thinking. Where does knowledge about automobility, bus corridors or the mass displacement of people come from? Who produces this knowledge? What knowledge sticks and why? How can we learn to work against the grain of received wisdoms?

The original brief was to look at the political economy barriers to the implementation of low carbon transport. Given the chasm between climate change urgency and on-the-ground thinking about transport, the single largest barrier appears to be the political economy of knowledge production itself.

Future questions might include: The world has changed since the foundational ideas on the relationship between infrastructure and economic growth were established. Do these old ideas still stand in the new world where there are other costs that cannot be ignored?

Is mobility a right? What might 'global mobility justice' look like?

Summary

Social science knowledge can be communicated to encourage transport professionals to think positively about the insights derived from qualitative research. Social science asks different kinds of questions and makes different types of connections in the field to those conventionally asked by engineers. Reflexive social science techniques can make professionals aware of the assumptions that underpin and drive their policy and practice.

Understanding national cultural conditions that influence attitudes and capacities towards low carbon transport and ideas of development are key to working across boundaries and to building a truly global agenda for transport thinking. Social science methodologies are well suited to developing such understandings.

Section 1

Addresses some of the underlying assumptions of the *Global Mobility Report* (2017) to ask why the need for mobility itself is not questioned.

New conditions of infrastructure demand call for revisiting old and unsatisfactorily answered questions such as: what is the relationship between infrastructure development and economic growth in urban areas? Is there any longer a demonstrable causal connection?

Coalitions of organisations working with a global vision should dedicate resources to exploring the best methods for making agendas more inclusive, especially in the countries of Africa and South Asia. Such relationships may involve studied compromise rather than the universal acceptance of a low carbon agenda.

Much research on low carbon transport seeks solutions in institutional reform. While important, demand-side aspirations and cultural expectations are also key. These are linked to broader cultural ideas about aspiration, progress and development. Once understood as such these can be treated as a resource to be worked with and influenced rather than as a barrier to change.

Section 2

Addresses the human factors associated with settlement and displacement caused by the development of urban transport infrastructures.

Recent literature suggests that resettlement is always painful no matter how it is handled. Best practice suggests that resettlement should be central rather than secondary to new urban transport infrastructures, the language of resettlement should be positive and the timeframe and incentives for such projects should be projected into the future.

Restructuring urban transport typically treats resettlement as a secondary rather than as a primary activity. Prioritise resettlement and treat it as a contribution to lowering carbon emissions from transport by creating local opportunities and efficient transport links for new settlements – rather than it adding to commuting times and distances.

Take a long-term approach to resettlement, distributing resources accordingly, as a way of smoothing disruption, minimising shock and trauma, and creating possibilities for optimism.

Section 3

Addresses the political economy of BRT knowledge and assumptions in a range of urban settings. The material addresses the question of what happens when knowledge is so well promoted and organised that it too becomes a barrier to sensible and clear decision making.

BRTs are presented as a 'win-win' public transport interventions, with benefits for the economy, the poor and the environment (through low carbon transport technology). However, the vast majority of existing literature is funded by actors with economic interests in BRT.

Independent research suggests – and there is need for more – that the implementation of BRTs benefits some actors and makes others worse off.

Such actors (who might include pre-existing transport operators, both bus owners and workers or local authorities) do not resist BRT due to lack of information (as is often suggested). Instead, they resist the negative impacts of BRT on their livelihoods and immediate environments.

Section 4

Addresses the symbolic and extra-material qualities of infrastructure to suggest that transport technologies themselves can carry behavioural-changing messages.

Infrastructure is an object and infrastructure is also a set of social and behavioural patterns. Quite a lot is known about both qualities but much less is understood about the relationship between the two. This is perhaps the key contribution that anthropologists working with engineers and planners could make to the field. This is the field in which both the success and failure of low carbon transport initiatives is to be best understood.

When we say that transport infrastructure contains within itself powerful messages, we are not saying that adverts can be put on the side of buses. We are pointing to the invisible and unspoken powers of infrastructures to fashion subjectivities and to engage with the world in very particular ways, ways that are open to change.

Section 5

Addresses some of the ways in which social scientists have addressed the lack of action on climate change and have written about the fetish of automobility, i.e. why having a car and being auto-mobile has taken such a central place in thinking about rights and prosperity in most parts of the world.

There is a great deal of international/science thinking on climate change, less social science thinking on the subject and much less policy thinking at the local/national level. This leads to climate change not being centrally incorporated into municipal/national transport agendas.

Social science research consistently shows that the presentation of 'science' and 'facts' do not change people's minds about climate change. These are 'beliefs' tied to political and cultural ideas about the world. These are questions of emotion and subjectivity – and when understood as such become a creative resource for policy makers to work with.

Cars carry with them all manner of extra meanings to do with status, individuality, power and so forth. These associations are far from 'natural' they have been made by advertising and related systems of production.

The fetish and political leverage of automobility are reasons for the absence of concern about climate change in the everyday world of transport decision-making. Social science research can help denaturalise the mystification of mobility.

Glossary of terms and acronyms

ADB- Asian Development Bank

ASTUD- Asian Sustainable Transport and Urban Development Program

BRT- Bus Rapid Transit

CBDR- Common but differentiated responsibilities

CCP- Cities for Climate Protection

CDM- Clean Development Mechanism

CERs- Certified emission reductions

CNG- Compressed natural gas

COP- Conference of Parties

COP-3- Third Conference of Parties to the UNFCC in Kyoto, 1997

CTFR- Clean Technology Fund, administered by the World Bank

DA- Democratic Alliance, South Africa

DART- Dar Rapid Transit Agency, BRT serving Dar es Salaam, Tanzania

DDPP-T- Deep Decarbonization Pathways Project for Transport

EEA- European Environmental Agency

ET- Emission trading

EVs- Electric vehicles

FCCC1992- United Nations Framework Convention on Climate Change, adopted in 1992

GCF- Green Climate Fund, established by the UNFCCC

GEEREF- Global Energy Efficiency and Renewable Energy Fund, administered by the EU

GEF- Global Environment Facility, administered by the World Bank

GHG- Greenhouse gases

IAM- Integrated assessment models

ICLEI- International Council for Local Environmental Initiatives

IDDRI- Institute for Sustainable Development and International Relations

IEA- International Energy Agency

IFMO- Institute for Mobility Research, funded by BMW

IPCC- Intergovernmental Panel on Climate Change

IPCC 2001- IPCC third assessment, 2001

ITF- International Transport Foundation

JF- Joint fulfilment

JI- Joint implementation

LAMATA- Lagos Metropolitan Area Transport Authority

LDCs- Least developed countries

NHAI- National Highways Authority of India

NMT- Non-motorised transport

NURTW- National Union of Road Transport Workers, Nigeria

ODI- Overseas Development Institute

OP11- Operational Programme #11, a programme focussed on transportation within the GEF

PPMC- Paris Process on Mobility and Climate

PRD- Party of the Democratic Revolution, Mexico

SBTi- Science-Based Targets Initiative

SDGs- Sustainable development goals0

SIDs- Small island developing states

SLoCaT- Partnership on Sustainable, Low Carbon Transport

SREP- Scaling up Renewable Energy Program, administered by the World Bank

TDM- Transport demand management

TransMilenio- BRT system that serves Bogotá, the capital of Colombia

UNCED- United Nations Conference on Environment and Development in Rio de Janeiro, 1992

UNDP- United Nations Development Programme

UNEP- United Nations Environment Programme

UNFCCC- United Nations Framework Convention on Climate Change

UTS- Urban Transport Strategies, a World Bank initiative

WMO- World Meteorological Organization

WRI- World Resource Institute

National Highway 8, India

Dismantled BRT Delhi

Source Swamy n.d.,
Narendra Modi visiting Janmarg, the flagship project of his administration as Chief Minister of Gujarat and arguably instrumental to his ascent into national politics.

Source Akintunde Akinleye and Marloes Janson,

Mountain of Fire and Miracles Ministries (MFM)

prayer camp as a form of “drive-in” religion

Advert for Renault Kwid, available for £3000, or £25 a week.

Introduction

There is an extensive and specialist literature on why low carbon transport projects can be difficult to develop, implement and sustain. The three phases – development, implementation and maintenance – throw up barriers of different types, and might be usefully separated to refine analytical precision, although these distinctions are generally not made in the literature.

Much of the literature is written by transport professionals, whose technical and institutional knowledge and experience leads them to reproduce – even in the form of critical engagement – the conventions and history of their disciplinary and professional practice. This report makes extensive reference to the existing body of literature, not simply to summarise previous findings, but rather to identify areas where the conceptual tools and analytical methods from social science might productively aide thinking about future-oriented action relating to global transport.

Urban contexts bring high-population density and high rates of mobility together. Currently, such a coincidence dramatically highlights congestion and pollution as two obvious outcomes, i.e. problems. These 'problems' affect the large numbers of people in urban spaces. Policy and practical innovation, when applied to such contexts, therefore has potential to benefit many people simultaneously. Less obvious in this decision-making landscape, however, is climate change (as distinct from 'pollution' which is broadly recognised as a 'problem'). The scale and invisibility of climate change remains, for many people, either distant or too large to be incorporated into their daily concerns.

The relationship between transport and urban morphology has been a recurrent theme in the literature historically. Concepts such as density, diversity and design (DDD, as in Cervero and Kockelman 1997) and the comparative typology of cities developed by Thompson in the 1970s (full motorisation to traffic limitation) are two of the conceptual contributions best symbolising these lines of enquiry. Both approaches underpin subsequent thinking about the relationship between transport and urban and suburban land use. Cities have also been characterised by the dominant mode of transport and the different roles cities can play in varied national transport contexts (foci, hubs, transit metropolises, Cerero 1998).

2002 saw the publication of *Cities on the Move*, a World Bank Urban Transport Strategy Review and a major intervention in the field (Gwilliam 2002). The report moved discussion away from earlier interests of the World Bank in economic and financial viability (1986), the

integration of sustainable transport (1996) and the 'liveability' and competitiveness of cities (2000) towards a strong focus on poverty and poverty reduction in relation to urban transport policy. The report outlined a broad understanding of the urban transport problems in developing and transitional economies and outlines possible strategy for local governments to work on multiple fronts to improve urban transport.

Importantly, the research developed a theoretical overview of the urban scene, looking at global trends of urbanisation and city growth. The case studies were strongly rooted in global data. Overall, *Cities on the Move* drew a picture in which increased wealth tended to mean the reduction of the quality of travel, particularly (but not only) for the poor; that urban growth, often oriented towards the accommodation of the car, led to greater travel costs and travel distances which in turn contributed to congestion and pollution. Significantly, motorisation tended to decrease the quality of public transport, while forcing the poor to cheaper land, both trends exacerbating poverty in a broad sense. This raises the interesting question: can this phase be skipped/planned away? Or, does the car have to take over urban space in order to be latter expelled?

The report's recommendations focused on urban planning, targeting the disadvantaged, encouragement for both public and private forms of transport, non-motorized transport and mass transit, and institution building. Some of the case studies (TransMilenio in Bogotá, for example) discussed in the report played a key role in developing best practice elsewhere; others, notably bicycle schemes in Latin America and Africa have all but disappeared, while rates of bicycle ownership in Asia and Africa continue to fall. What was then called 'Global Warming' did not play a significant role in orienting the report, nor in its recommendations. Global Warming was treated in a similar way to urban air pollution.

Since then, however, the world has grown wealthier, more populous, patterns of inequality have shifted, rates of car ownership (then central to Gwilliam's understanding of morphological and density trends in urban areas) have expanded dramatically – changing the rules of the game in many urban areas. The projections of growth and technology used in 2002 now seem naïve as rates of vehicle growth, road building, mass transit schemes, BRT implementation, and the role of technology in changing urban transport markets and provision (Uber and other service sharing apps for example) has changed the face of transport thinking and what it means to be mobile. In most urban areas of South Asia and Africa congestion and pollution are now greater problems than they were then.

In more recent times, scholars have turned to examine social and economic indicators, such as transport cost, fuel prices, regulatory regimes and income levels. Building on this work, Starkey and Hine's (2014) review of the literature on poverty and sustainable transport updates and condenses many of the key ideas in transport thinking in the subsequent decades. This wide-ranging survey of the literature points to the key problem of 'congestion' for urban transport engineering. What can be done about congestion? New roads, mass transit solutions, the promotion of public and non-motorised transport, traffic management, road pricing, and combining the means and aims of transport and land-use planning (2014: 36).

These practical ideas are now well known and we do not repeat them in the main body of the report; instead, we turn to focus on communication and knowledge practices in relation to urban transport, on which the success or failure of these practical solutions may actually hinge. Engineers do not doubt that suitable technologies are readily available for more efficient and cleaner transport – there are however numerous barriers which prevent the implementation of such technology – and even for such technologies appearing as plausible options.

More recently still, there has been new focus on behaviour and attitudes. In the transport literature, these are often described as 'soft' and 'subjective' characteristics as opposed to 'hard' or 'objective' measurements. In part, this can be explained by the slow spread of the 'sustainability agenda' from science to social science. However, there is still work to be done in embedding multi-methods and 'softer' approaches within transport research culture.

The persistent tendency is to see qualitative data as fanciful and quantitative data as real. Such a self-serving hierarchy of knowledge diminishes the potential for creative and productive complementarity of methodologies and worldviews. Those who believe in a quantifiable or even objective world might also be persuaded that subjective views have objective implications - even if they are less willing to believe that their view of the world – that it can be understood quantifiably - is in fact a subjective and enchanted mystification of reality.

In this report, it is taken for granted that personal transport preferences and decision-making are parts of broader cultural systems and do not exist in isolation as a straight-forward form of rational choice. This is a conventional starting point in many branches of social science. It is not however the starting point in much transport literature. For social sciences, and anthropology in particular, cultural and social norms and political

representation may influence all manner of reasoning about travel that are on the surface unrelated by 'rational choice'. When these values and norms are understood in a broad sense and amalgamated only then can we understand mobility systems in any given urban context (we elaborate this conceptual view in Section 1 and elsewhere). So too are these observations true of views on climate change, mobility rights and relation between economic growth and human progress: from an anthropological point of view, these are not universal or common-sense values but always have some local inflection to a greater or lesser degree.

'Holistic' approaches towards urban mobility cultures (Götz and Deffner 2009) have attempted to bring together hard and soft ways of looking at the world. Recent studies, such as that under-taken by the BMW-funded think tank IFMO (2013), further develop the concept of 'mobility culture' as something that has to be understood if transport planning is to be effective. Elsewhere, for the last decade the idea of a 'mobility turn' has increasingly animated the social science discussion (see Urry 2007). Urry and other have argued that social science was too attached to particular places, and as people began to increasingly move so too should the approach and methods of the social scientist.

This report brings some of the allied conceptual tools of social science and the mobility turn in particular into conversation with issues in transport thinking.

In the last two decades, climate change mitigation efforts have moved from the realm of international governance regimes to city-level. This is a result of multiple factors, but those of particular relevance for the governance of low carbon transport include:

(a) the slow pace of international climate change negotiations;

(b) ineffectual treaties that have not generated expected or required results;

(c) the general political impetus and conscious policy moves towards decentralisation and city-centred regional development; and

(d) the unmistakable signs of deep environmental crises at city level: noise, toxic and particulate pollution, waste management failings, building safety concerns and congestion.

These themes are fleshed out in Appendix 1, which traces the recent history of transport within the context of international climate governance. This narrative sets the scene for the development of the policy landscape and general low carbon

zeitgeist which allowed the collaborators behind the *Global Mobility Report* (2017) to come together.

The literature on low carbon transport shows the co-evolution of scientific knowledge and social institutions over the same period. At the end of the last century, the literature was dominated by models based on the idea of 'integrated transport', informed by the economic analysis of a distinct transport sector, artificially separated from planning, power, governance and general tax regimes. This research effort often used global/universal data to generate recommendations with a narrow focus on alternative fuels, innovative vehicle technologies and projected efficiency and emission savings. This body of work was largely produced by international climate change institutions (notably, IPCC and IEA) based in developed countries – who, at the time, were the primary arbiters of concern over climate change.

After 2000, the move to decentralise and liberalise governance began to gain momentum and the World Bank took charge of major climate change funds. The literature moved from a focus on fuel and vehicle technologies to 'demand management' '(avoid)' and 'mode shift'. A growing number of papers during this period were produced by planners and behavioural scholars (again details of the high-level narrative culled from the literature can be seen in Appendix 1).

In other words, however, there was a discernible change in the politics and language of knowledge production. This can, in part, be attributed to the evolution and maturation of the climate change debate: the content of specialist scientific knowledge has gradually been understood as a social problem and has slowly entered into the domains of other disciplines and sectors. This trend has been accompanied by the realisation – often compounded by on-the-ground experience - that there are significant costs, alongside technical and, significantly, 'human' and 'knowledge' barriers to the implementation of low carbon transport solutions in the urban areas of South Asia and Africa.

This report draws on our strengths as a research team to focus on the 'human' and the 'knowledge' aspects of these equations, suggesting that it might be an opportune moment in the history of these debates to increase the social science resolution once more – not only as a way of introducing further 'soft' variables to our analysis, but as a way for governments and policy makers to develop a more self-reflexive understanding of their own assumptions as they seek to enter global coalitions to influence and shape the

transport debate within the umbrella of the climate debate.

In reality, the combination of these trends poses significant challenges for the traditional research community: the shift of policy initiative to the local level poses major methodological and epistemological questions for conventional transport research paradigms. Significantly, many of the key factors crucial for decision making at the local level are extremely difficult to quantify and are often not 'scalable', such as culture, politics and activities in the 'para' and informal sectors. Therefore, what we might think of as 'context' emerges as the key to problem solving, rather than readymade universal solutions, such as fuel type, vehicle technology or out-of-the-box transport solutions such as BRT.

Those typically conducting, analysing and implementing transport research and practice tend to be from engineering and scientific backgrounds. Over the years, they have formed strong communities of practice that have developed traditions, histories and networks of their own. As a consequence, knowledge and the ability to handle and understand qualitative data is lacking. There is a scepticism towards qualitative data, largely, we hypothesise, because of a lack of training and unfamiliarity with qualitative techniques – not because qualitative data is empirically unsuited for addressing such problems.

The distinction and separation of qualitative and quantitative research methodologies is part of a set of older tensions about knowledge and knowing. The result is often that one set of research practitioners mistrust the methodologies of others. Questions of knowledge politics are at stake here – but so too are matters of education and familiarity. This report is written in that spirit – written by social scientists, explaining to transport engineers and planners what it is that we do and why this might be useful in understanding barriers to the implementation of low carbon transport technologies. Real engineers and planners exist in our own empirical research worlds, but here we have taken the literature to be representative of how knowledge is constructed in these worlds – with some recognition, although not perhaps enough, of differences in approach between these types of practitioners to both problems and solutions.

There are of course behavioural economists and social scientists attempting to incorporate 'social' factors into climate change modelling and future transport planning, notably those who take a 'multi-level perspective' on 'socio-technical transition'

(see Whitmarsh 2012 for review). However, on the whole, they tend to direct their research effort to transport-oriented problems. Therefore, they may miss other important variables that a broader approach would allow to remain in focus, such as politics, culture and broader webs of aspiration and decision making. Some literature successfully bridges disciplines and approaches, such a Creutzig (2015), Hughes (2017) and Naess at al (2015). However, when we compare these three combined approaches we see that the various starting points are so different that a further comparison of combined approaches runs into conceptual difficulties.

In another register, scholars have produced a significant body of research on BRT; however, due to the relegation of 'social science questions' in favour of 'transport questions' and, often even more specifically, 'industry questions', this literature primarily addresses the importance of the technology or the role of cities as lead players, with little deeper reflection about legitimacy, functionality and actual impact of such transport regimes on people who consume and produce mobility in the cities of South Asia and Africa. The literature develops a vocabulary and framing of its own, becoming increasingly parochial while being increasingly universal in its application. We address the production of knowledge in relation to BRT in Section 3 and touch on it again in Section 4.

From a social science perspective, successful planning for urban transport requires both a knowledge of the environment in which planning is taking place and an understanding of the expectations and aspirations of those being planned for. Planning too is a form of culture and has distinct organisational practices, histories and influences in different parts of the world. When planning is viewed as a technical process rather than a social or cultural one opportunities are lost to affect behaviour and attitudinal change. At other times, arguably as with BRT, technology itself becomes the 'solution' and people necessarily become the 'problem' or the 'barrier'.

Significantly, there is a complete absence from the sustainable transport literature of the type of self-reflexive research that has dominated the academic fields of sociology, geography and social anthropology for the last three decades. Through research practice, the researcher is able to ask questions about the values, methods and aims of researchers themselves and their own knowledge practices. Self-reflexive research sheds light on the cultural and planning assumptions of researchers and institutions that employ them, that could be used to great effect in

the formation of a global sustainable transport planning agenda, when the agenda requires working across different cultures of government, expectation and aspiration.

In this report, some of the techniques and possible insights of a reflexive social science approach are brought to bear on: the *Global Mobility Report* (2017) (Section 1), urban displacement (Section 2), BRT schemes (Section 3), the hidden or ideological messages that can be conveyed with transport infrastructure (Section 4), and 'automobility' (Section 5). Given the scale and limited time-frame of this project, the findings represented here are suggestive rather than exhaustive – but hopefully pave the way for asking broader questions and contribute to a better integration between social science and key research on sustainable urban transport solutions. As mentioned above, Appendix 1 provides the high-level context in which current debates and concerns can be meaningfully traced to the present.

Conversely, it must also be added that although transport planners might ignore or dismiss qualitative social science, this review has demonstrated to us a significant lag between the emergence of ideas on the international stage and the scholarly treatment of such issues by peer reviewed social science of international standing. Only now, for example, are social scientists beginning to focus on whether climate change is happening or not, to critically address new forms of knowledge politics and claim-making in relation to climate, and the significance of thinking in terms of 'North and South' at the expense of 'urban v rural' – these debates perhaps seem quite old hat for 'the transport guys' and have been on the international policy agenda for two decades or more.

For many disciplines, it is the case that local matters are considered too trivial for scholarly effort. For example, research on international law has expanded while research on local government and decentralisation has contracted. Local issues are not as visible as national or international issues to most theorists, and often require time-consuming and expensive field research, which is itself often under-valued. Also, case studies are not easily scalable to general theories. Therefore, overall, as the power is pushed into the mega and secondary cities of South Asia and Africa there is little critical research being undertaken on how to make this power count in relation to SGDs or broader humanitarian values which can be instilled through thinking about transport in new ways.

The lack of data is often presented as the primary barrier to the implementation of a

low carbon transport agenda. Governments are not resourced to provide performance indicators and targets against which action can be calibrated. This lack takes place in an already-difficult field, where calculating the GHG emissions from transport, for example, is subject to considerable disagreement. Recent decades have demonstrated that targets are difficult to establish and, furthermore, it is harder still to find equitable and universally acceptable methods to work towards such targets. There are similar difficulties in quantifying the impact of 'co-benefits' that can be realised through transport interventions, which may considerably enhance the cost effectiveness of activities in the sector if ways are found to mainstream low carbon transport targets in other related spheres of urban governance.

In sum, major political economy barriers to the implementation of low carbon transport emerging from the literature are many and varied:

Political factors include, low levels of government and political commitment to implement measures to reduce the expansion of private car ownership; the unwillingness to scale-up or develop replicable sustainable projects; reluctance to reduce or regulate informal transport services provision because of its flexibility, employment creation and use-value to the poor (and conversely the demonstrably negative effects which typically come with trying to regulate these spheres); the influence of vested commercial interests promoting unsustainable transport solutions (for example, vehicle manufacturers, cartels of various kinds, transport providers, developers and land-use planning authorities). It is also the case that substantial infrastructure projects are risky political investments for politicians and civil servants because they may take longer than an election cycle, and in many cases far more than one. The long-term planning required is difficult to square with the shorter term political needs of an enthused electorate.

Economic and financial barriers include the brute fact that in most countries subsidies, pricing and planning systems generally continue to be oriented towards car ownership – even after three decades of international concern about the relationship between transport and climate change. Typically, cost-benefit analysis or general project management thinking does not address or account for associated negative externalities. Budgets might be stretched, reliable public funds limited, and borrowing rates prohibitive so that other more immediate human development interests may take priority, to the detriment of transport planning and environmental conditions.

Institutional factors include the difficulty of integrated action and communication across regulatory, planning and fiscal bodies: transport use is intimately,

although seldom explicitly, connected with policies in other sectors where other priorities may take precedence; for all sectors, and at all levels of governance, working across agencies within cities and within development contexts is notoriously difficult. Local authorities may have limited influence within private or informal sectors; legal frameworks may be insufficient or obsolete; local institutions may have experienced different rates of reform and have incompatible working procedures and aims.

Two key issues stand out from the World Bank's long experience in low carbon transport (Gwilliam 2013):

- The struggle local governments have had to incorporate 'paratransit' companies within public transport services. It is important for cities to incorporate the informal sector to improve its capacity to provide service and reduce resistance; however, in the real world, municipal governments often lack the resources and capacity to handle 'paratransit' companies.
- There is a strong perception that public transport is for lower classes, and the private car is valued as a status symbol and a development right; individual choice is therefore often extremely limited in urban transport contexts given the absence and costs of transport alternatives.

There is also a lack of skills or capacity to develop and implement appropriate technologies and methods in a wide variety of fields such as integrated transport planning; vehicle, fuel and infrastructure standards; assessment, evaluation and accounting of transport impacts.

In many settings, the market for low-carbon alternatives is not fully developed. For example, although it may be possible to import a low-carbon vehicle technology, there is no infrastructure or local industry that enables its maintenance. Monopolies in the supply of specific low-carbon fuels, make their use an ineffective cost option and serve as a deterrent for a broader uptake. In addition, in new markets, the business case for a specific low-carbon alternative may not have been explored yet or discussed openly.

In some accounts, the lack of awareness or education is presented as a major obstacle to the implementation of change. We do not rule out the possibility that limited understanding of local or global environmental concerns might play a role; however, social science research on climate change suggests that the provision of information or 'facts' does not simply change people's minds nor their behaviour; thinking about climate and culture are also cultural values tied in with global ideas about justice and equity.

What is striking about the literature overall is the extent to which explanations are located in institutional and governmental failing. Of course, the institutions in question fund research and, unsurprisingly, seek justification to improve, change and reform themselves and others. As institutions, they may best recognise other institutions and see institutional form as a legitimate form of knowledge and set of standards and practices to work with. An alternative is offered by social science research with a focus on qualitative ideas and 'the people'. The people are those who vote for certain ideas and use – or not – particular forms of transport innovation. A stronger understanding of what 'the people' think about the future, technology and development questions – the kind of knowledge a good local politician may have as well as a field-oriented researcher – might make the work of institutions thinking about future transport more effective.

References

Cervero, R. 1998. *The Transit Metropolis: A Global Inquiry*. Washington, DC: Island Press.

Cervero, R. and K. Kockelman. 1997. Travel demand and the 3ds: Density, diversity and design. *Transportation Research Part D: Transport and Environment*, 2 (3): 199-219.

Creutzig, F. 2015. Evolving Narratives of Low-Carbon Futures in Transportation. *Transport Reviews*, 36 (3): 341-360.

Götz, K. and J. Deffner. 2009. Eine neue Mobilitätskultur in der Stadt – praktische Schritte zur Veränderung. In: Bundesministerium für Verkehr, Bau- und Stadtentwicklung (Hrsg.): Urbane Mobilität. Verkehrsforschung des Bundes für die kommunale Praxis, direkt 65, Bonn, S. 39-52.

Gwilliam, K. 2002. *Cities on the Move: A World Bank Urban Transport Strategy Review*. Washington, DC: The World Bank.

Gwilliam, K. 2013. Cities on the Move: Ten Years After. *Research in Transportation Economics*, 40 (1): 3-18.

Hughes, S. 2017. The Politics of Urban Climate Change Policy: Toward a Research Agenda. *Urban Affairs Review*, 53 (2): 362-380.

Institut für Mobilitätsforschung. 2013. *Megacity mobility culture: How cities move on in a diverse world*. Berlin: Springer.

Naess, L.O., P.J. Newell, A.J. Newsham, J. Phillips, J.F. Quan and T. Tanner. 2015. Climate policy meets national development contexts: Insights from Kenya and Mozambique. *Global Environmental Change*, 35: 534-544.

Starkey, P. and J. Hine. 2014. *Poverty and sustainable transport: How transport affects poor people with policy implications for poverty reduction: A literature review*. London: UN-Habitat, the Overseas Development Institute (ODI) or SLoCaT.

Urry, J. 2007. *Mobilities*. Cambridge: Polity Press.

Whitmarsh, L. 2012. How useful is the Multi-Level Perspective for transport and sustainability research? *Journal of Transport Geography*, 24: 483-487.

World Bank. 1986. *Urban Transport: Sector Policy Paper*. Washington, DC: The World Bank.

World Bank. 1996. *Sustainable Transport: Priorities for Policy Reform*. Washington, DC: The World Bank.

World Bank. 2000. *Cities in Transition: World Bank Urban and Local Government Strategy*. Washington, DC: The World Bank.

The big numbers

In some quarters, it is widely acknowledged that climate action/ambition in the transport sector has been insufficient when compared to the requirements of mid-century Paris compatible transformations. Ambitious transport decarbonisation requires a global alignment of strategies by state and private sectors *and* people.

However:

Each decade or so produces a series of ideational statistics that become the defining wisdoms of the age. It is beyond most of us to know, even specialists, how accurate they are - even so, they become the basis for projections and the imagination of the world as heading in a certain direction.

Global transport thinking currently operates on the following frequently cited numbers:

It took a century to get the first billion vehicles on the road, the second billion will take a decade.

If trends observed in the last decade of the twentieth century were to prevail, the most notable change in urban transport would be a shift from walking and cycling to private motorised vehicles. Public transport will decrease in market share in all regions.

Global transport emissions grew at an average annual rate of 2 percent from 1990 to 2012 and up to now remains amongst the fastest growing sectors of CO_2 emissions. In 2012, transport was the largest energy consuming sector in 40 percent of countries worldwide, and second in the others. In one projection, energy related to CO_2 emissions are expected to grow by 40 percent between 2013 and 2014.

The transport sector contributes between 20-25 percent of global energy-related greenhouse gas emissions and 18 percent of all man-made emissions in the global economy.

In the coming decades, the economies of Africa and Asia will expand rapidly. In 2015, there were 29 cities of more than 10 million people - within a decade it is estimated that there will be 12 more.

About 7.5 billion trips were made every day in urban areas worldwide in 2005. The share of daily trips made by public transport was at 16 percent, walking and cycling 37 percent, whereas private motorised moments had around 47 percent - about three times the share of public transport.

Current logic suggests that improving the fuel efficiency of vehicles reduces greenhouse gas emissions and air pollution. Vehicles consume less carbon to travel the same distance. However, allowing the number of cars on the road to double in the next decade would mean that energy efficiency of the average vehicle (other things being equal) would have to improve

beyond all current technological possibilities just in order to keep emissions from transport at current levels.

The International Transport Forum (ITF) calls for a significant reduction of transport-related emissions. This requires profound transformations in the provision of mobility and freight services. Identifying these transformations and defining concrete actions for their implementation requires an understanding of technological, social and economic challenges, opportunities and enabling conditions, at different scales and from different perspectives.

In response, there are numerous exciting initiatives, such as the Decarbonising Transport initiative of the ITF, working with governments towards decarbonisation of the transport sector; the Deep Decarbonization Pathways Project for Transport (DDPP-T), led by the Institute for Sustainable Development and International Relations (IDDRI), working for country-driven decarbonisation of transport; the Paris Process on Mobility and Climate (PPMC), led by Movin' On (Michelin) and the Partnership on Sustainable, Low Carbon Transport (SLoCaT), is developing a macro-roadmap as a framework for action on transport; and the Science-Based Targets Initiative (SBTi) is developing target-setting tools and guidance for the transport and logistics sector.

What is not particularly evident in conversations taking place at these levels is that people demand mobility, demand can be understood and such understanding can be used to generate behavioural and aspirational changes.

It is also the case that outside the initiatives mentioned above there remains a very wide gap between transport thinking driven by concern over climate change and the statistics on future mobility projections.

Section 1: Aspirations and the *Global Mobility Report*

The *Global Mobility Report* was launched by the World Bank in the autumn of 2017. It is the first attempt to examine the performance of the transport sector globally. Most significantly, perhaps, it represents a serious and exciting attempt at thinking about what sustainable transport might look like in an uncertain future. The Report was produced by a number of institutions in the form of a 'multi-stakeholder partnership' – with significant funding from DFID. Various organisations fed data of varied provenance and research of different types into the Report. The spirit is international and acknowledges that we have a shared responsibility to shape the future transport agenda. The ultimate aim of the Report and the project it represents are to create mechanisms for global decision-making to influence the development of 'universal sustainable mobility' and investment patterns.

The *Global Mobility Report* acknowledges that we are at a critical juncture in global thinking about transport. Actions we have already taken and decisions we have already made mean that mobility will only increase in the coming decades. More people, goods and ideas will be transported here and there than ever before. The creation of new markets for vehicles, falling costs of production (often at the expense of safety in some countries), and the continued expansion of existing markets – will increase the number of vehicles on the world's roads. In the next decade, it is estimated that annual passenger traffic will exceed 80 trillion passenger kilometres. This represents a doubling of the distance travelled in a period of only 15 years. It is also estimated that within a decade there will be more than twice as many cars in operation than there are today. In short, it took a century to get the first billion on the road and will take a decade to get the second billion fuelled and running.

This is an extraordinary and troubling forecast, which comes at a time when climate change policy and thinking has just about become entrenched in some institutions in some parts of the world. This is not simply a case of policy being un-joined. When seen in this light, transport policy and planning - at least to the degree that these practices corresponds to actual vehicle numbers - would seem to have a trajectory quite at odds with the broader aims of carbon reduction and sustainable transport. It is not only the sheer number of vehicles that staggers, nor is it the levels of congestion and pollution that such an enlarged fleet can rightly be imagined to produce; rather, it is the knock-on effects of such mass automobility that will have serious implications for increased consumption and therefore sustainability agendas in all sectors.

Despite these rather cataclysmic forecasts, the report makes no suggestion that mobility is itself *the* problem; instead, the challenge is presented as being how to 'meet' the 'growing aspirations for mobility' (2017: 6). Mobility is itself treated as a valuable commodity and is described as having the potential to improve lives and livelihoods. Mobility is presented as a signifier of economic growth which will somehow (the key question of 'how' is not clearly spelt out in this Report, although it is perhaps assumed that this comes with economic growth) improve the 'quality of life' and 'help minimise the effects of climate change'.

Looking to the future, cities are quiet, air is clean, people ping and zip here and there using a variety of existing – but improved – transport technologies, border crossings are efficient, the world is punctual - and all this happens with minimal environmental impact and without compromising opportunities for future generations. This is a utopian vision in which we go on doing our business as usual - more of it even - saved by clean sources of power and the development of integrated and efficient thinking which translate clearly into the way we achieve consensus, attain political power, and plan and construct our built environment. It is utopian, but it is also wishful thinking, with the technological aspect of the projection being perhaps more probable than the creation of global, efficient and harmonious systems of governance for global transport. Part of the problem with this picture is whose vision it represents – whose ideas are these? We return to these questions later.

Underlying this rather optimistic picture is also an acknowledgement that the future of mobility has the potential to engender inequality, promote the consumption of carbon, contribute to the further degradation of the environment, and have a negative impact on global health. The Report suggests this as a possible scenario for the future, although it sounds rather like the present.

In order to avoid this less desirable pathway, the Sustainable Mobility for All initiative aims to make transport equitable, efficient, safe and green. Significantly, the global multi-stakeholder partnership that produced the Report is an attempt to create a voice and movement within global transport thinking. The transport sector is poorly represented in sustainable development goals (SDGs), and, although transport clearly transects many of these goals - given the significance of mobility as a source of inequality and emissions - it is surprising that little dedicated thought on the topic went into the formulation of the goals. In addition to forming a lobby, the partnership aims to structure the space - the vision – for the future of transport thinking and to develop measures and indices that will facilitate the tracking of transport development in different sectors and regions.

This report is a small contribution to structuring that space by bringing social science thinking into disruptive conversation with discussions around transport.

The central challenge outlined in the Report is to 'meet' (2017: 6) 'the growing aspirations for mobility', and 'the strong association between transport and economic growth' (2017: 14). Clearly demography and technology are significant variables in what the future of mobility might hold, but of particular significance is the acknowledgement that 'people aspire to live in a mobile society where they can move easily from place to place, travel and relocate as needed, and have quick and easy access to a range of goods and services' (2017: 14).

This is an incredibly important statement of recognition and is supported by much of the social science literature on grassroots development and class formation (the emergence of a middle class) in Africa and South Asia. This literature shows the elevated place of mobility in the imagination of development - and the powerful symbolic status or social capital that mobility can bring with it. As incomes rise, a vehicle and a suburban house (for which personal mobility is a requirement) are high on many people's shopping lists. There is, so to speak, an incredible demand for mobility - but this is generally oriented towards two and four-wheeler personal transport rather than the shared spaces of mass transit.

The theory used in the Report to understand this 'aspiration' is from economics in the forms of supply and demand. By identifying where market performance is sub-optimal or fails and by investing in these sectors - it is reasoned - all can be given sustainable mobility and no one will be left behind. Given the multiple authorship of the Report, it is not surprising that the text has an uneasy and inconsistent relationship with market mechanisms. It is noted that the market does not distribute transport, infrastructure and services equitably (for example 2017: 38). Elsewhere, the Report acknowledges that vulnerable groups are not likely to be well served by the free market in mobility. Those listed as vulnerable include women, children, those with disabilities and older persons – or, in other words around two thirds of the population. Given such numbers, might it not be better to see these vulnerabilities as produced by the market rather than exclusions from it? Those who benefit from the operation of such markets (presumably adult men) are likely to over-use their private automobiles to the detriment of public transport systems, resulting in congestion, excessive fossil fuel use and air pollution (2017: 25).

At the heart of this economic model is the rational decision-maker who naturally

wishes to ‘satisfy private needs, without taking into consideration the collective present and future needs’ (2017: 25). Such action is exemplified by high levels of car usage and the continued development of an automobile-focused transport system. Thus, what constitutes a set of individual choices in the short term is not a sustainable pathway for the planet in the longer term (a point clearly made in a World Bank (1996) report written in the mid-1990s).

This point is easy to articulate, difficult to comprehend, and virtually impossible to put into working practice. National and international technological path dependency, slow rates of policy change, and grassroots demand for mobility point to a ‘runaway world’ of ever-increasing mobility. It is this demand or aspiration for mobility and automobility in particular which is perhaps the single largest barrier – or set of barriers because the aspiration can be further refined and thus better understood - to the implementation of low carbon technologies and the reduction of carbon emissions. The aspiration is not only to be mobile but to be mobile in particular ways, with bikes and cars in particular taking centre stage.

A model in which two thirds of the population are rendered vulnerable and the remaining third contribute to traffic jams is not sustainable; neither, however, is it particularly helpful in understanding the complexity of the mobility aspirations the Report aims to meet.

Anthropology and aspirations

What are aspirations? Aspirations are wants and preferences that influences choices and the ways in which ideas, promises and plans are received and acted upon. Anthropologists have argued – as part of the perennial attempt to counter the hegemony of economists - that these are not simply rational choices but are part of cultural value systems. Therefore, aspirations can be seen as parts of wider ethical and metaphysical ideas, and specifically related to other cultural ideas such as time, progress and rights. In other words, aspirations are not individual decisions but part of collective webs of endeavour that may find reflection in other shared ideas and values. While aspiration might have history in a particular place or culture, it is more important to understand that aspiration influences the actions people take as they anticipate what the future might hold; or, what they hope to gain from the future; or, what a just future might look like.

Aspiration then is connected to other ideas and becomes part of a broader system of cultural values. This anthropological understanding of aspiration allows us then to think of aspiration as a resource, something that can be understood, worked with and ultimately influenced. As

Appadurai (2004) has suggested, aspirations might be casually thought of as a future good life. However, upon closer scrutiny, aspirations directed at a good life tend to be formed from more specific and local ideas about marriage, work, status, health, and progress. Increasing the resolution further, these kinds of norms are often submerged and unarticulated, only emerging as singular expressions of wants: for this house, that marriage, for a two-wheeler or a car, or to be mobile, or to be somewhere else.

The visible and readily-comprehendible shopping list of wants do not reveal the layers of rationale and context-driven decision making that have nurtured such wants. Therefore, to want a car could appear as a rational choice rather than as a cultural value – but only if the aspiration for an object is decontextualised. When so decontextualized, such aspirations become individual choices to be understood in the terms of calculation and market-economics and the cultural import and weight of such aspirations is disappeared. But, and to repeat, these lists are inevitably and significantly tied up with more general norms, presumptions, and axioms about the good life, and life more generally. They emerge from deep-rooted ideas about justice, rights, privileges and what constitutes human development and progress.

Aspirations, in a general sense, then can help us understand why people are mobile and why mobility has become such a strong value and want – but only if we link mobility to a broader set of cultural impulses. However, aspiration is not a homogenous cultural value or faculty. It is unevenly distributed across a given population. In Appadurai's provocative view, the rich have a more fully-developed capacity to aspire because they are more likely to be conscious of the links between the more and less immediate objects of aspiration. Because the better off, by definition, have a more complex experience of the relation between a wide range of ends and means, because they have a bigger stock of available experiences of the relationship of aspirations and outcomes, because they are in a better position to explore and harvest diverse experiences of exploration and trial, because of their many opportunities to link material goods and immediate opportunities to more general and generic possibilities and options. They too may express their aspirations in concrete, individual wishes and wants. But they are more able to produce justifications, narratives, metaphors, and pathways through which bundles of goods and services are actually tied to wider social scenes and contexts, and to still more abstract norms and beliefs.

As Appadurai says, the balance is in favour of the wealthy - the rich get richer – because acquiring wealth is itself part of the experimental process through which

one learns about connections, language and strategy. In this sense, 'the capacity to aspire' is a form of navigation or skill. 'The more privileged in any society simply have used the map of its norms to explore the future more frequently and more realistically, and to share this knowledge with one another more routinely than their poorer and weaker neighbours' (Appadurai 2004: 69). This is not to claim that the poor cannot develop strategies, wish for things or aspire – but it is to say that the landscape in which they can do so and the resources at their disposal are necessary more limited. Other social scientists might make similar arguments about the role of agency in relation to poverty and opportunity.

The inverse of this argument is that the poor may have fewer resources to imagine and create alternative futures. Access to the cultural capital, technology and accomplices will be more limited. Thus, again following Appadurai, the capacity to imagine and manufacture possible courses of action is also less developed. This argument seems to sit well with choices about mobility and technology. The possible options and technologies for mobility among many of the poor of South Asia and Africa are quite restricted when compared to the choices available to the wealthier. The adverts, available brands and status claims of their friends and neighbours follow quite limited pathways.

When seen in this light, the capacity to aspire is a cultural quality, the fortification of which may accelerate the building of other capacities. If so, Appadurai suggests, it ought to be a priority concern of any developmental effort. In concrete terms and to this end, he suggests four strategies for those working in development contexts; his focus is on the poor but the strategies arguably have broader application:

- Rituals of consensus production may provide a place to change the terms of self-recognition that define values and aspirations.
- Capacity building should focus on local education that increases the ability to understand the links between aspirations, achievement and consequences.
- Outside agents should encourage internal efforts to cultivate voice and confidence.
- Any development project or initiative must develop a set of tools for identifying the cultural map of aspirations that surround the specific intervention.

These proposals connect aspirations to culture and are guided by the assumption that understanding the values, morals, habits and material life of people is key.

Appadurai's ideas have embedded themselves within some strands of the international development world. The idea that aspiration, which could be nuanced by adding a strand of motivation, is a resource that can be understood and worked with is

an extremely powerful idea. Therefore, in order to 'meet' a world aspiring to be mobile, which is what the *Global Mobility Report* aims to set the conditions for, what does it mean if aspirations are cultural rather than belonging to the realm of rational choice? In order to understand this, we might wish to add our own criticism to Appadurai's otherwise intellectually vigorous account. He presents to the economist a rather quaint notion of what culture is, where it comes from and what it does to people. Anthropologists have long given up on the idea that people live in hermetically sealed cultural worlds. Borders and boundaries of what we know and how we know it are open and in flux. Significantly, cultural values can be influenced and manipulated - including that of aspiration.

Whole industries the world over have developed to manipulate and engage with the varied capacity people have to aspire. At one level, advertising encourages and promotes demand of particular kinds - this car over that, this deep-seated restlessness or insecurity to be overcome with this or that product – politicians thrive in this terrain also; at another level altogether, entire systems of production and consumption continue to produce their own messages which run deeper in popular consciousness than any slogan or brand – and which develop individual and collective aspiration in particular directions, often to the point to which aspiration seems little more than common sense. One of the key questions which is attached to the idea of aspiration is: where does the aspiration to be mobile come from? Is it natural? Most anthropologists would say 'no'. If it is cultural then how are we best to understand it? And, what information, ideas or alternative values might be introduced or cultivated to lessen the aspiration to be mobile?

There is a second and final use to which anthropological ideas of aspiration can be called upon to help illustrate an important point. The *Global Mobility Report* is itself a form of aspiration. The authors are leading and world experts in their fields, drawing upon the resources of personal experience and well-funded institutions. The aim of the Report is to develop global thinking in relation to transport - this is laudable and surely to be encouraged. However, the partnerships from which the Report emerged were between wealthy institutions and those with the cultural capital and financial security to think about sustainability and transport in particular ways. Recall the quiet cities and clean air of the future. This is not a mainstream vision in much of South Asia or Africa, where for many the daily struggle is to become mobile, a process that generally demands aspiration for technologies of mobility which are oil powered. The greater challenge for such a global partnerships is to decolonise the transport movement and to work with those whose national ministries are over-seeing the increased

consumption of carbon, the further degradation of the environment, and negatively impacting on global health. This is a question of culture as much as it is one of technology or 'facts'. Planners can deeply influence 'culture' through what they do – both directly through what they produce and more profoundly by the messages that accompany what they do.

In his rather unpunctual inaugural address to the International Road Federation in Delhi in November of 2017, the minister responsible for India's highways told the audience that his country was now building more than 35km of four-lane highway per day – an incredible rate but still some 15km behind his target. When the *Global Mobility Report* was released at the same conference the following day, one of the worst periods of air pollution in India's history was coming to an end. Traffic-jam bound Delhi-ites blamed farmers in Punjab for burning stubble. The panellists congratulated Jose Luis Irigoyen from the World Bank for his excellent report before turning to discuss electric vehicles and smart technologies. There were no Indian or Chinese faces on the stage as part of the global discussion. The rest of the conference proceeded in a similarly divided fashion, with the men who build roads in India attending one set of panels and representatives of international sustainable transport attending others. The difference in the culture, language and aspirations of these two interest groups was laid out in rather stark contrast.

The point is not to say that the aims of the *Global Mobility Report* are wrong – far from it – but to say that in other parts of the world the cultural basis of individual and national aspirations emerge out of very different developmental and cultural concerns. While not easy to work with institutions that have such different starting points, ways of operating and paymasters, without working across such divides the global vision of the future is likely to be rather parochial and exclude some of the most carbon-influential countries on the planet.

References

Appadurai, A. 2004. 'The Capacity to Aspire: Culture and the Terms of Recognition', in V. Rao and M. Walton (eds) *Culture and Public Action*. Palo Alto: Stanford University Press, pp. 59-84.

World Bank. 2017. *Sustainable Mobility for All. Global Mobility Report 2017: Tracking Sector Performance*. Washington, DC: World Bank.

World Bank. 1996. *Sustainable transport: Priorities for policy reform*. Washington, DC: World Bank.

Section 2: Urban transport and displacement: When people are a barrier

Addis Ababa Light Rail

The Addis Ababa Light Rail (Ethiopia) is a 17km electrified double track rail line running from the city centre to industrial areas in the south of the city. It was constructed by the China Railway Group Limited, with funding from the Export-Import Bank of China. It is part of the Addis Ababa Master Plan to modernise the city. The scheme has been promoted as a greener and safer means of transport for city commuters. The first line opened in September 2015.

The construction of the Addis Ababa rail line led to the demolition of thousands of homes in order to make space for the rail tracks and stations. While rich companies were able to raise law suits to secure substantial amounts of compensation for the relocation, most of the displaced were rendered voiceless under the government and the contractor's heavy-handed approach to dissent and complaints.

Most displaced were relocated in a rush to half-finished, unsafe buildings on the outskirts of the city with cramped living space. These housing units were without doors, windows and paths and there was no access to electricity, water and private toilets. Some newly built resettlement units collapsed, and people who had already been re-housed had to be moved yet again.

Apart from poor living conditions, the displacement also disrupted the socio-economic and cultural lives of those who were moved, brought back environmentally unfriendly practices and exacerbated the vulnerability of the poor. For instance, without electricity, women were forced to build traditional clay stoves by hand and purchase expensive wood from farmers as a fire source for cooking. Unable to afford to travel long distances to schools, having no electricity to watch TV at home, and with no recreation facilities in the resettlement area, many school children were left resenting their displaced conditions, wandering on the street and joining street gangs.

In 2012, the Ethiopian Railway Corporation displaced 2,700 land owners in Adama City of the Oromia region, an area of the country with a long history of ethnic conflicts. A strong protest in 2014 against the government's continually evolving Addis Ababa Master Plan left dozens of protesters dead under the government's explicitly 'merciless' approach. In 2015, the government announced the tenth Addis Ababa Master Plan seeking to further expand Addis Ababa city (with the rail line as a key component) into the Oromia region. The fear of forced eviction and displacement immediately sparked widespread protest. Human rights groups reported that at least 150 protesters were

killed and another 5,000 were arrested by security forces in the initial conflict. Enraged Oromos, especially those in the rural areas, perceived the Master Plan as a ploy by other ethnic groups, especially the Tigray and Amhara, to uproot them from their fertile lands under the guise of development.

The government had to make an unprecedented policy U-turn and cancel the development plan, due to concerns that the protestors might otherwise turn to support the local armed ethnic rebellion groups threatening the already fragile stability of the country. Unfortunately, however, the policy U-turn was too late to stop the public outcry and the resulting tragic violence. The Ethiopian government announced that the nation was in 'a state of emergency' in October 2016. Human rights groups reported that the incident had turned into a major human rights crisis with many hundreds dying in the chaos.

Lyari Expressway Karachi

Lyari Expressway is a 16-km city district expressway currently under construction along the Lyari River in Karachi, Sindh, Pakistan. It was promoted as a way to alleviate the traffic to and from Karachi Port and as a solution to flood protection. Construction started in 2002 and remains incomplete.

Protests against proposed demolitions and the resettlement plans were the main cause for these ongoing delays. Local NGOs estimated that the government's original plan would lead to 25,400 housing units and 8,000 commercial and manufacturing units being demolished. At the time, this was probably the largest urban demolition project for the purpose of urban road-building in the world, with considerable social impacts resulting from an estimated 77,000 families (230,000 persons) being moved, 26,000 students' education being disrupted, and 40,000 wage earners losing their jobs.

The project had been shelved by the previous government due to the contractor's decision, in the face of effective protest, to withdraw from the project. The contractor came under pressure when local NGO's networked with international journalists to expose the scale of the demolition. Sufficient press coverage of the plans in Canada, the home country of the contractor, compelled them to withdraw from the project.

Nevertheless, the military government decided to proceed with the project with a halved government budget and, without prior consultation nor notification of the affected residents, started the demolition. When the Hawke's Bay resettlement site for

the Lyari affectees was established 30km outside the city in 2002, the displaced found little infrastructure was in place, nor were regular bus services to Karachi.

The demolition was met with extraordinarily well-organised protests from the affected communities, who staged not only physical protests but also successful political lobbying and campaigns in the international media, employing human rights activism and prolonged legal challenges in their struggle against the government. As a result, the project was halted for lacking sufficient resources to fund the resettlement schemes demanded by the protesters.

Local planning and development NGOs had teamed up with academic experts and activists, serving as an incredible knowledge resource to the affected residents. This coalition armed affected residents with a professional level of knowledge that helped them organise and build broad support networks, both locally and internationally.

The government's plan was challenged as an environmentally unfriendly, unsustainable, corrupt and discriminative attempt against the poor. The protesters had managed to reach a high-level of support, including from the opposing political parties' alliance 'Muttahida Majlis-e-Amal', the UN, and over 1,000 international human and housing rights organisations, creating immense political pressure. The government was only able to continue the construction when an unexpected court ruling divided and weakened the affected residents' alliance, and sufficient government funding for the resettlement project was secured.

When people are a barrier

Not always, but often, new transport infrastructures require corridors be made in urban areas. This may cause the fragmentation of the urban space and cause disruption to those who remain in the area. Buildings are demolished and people have to be moved and resettled.

The literature records the complexity of resettlement and the changing emphasis of guidelines and best practice (Mathur 2006, 2013). The literature also records the pain and hardship generally associated with relocation, even when it is managed efficiently and with humanitarian sensitivity.

Anthropologists have pointed out that communities may appear to have unifying characteristics such as 'lower income' or 'urban poor' but, in fact, generally speaking communities are comprised of groups of people with varying capacities, interests and aspirations and, therefore, resettlement affects people in different ways (Oliver-

Smith 2009, 2010). The process is never going to be without discomfort and some will do better than others.

There are features in the landscape that cannot simply be compensated for, such as memories, religious sites and the particular dynamics of the community having developed in situ (Cernea 2007, 2008). The costs and the difficulties of resettling people often mean that this element of a project receives less care and attention and resources than the main headline grabbing piece of transport infrastructure. Resettlement projects generally are unwanted extra costs, rather than at the heart of rethinking urban transport infrastructures.

The World Bank implemented a set of international standards in 1980 as a response to the displacement of people in Brazil. The International Finance Corporation also has its own standards which are commonly used in the private sector. Most of the international development banks, export credit agencies and development cooperation agencies have their own standards relating to the relocation resettlement projects they fund.

There are a number of international guidelines in place which are aimed at assisting displaced people to improve, or at least restore, their former living standards and earning capacities. Ideally, displaced people should be compensated for their loss at replacement cost and given opportunities to share in the benefits brought about by new projects. The displaced should be consulted on the transfer and provided assistance to both move and transition to the relocation site. Moving people in groups is recognised as making the disruption of dispossession and relocation easier to live through. Minimising the distance between original and relocation sites might mean that former patterns of livelihood and sociality can be retained. The relocated should be encouraged to take part in the design and ethos of resettlement sites, and wherever possible, existing institutions should be used to conduct the transfer, relocation and transition processes. New institutions with uncertain powers risk being unfamiliar to the displaced, exacerbating their potential alienation. Those resettled should be provided with viable settlements with infrastructure and services that ideally are also integrated into the broader urban fabric.

Price (2015) reviews the international standards, suggesting there is an increasing alignment and that similar guidelines exist across the major institutions. However, it should also be noted that national and urban governments do not always follow international standards relating to the acquisition of land, many often relying on other kinds of expropriation procedures and the use of force, rather than negotiation.

Resettlement requires a great deal of planning and careful implementation in consultation with those responsible for the main incoming infrastructure project. Often, contractors and agencies vary, making cooperation difficult and ineffective. In essence, relocation involves the destruction of something that has history, complexity and interconnectivity, and the provision of some new alternative, often at some remove. Sometimes, though perhaps rarely now, cash compensation is given; at others there may be the provision of compensation for lost assets; other schemes may also provide mechanisms to encourage livelihoods' restoration and educational opportunities. There might also be activities to encourage the recreation of social institutions, collective rituals and vernacular forms of authority and decision-making.

In most of these scenarios, land has to be acquired to make way for a new settlement. Even in informal settlements, land prices where new infrastructure is critical tend to be high and such areas are also typically densely populated, adding to the complexity of the resettlement challenge. The temptation to acquire low-cost land is understandable; however, this means that those resettled may be asked to surrender something of high value with a central location in exchange for something of low value in a distant and remote location. Resettlement sites may become part of other planning visions for the future, such as new satellite cities on the outskirts of mega city. Such locations tend to be cities in the making, which in the short term might mean that they lack the services and excitement of a larger city.

Obviously, moving people away from where they have settled will mean disrupting their rhythms, routines and journeys through the city, including journeys to school, work or other forms of civil society activity. Often, livelihood provision is far more complicated than having a 'job', as people rely on multiple strategies and engage in a wide variety of activities to support their families. Many will also have investment in local savings schemes, access to informal credit, beneficial rental arrangements, remittances from family members elsewhere and so forth. Many of these sources of support are invisible to the naked eye and difficult to tease out even by skilled qualitative researcher.

Given the embeddedness of most people in their local environment, the complexity of resettling them becomes increasingly apparent and there are obvious development questions and opportunities in the programme of resettlement. Should all livelihoods be restored? Should some livelihoods be discouraged?

Owen and Kemp (2016) express doubt as to whether planning can address the complexity and uncertainty associated with project-induced displacement. There are simply too many variables, and planning for

the restoration of people's subjectivity is an unrealistic goal. Being moved from your home to make way for new forms of development, which may exclude you, even if the most stringent best practice guidelines are followed, will create physical, psychological and social forms of stress. The uncertainty and the adaptation to new forms of habitation are documented to induce many forms of illness.

Livelihoods and educational opportunities are perhaps key to remaking communities. In pioneering resettlement site research by Cernea (1997, 2006), it has repeatedly been shown that the risks associated with resettlement include landlessness, unemployment, homelessness, new forms of marginalisation, insecurity of food provision, reduced access to common property resources, increased morbidity and mortality, perhaps accompanied by the declining health associated with stress, and the dis-articulation of community.

Displacement is a cause of disruption and sensitivity. The kinds of protest movement and suffering associated with displacement are now well known and, as the Karachi case study shows, are readily recognisable in international media. However, it takes many years for resettled groups to reform into what we might think of as communities, and to become part of local economies. Longer-term studies of resettlement communities show how normalcy is re-established over the years and how new forms of ritual and sociality can emerge (Simpson 2013). The short-term focus on resettlement and the short-termism of compensation packages, consultation and the language of movement arguably contribute to this disruption and sensitivity. By taking a longer-term perspective, by putting incentives in the future and by emphasising the possible longer-term benefits of moving, displacement might be framed, and thus seen, as a more positive step rather than a sacrifice.

Well-known cases in the literature from Mumbai (Patel, Cruz, Burra 2002), when people were displaced by rail developments, have shown that there is perhaps an inverse relationship between the ways in which people participate in their own resettlement and the level and degree of stress that resettlement causes. Participation is key, but so too is communication. Resettlement should not be presented as a sacrifice for development, but seen as a development and transport planning opportunity. The kinds of actions authorities took in Ethiopia are short-sighted and in violation of international norms. The protestors in Karachi added significantly to the overall cost of the project and the timetable. Shifting the focus away from transport innovation to resettlement innovation would entail investment in upgraded facilities, reducing requirements for mobility from the new sites, and making the sites part of transport and urban master plans rather than treated them as

afterthoughts. Such a focus on resettlement would also involve investment in the soft infrastructures that allow for the redevelopment of community features. Above all, such an approach should lengthen the time-frames for thinking about the move, so as to lessen the immediate traumas created by displacement, and to create incentives for affected people to look optimistically to the future.

Other questions to orient future thinking:

- When do the human costs of resettlement become too high for a project to proceed?
- How can this be calculated?

References

Cernea, M. 1997. The risks and reconstruction model for resettling displaced populations. *World Development*, 25 (10): 1569-1587.

Cernea, M. 2006. Re-examining 'displacement': A redefinition of concepts in development and conservation policies. *Social Change*, 36 (1): 8-35.

Mathur, H.M. 2006. Resettling people displaced by development projects: Some critical management issues. *Social Change*, 36 (1): 36-86.

Mathur, H.M. (ed.) 2013. *Displacement and resettlement in India: The human cost of development*. New Delhi: Routledge.

Oliver-Smith, A. (ed.) 2009. *Development and dispossession: The anthropology of displacement and resettlement*. Santa Fe: School for Advanced Research Press.

Oliver-Smith, A. 2010. *Defying displacement: Grassroots resistance and the critique of development*. Austin: University of Texas Press.

Owen, J. and D. Kemp. 2015. Can planning safeguard against mining and resettlement risks? *Journal of Cleaner Production*, 133: 1227-1234.

Patel, S., C. d'Cruz, and S. Burra. 2002. Beyond evictions in a global city: People-managed resettlement in Mumbai. *Environment and Urbanisation*, 14 (1): 159-172.

Price, S. 2015. '*Is there a global safeguard for development displacement*?' in I. Satiroglu and N. Choi (eds) Development-induced Displacement and Resettlement: Revisiting the Knowns and Revealing the Unknowns. Oxford: Routledge, pp 127–41.

Simpson, E. 2013. *The political biography of an earthquake: Aftermath and amnesia in Gujarat, India*. London: Hurst.

Supporting Sources Addis Ababa Light Rail

Addis Fortune, 2013 (8.12.2013). Addis-Modjo Edible Oil Complex Agrees 8m Br Compensation with Railway Corporation. https://addisfortune.net/articles/addis-modjo-edible-oil-complex-agrees-8m-br-compensation-with-railway-corporation/ (accessed 15/12/2017)

Ali, G.S. 2017. *Post Completion Sustainability of Ethiopian Railway Project: The Case of Addis Ababa Light Rail Transit Project (AALRTP)*. *Management*, 7: 7–28. https://doi.org/10.5923/j.mm.20170701.02

Amnesty International, Association for Human Rights in Ethiopia, CIVICUS: World Alliance for Citizen Participation, Civil Rights Defenders, Defend Defenders (East and Horn of Africa Human Rights Defenders Project), Ethiopian Human Rights Project, FIDH (International Federation for Human Rights), Foundation for Human Rights Initiative, Freedom House, Front Line Defenders, Global Center for the Responsibility to Protect, Human Rights Watch, International Service for Human Rights, Reporters Without Borders, World Organisation Against Torture (OMCT), 2016 (8.9.2016). *Joint NGO letter to the UN Human Rights Council on Ethiopia. Global Center for the Responsibility to Protect*. https://www.hrw.org/news/2016/09/08/joint-letter-un-human-rights-council-ethiopia (accessed 28.12.2017)

Federal Democratic Republic of Ethiopia Addis Ababa City Administration, 2016. *Ethiopia Transportation System Improvement Project (TRANSIP) Social Impact Assessment (SIA) (No. SFG2137)*. Federal Democratic Republic of Ethiopia Addis Ababa City Administration.

Human Rights Watch, 2016. UNPO: Oromo: Addis Ababa Master Plan – a Recipe for Disaster? The Unrepresented Nations and People Organization. http://unpo.org/article/19014 (accessed 12.12.17).

Jemere, Y. 2012. *Railway Development in Ethiopia. Horn of Africa Summit 2012 infrastructure and investment*. Nairobi, Kenya.

Muindi, M. 2016 (18.1.2016). Why Ethiopia is making a historic ‘master plan’ U-turn. BBC Monitoring. http://www.bbc.co.uk/news/world-africa-35325536 (accessed 28.12.2017)

Nazret, 2011 (11.10.2011). Ethiopia’s railway construction to demolish 1,000 homes. Nazret.com (accessed 28.12.2017).

Pedrazzini, Y., S. Vincent-Geslin, A. Thorer. 2014. Violence of Urbanization, Poor Neighbourhoods and Large-Scale Projects: Lessons from Addis Ababa, Ethiopia. *Built Environment*, 40 (3): 394–407.

Spooner, S. 2015 (17.7.2015). Addis shows Ethiopia's impressive growth trend, but it's leaving its weak and poor behind. *Mgafrica.com*. http://mgafrica.com/article/2015-07-14-addis-a-city-in-flux (accessed 28.12.2017)

Tadesse, Y. 2015. Effects of Displacement caused by Light Train in Addis Ababa: The case of Piassa. Addis Ababa University College of Social Sciences School of Graduate Studies.

UNPO, 2017. UNPO: UNPO's XIII General Assembly Adopts Resolution on the Oromo. The Unrepresented Nations and People Organization. http://unpo.org/article/20189 (accessed 8.7.17).

Wells, A. 2016. Addis Ababa: Home of Sub-Saharan Africa's First Light-Rail System. The Gate.

Yonas, M.B. 2017 (6.5.2017). Ethiopia needs to open up civic space: UN rights chief. Deutsche Welle. http://www.dw.com/en/ethiopia-needs-to-open-up-civic-space-un-rights-chief/a-38735190 (accessed 28.12.2017)

Supporting Sources Lyari Expressway

Ahmed, Q.I., H. Lu, S. Ye. 2008. Urban transportation and equity: A case study of Beijing and Karachi. *Transportation Research*, 42 (A): 125–139.

DAWN, 2017 (17.7.2017). Encroachment' obstructing Lyari Expressway project removed. https://www.dawn.com/news/1339972 (accessed 15/12/2017)

DAWN, 2006 (10.3.2006). Karachi: Lyari Expressway: A new land scam? https://www.dawn.com/news/182364 (accessed 15/12/2017)

Hasan, A. 2016. *Emerging urbanisation trends: The case of Karachi (No. C-37319-PAK-1)*. International Growth Centre, London.

Hasan, A. 2015. Land contestation in Karachi and the impact on housing and urban development. *Environment & Urbanization*, 27: 217–230. https://doi.org/DOI: 10.1177/0956247814567263

Hasan, A. 2005. The political and institutional blockages to good governance: the case of the Lyari expressway in Karachi. *Environment & Urbanization*, 17: 127–141.

The Express Tribune, 2016 (14.10.2016). Encroachments on 10% of Lyari Expressway hinder progress of construction. https://tribune.com.pk/story/1198434/petty-excuse-encroachments-10-lyari-expressway-hinder-progress-construction/ (accessed 15/12/2017)

The Express Tribune, 2015 (9.3.2015). Hope at last: Five years past deadline, Lyari Expressway inches closer to completion. https://tribune.com.pk/story/849991/hope-at-last-five-years-past-deadline-lyari-expressway-inches-closer-to-completion/ (accessed 15/12/2017)

The Nation, 2017 (14.1.2017). Chinese team, minister discuss Lyari Expressway. http://nation.com.pk/14-Jan-2017/chinese-team-minister-discuss-lyari-expressway (accessed 28.12.2017)

Younus, M. 2013. *Pakistan: Forced evictions and socio-economic costs for vulnerable communities: An overview*. URC Karachi.

Section 3: The political economy of BRT: Knowledge as a barrier

Bus Rapid Transit systems have come to play a prominent role in the list of options available for urban transport planners and engineers. It is clear that strong political will – rather than good engineering – is key to their sustained success. When such projects are treated as solely as engineering or planning projects then the likelihood of failure is greatest. Successful BRT projects tend also to focus on behavioural and attitudinal change and involve a strong social component. In South Asia there has been considerable investment in BRT schemes over the last decade. Initial successes now seem to be failing as new streams of funding, a preference for flagship schemes such as metros, and a new wave of low-priced automobiles have come to dominate the scene.

The point made in this section is that the production of knowledge about BRT was encouraged by the industry itself. This knowledge was carefully produced and then cemented into the worldviews of city planners, so that in many cases BRT seemed like the only sensible option to ease congestion and to reduce carbon emissions, when in fact other options might have been empirically preferable. Despite attempts at developing global standards and forms of certification for BRT, many industrious city-level politicians and engineers developed their own 'counterfeit' versions. A review of these is absent from the literature, and thus this review.

BRTs have been increasingly promoted as the way forward for public transport in developing countries. A consensus in the literature portrays them as the 'win-win' solution to chronic and rapidly escalating traffic congestion and to the low quality of public transport provision, which are widely-shared features of urban life in developing countries today. In 2007, forty cities across six continents had BRT systems. In December 2017, the figure had risen to 165. This increase mainly results from new BRTs in Latin America, Asia and Africa, where many more BRTs are currently being planned and negotiated. At present, Latin America hosts the largest number of operational BRTs (54), followed by Europe (44), Asia (43), North America (16), Oceania (4) and Africa (4).[2]

It is crucial to note from the outset that while low carbon emissions have been an

[2] On the current figures see: http://brtdata.org

important argument for the adoption of BRTs, the conceptual case for BRT relies on a broader set of arguments – around economic efficiency, environmental impact and public interest – that although continuously evolving, draws largely from foundational reviews and policy manuals (Levinson et al. 2003; Wright 2004a, 2004b; Hook 2005; Danaher et al. 2007; Wright and Hook 2007; Engelskirchen 2011). Such manuals are used by would-be BRT implementers as planning guides, as they include step-by-step guidance on how to conduct pre-feasibility studies and list potential sources of funding for BRTs.

Furthermore, BRT proponents have developed an effective communication strategy based on additional material for both specialised users and for the general public. In addition to training manuals, branding tools, such as the BRT 'gold standard' scoreboard, have been developed to aim at securing a uniform delivery of BRT-reforms. The success of the case for BRT is evident in the emergence of a consensus in the media and in literature that reproduces the same arguments put forward by BRT proponents (Badami 2005, 2010; Patel 2006; Breithaupt 2008; Wright 2010; Filipe and Macário 2013), as well as by the rapid diffusion of the BRT model in cities of the developing world.

Many of the cities that considered the adoption of a BRT system were emerging from a protracted period in which, private unregulated public transport had unleashed fierce market competition on the streets, creating deeply entrenched problems, including congestion, oversupply of under-utilised buses, exploitative work conditions, predatory driving practices, and high-levels of pollution by aging fleets (sometimes of imported secondhand vehicles that had been outlawed by emissions legislation in other parts of the world). In light of this diagnosis, public mass transport reforms were presented as an imperative and the BRT model was offered as the most cost-effective form of reforming public transport, and therefore one suited to cities and metropolitan areas in the developing world (Gilbert 2008).

The economic argument for BRT was central in drawing the attention of politicians and urban planners. BRTs were promoted as cost-effective solutions to mass public transport problems, transporting as many passengers, and leading to similar time savings, as rail-based solutions, but at a fraction of the cost. BRTs were presented as the mass transport solution with the lowest cost per kilometre and lower overall life-cycle costs. It was argued that BRTs could operate on the basis of fares alone and would not require ongoing subsidy. Furthermore,

due to comparatively lower investment demands, BRT systems could operate profitably with lower passenger density when compared to rail-based alternatives (Fouracre et al. 2003; Wright and Hook 2007; Breithaupt 2008; Hensher and Golob 2008; Deng and Nelson 2011; Adewumi and Allopi 2013; Cervero and Dai 2014).

Technical and public welfare arguments also weighed in: BRT systems could allow for an intensification of transport, improve mobility, travel times, traffic safety as well as the overall reliability of public transport. Since BRT systems were said to work for both high-density corridors and spread-out urban forms, they would be the ideal transport solution to meet the needs of cities that were growing rapidly and constantly changing (Matsumoto 2007). BRT systems would be easier to implement in developing countries since they required only minor changes in technology and 'mindsets' and were supposed to incorporate existing transport operators (Mejía-Dugand et al. 2013). The proposition of BRT systems as capable of incorporating, rather that displacing public transport systems' existing workforce has been instrumental to the perceived favourability of BRT *vis-à-vis* Metro systems.

In other cases, the BRT system was presented to urban planners as an inroad to adding value to urban land through investment in transport infrastructure and services. (Badami 2010; Suzuki and Shewmake 2011; Deng and Nelson 2013; Mathur 2015; Suzuki et al. 2015; Smith and Gihring 2016). Lastly, BRT systems were expected to have a positive effect on employment in the transport sector by creating more jobs and better work conditions (Deng and Nelson 2013; Wirasinghe et al. 2013; Cervero and Dai 2014).

The environmental case for BRTs saw their introduction as a way to reduce emissions in large mega-cities in which unregulated private operators were contributing heavily to pollution, as well as an engine of modal shift away from private cars to public transport: BRTs would lure private drivers through lower travel times.

Attempts were made to develop standards for BRT schemes through study visits and planning guides. The aim was to lower the costs and time involved in the planning phase of BRT implementation. As previously discussed, BRT policy guides included detailed description of the planning process, sources of finance and lists of consultants. In highlighting best practice, BRT processes are rendered into a 'flat-pack' solution for local assemblage (Wright 2004a, 2004b; Wright and Hook 2007; Hidalgo and Carrigan 2010b). In examining these instances of 'policy tourism' and policy transfer through the

conceptual frame of policy mobility proposed by E. McCann, Wood contends that such visits reinforce policy adoption within 'ideologically prescribed parameters' that allow the export of the BRT-model to very different polities, while protecting its consistent replication (2014, 2015a, 2015b, 2015c).

By contrast, the (albeit minimal) independent research, alongside a preliminary study of media coverage on TransMilenio, reveals a more ambivalent picture, in which the positive impacts of BRT co-exist with negative consequences. Although travel times, and the quality of transport, initially improved with TransMilenio, claims that it is 'providing reliable transport accessibility for the poor' (World Bank 2010) sit at odds with increases in transport fares, a trend observed in other cities following the introduction of BRTs (Muñoz and Hidalgo 2013' Muñoz et al. 2008, 2013, 2014).[3] There have been claims that it has prevented the poor from accessing the service and has led to public protests demanding lower fares. Such demands could not be met, as the bargaining power of the public regulatory body *vis-à-vis* private operators was low. Furthermore, the inclusion of previous public transport operators has often proved problematic. In Bogotá, ownership of BRT buses increasingly became concentrated in the hands of a few private operators, while other contexts presented their own distinctive, and at times violent, tensions over participatory inclusion (Paget-Seekins 2015; Walters and Cloete 2007).

Another major problem with TransMilenio was the contraction in employment opportunities that accompanied the higher productivity of labour. The proclaimed goal of replacing the exploitative informal employment relations of the pre-existing transport system with better, formal jobs was not straightforward. Only one in seven of the bus drivers in the old system were able to find employment opportunities that accompanied the higher productivity of labour. International loans were used to pay for the infrastructural work, thus acting as a hidden subsidy to the private companies operating BRT (Gilbert 2008: 439-467). In sum, BRTs are mass transit systems which often display an unimpressive record in providing cheap, quality public transport to the poor and

[3] The inflationary impact of BRTs on transport fares has been observed in many other cities, with costs as high as 1.05 US$ per trip (São Paolo, Brazil). Most systems with a fare below 0.40 US$ are reported to be under financial stress.

mixed results in including previous providers of public transport.

Beyond a 'win-win': A political economy analysis

BRT systems require a more complex organisation than that of unregulated transport due to the introduction of new functions and actors. It has been observed that the adoption of a BRT system raises considerably the coordination demands on public authorities, who are ultimately responsible for setting in motion the planning and design of the project, for seeking finance to fund it and for securing political backing at different levels (Finn 2013; Finn and Muñoz 2014). In effect, the World Bank explicitly saw the BRT model not purely as a transport technology but also as a vehicle for institutional reform of urban public transport at large (Hook 2005; Mitric 2006, 2013). More broadly, such reform is part and parcel of an agenda to reform urban governance and to develop new mechanisms for the private sector to play a role in the provision of public services.

Precisely because BRT cannot be understood as a 'win-win' intervention to transform the provision of public transport, strong political will is required to introduce such schemes successfully. Political coalitions with the capacity to drive the project to maturity by ring-fencing it politically and bureaucratically are required. Such coalitions would in principle be eager to reap the political premium of being associated with a successful project, but in many cases have also paid the reputational price of botched interventions or the loss of legitimacy among those negatively affected by the introduction of BRT.

Part of Narendra Modi's political capital was gained through his association with the development of the Ahmedabad BRT, as Chief Minister of Gujarat. When more problematic aspects of this BRT came to the fore, Modi had already been voted in as prime minister.[4] Similarly, Jakarta's Governor Sutiyoso was re-elected on the promise of introducing BRT in 2003 and gained some political capital from TransJakarta, until its problems became more evident. In 2009 and 2014 Sutiyoso failed to gain support for a presidential nomination (Matsumoto 2007). The early and evident failure of Transantiago in the first year of operation led to public backlash and the most intense popular

[4] In Ahmedabad the BRT system is failing, support for it has fallen away and a metro is being constructed.

protests since the beginning of the democratic period (Libertad y Desarrollo 2011; Gómez-Lobo 2012; Paget-Seekins and Tironi 2016). This leads several authors to claimSho that success in BRT implementation is correlated with the existence of political vision and leadership on the part of a determined individual or group, a 'determined political champion', an 'enlightened Mayor' or a 'highly talented public administrators' such as the Lagos State Governor, the Major of Bogotá and the Ahmedabad district collector (Wright 2004; Wright and Hook 2007; Kumar et al. 2012; Basset and Marpillero-Colomina 2013; Deng et al. 2013; Mitric 2013; UN-Habitat 2015). [5] Mizuoka and Shimono (2013) argue that since BRT can be implemented in a typical mayoral term, it is well suited for political systems with high turn-over. The incentives are in place for ruling coalitions to finish and launch the system before their term is up.

The transport formalization agenda

The formalisation of public transport that BRT entails is linked to a shift in the conceptualisation of the role of the state in public transport. Indeed, the development of BRT systems contributes to enhancing the state's control of mass transport (Paget-Seekins and Tironi 2016) but added to this there is a more practical level at which trends towards the formalisation of mass public transport have political economy implications. BRT-proponents are right in claiming that BRT projects cannot be understood as discrete units of public intervention. The cases of BRT adoption that have failed to harmonise and integrate into broader transport system reforms seem to have been less successful. This is coupled with the fact that recommendations emerging from early BRT experiences emphasised the need to embed the BRT within integrated transport systems that ultimately aim for centralised fare collection and the overall formalisation of all transit operators, whether feeding into BRT trunk lines or not (Filipe and Macário 2013, 2014).

In the case of Bogota, the lack of a coherent strategy for the integration of the system was blamed for the very low rates of modal shift and bus reconversion in the first phase of BRT (Ardila 2005; Echeverry et al. 2005; Willoughby 2013). Later phases were more effective in forcing the

[5] Conversely, 'lack of political leadership' is blamed for the failures in the implementation of BRT projects and public transport coordination in general with Santiago, Dhaka and Accra as cases in point (Mitric 2013; Muñoz et al. 2014; Agyemang 2015).

ousting of considerable numbers of paratransit operators and finding synergies between the system's expansion and that of the network of cycle-paths, the regulations on public parking and restrictions on the use of private cars (Filipe and Macário 2014).

The type of system integration promoted by BRT reforms results in a struggle between the integrated system and so-called paratransit operators, not merely for the monopoly of operation along the transport routes, but also for the right to use stops, pavement and other urban assets in mass public transport. Furthermore, other aspects of the functioning of BRT reinforce formalisation. For example, the financial sustainability of BRT corridors is highly dependent on their ability to monopolise transport and attract as many riders as possible. BRT systems work best when the rest of the transport system, including paratransit operators, accommodate BRT and give it priority for operation in dense corridors.[6]

The displacement of traditional operators and restrictions on the unregulated use of public spaces have been characterised as form of 'privatisation of the commons' that is reinforced by the subsequent spike in fares - except in cases where subsidy mechanisms have been put into place (Paget Seekins and Tironi 2016). For neo-classical economic approaches, the privatisation of the commons is instead seen as the necessary process of specifying use and property rights over roads and pavements (Echeverry et al. 2005). In turn, this 'privatisation of the commons' contributes to municipal state-led attempts at formalising the transport system, either by displacing informal, unregulated operators or by forcing them to operate by contract with municipal authorities. This trend, observed throughout Latin American cities has different effects depending on local balances of power. [7] The ultimate expression of the formalisation drive is system integration: a set of measures aiming to standardise and nest together

[6] Metrobus in Istanbul provides a good example of a BRT system that takes over the densest corridor only, allowing fares to recoup operative costs and displacing non-BRT operators to the less coveted areas (Alokokin and Ergun 2012).

[7] The Quito BRT is publicly owned and operated. Key routes in the BRT of Mexico City were contracted out to a company in which the old operators of the route are the main shareholders, while in Bogotá the routes were allocated based on competitive, open tendering, but companies that could demonstrate share-holders among old paratransit operator received incentives.

routes, transfers and fare collection for all BRT and non-BRT operators.

Political economy analyses of BRT-led formalisation or transport integration can lead to various interpretations. Paget-Seekins and Tironi (2016) see the BRT expansion as the embodiment of a redefinition of 'publicness' in transport and a consolidation of a set of institutions that although publicly managed, are put in place as the means to enhance and facilitate the engagement of the private sector. Therefore, this would not be a case of outright privatisation of the commons, but a move in a similar direction (also Willoughby 2013). The classic example is the emergence of restrictions on the use of public assets, such as pavements and roads, that although remain publicly-owned can no longer be used by any private operator, but are exclusively at the disposal of transport suppliers operating within the BRT framework.

Alternatively, BRT interventions can be interpreted as a displacement of small-scale transport operators and an ensuing loss of jobs and opportunities in the paratransit sector. These debates could be brought to the fore and further problematised by conceptualising more rigorously the ambiguous role of the state in these developments. First, it might be incorrect to speak of outright privatisation. Second, a more nuanced approach to the politics and tensions between a range of old and new public transport investors, the state and workers in the process of transport formalisation is required.

Such an approach would study processes of competition, concentration and centralisation among different segments of capital (e.g. paratransit bus-owners and the state enterprises that own BRT buses), and struggles between capital (including state capital) and different types of intermediaries, contractors and workers in the transport sector (e.g. firms that supply outsourced transport services on behalf of BRT managers, their workers, workers in the paratransit sector and other contractors and drivers in a position akin to that of share-croppers in agriculture).

Transport formalisation and the paratransit operators: Resistance and co-option

Another theme that has received attention in the BRT literature is the effect of BRT implementation on social, political and economic groups and on the power balances between stakeholders in urban transport. Of particular interest are the effects of BRT adoption for traditional paratransit operators including drivers, bus owners and route concessioners, and the extent to which these groups can either be integrated into the formalised

transport framework, or alternatively resist these interventions. As the cases addressed in this section will show, the effectiveness of the opposition by paratransit operators depends on the degree of coordination and the type of political backing and leverage that such groups command in different political settlements.

BRT-proponents tend to demonise traditional, para-transit and non-bus operators as wedded to an inefficient and polluting organisation of mass transport. Paratransit operations are regularly characterised as vested interests, constituencies capable of wielding their political power and connections to oppose the positive transformation of BRT implementation (Weinstock et al. 2011; Wirasinghe et al. 2013) and largely responsible for the historical deterioration of the quality of urban mass transport (Salazar Ferro et al. 2013).[8]

In contrast, a historically-grounded analysis of paratransit operators reveals a different picture. Namely, that the informal unregulated private transport accounts for a larger share of passengers carried precisely in those cities in which public transport policy-making followed closely the recommendations of the World Bank and other prevailing policy actors. These advocated a move away from public provision of public transport and the dismounting of subsidies and price controls during the 1980s (Schalekamp and Behrens 2010; Salazar Ferro and Behrens 2015). As research on Bogotá (Echeverry et al. 2005) and Dar es Salaam (Rizzo 2013, 2014) shows, the many inefficiencies which characterised the operations of private, and largely unregulated, providers of public transport reflected the highly congested nature of the market in which they operated, and the cut-throat competition that prevailed in them.

By the early 2000s, the chaotic state of unregulated transport systems led to the formulation of a new paradigm in mass urban transport (around the publication of *Cities on the Move*). This paradigm articulated an explanation of the public transport crisis couched in new institutional economics, appealing to concepts such as market failures, information asymmetries and principal-agent problems (Gwilliam 2002; Echeverry et al. 2005; Kominek 2005).

[8] Gauthier and Weinstock go as far as to equate paratransit with lawless gangs with political, rather than business, interest in mind (2010).

The gist of this argument, most influentially developed by Gwilliam (2002), is that market failures arise in unregulated, privately-operated mass urban transport systems due to misalignment between the incentives of the agents and the interests of principals. To begin with, operators have no incentive to offer quality transport services because their compensation depends solely on the quantity of passengers carried. Furthermore, route managers have no incentive to regulate the number of buses operating a given route, because their income is derived from monthly affiliation quotas rather than from the number of passengers carried.[9] Route managers exert political pressure for higher fares to attract more affiliated buses and the price mechanism ceases to act to correct market failures. This leads to oversupply, on-the-road competition for clients, traffic congestion, exploitative labour practices, pollution and inefficiency. As more buses enter the system, both average passengers per bus and operator incomes fall, despite rising fares. Route managers start to operate as cartels to capture the regulatory institutions that allow them to control a rent they derive from transport fares that are generally above efficiency levels (Echeverry et al. 2005).[10] This has different implications.

- Bus associations, route managers and other players in the private, unregulated transport sector tend to become key political players and to wield considerable influence over the direction of urban transport policy.

- Reforming such systems entails transforming the structure of incentives and the regulatory framework.

BRT was conceived to carry such reform forward by restricting the use of public roads and raising the entry barriers for operation within the new system. The separation of transport services and fare collection and contracting and payment based on pre-agreed indicators are also strategies designed for state authorities to

[9] Whereas route managing enterprises typically act as intermediaries between bus owners and public administration in Latin America, unscheduled, unregistered minibuses in African cities may be predominantly organised through transport associations (Schalekamp and Behrens (2010: 373) for a comparison)

[10] A different account of 'carteliation' refers to the problematic effects of the rolling back of public investment and intervention in transport during this period. Cartels arise to protect exclusivity in key routes and to help coordinate collective action for investment and maintenance of the routes (Kominek 2005).

regain power in the transport sector. This leads some to argue that BRT is above all a strategy to reform informal transport (Schalekamp and Behrens 2010; Salazar Ferro et al. 2013; Paget-Seekins 2015).

As the impact of BRT on unregulated private transit operators can be significant, their resistance to its implementation can be a major political economy barrier. BRT implementers have developed two main strategies for dealing with paratransit: the integration of traditional operators into the new systems, and the mechanism for economic compensation used as an incentive for discontinuing their operation. In the most recent literature on BRT paratransit operators, their capacity to resist BRT is taken so seriously that their acquiescence is deemed politically expedient and necessary for successful BRT implementation (Wright and Hook 2007; Hidalgo and Carrigan 2010a, 2010b; Agyemang 2015). The political and financial negotiations with paratransit operators have been so problematic, prone to conflict and protracted that Schalekamp and Behrens (2013) claim that the biggest obstacle to BRT implementation at present is paratransit reform, not infrastructural or financial considerations.

In most cases, the phasing out of paratransit operators involves both scrapping old buses and mini-buses and seeking mechanisms to integrate old operators into the new system (Willoughby 2013). There is some debate as to whether vehicle scrapping should happen on a voluntary or mandatory basis. The valuation of the vehicle does not appear to be problematic, but estimating foregone incomes and the value of existing routes was far more difficult in the case of Cape Town. The starting point of the negotiation with old operators was the promise that through their acceptance of BRT they would under no circumstance end up being worse off and that no jobs would be lost. The costing of this plus that of the compensations is rarely included in the operational costs of BRT, especially when compared to the cost of alternative transport solutions. The import of these additional and rarely visible costs is such, that in the South African context it led to a transformation of the original spirit of pushing for BRT at all costs into understanding the actual costing of implementing a thoroughly formalised trunk and feeder system such as BRT. This came with the realisation, as described by a transport consultant that: ‘South Africa had jumped straight into this BRT story without understanding its financial implications’ (Schalekamp and Behrens 2013: 189; Flores-Dewy and Zegras 2012; Goméz-Lobo 2012).

Even in contexts where there was a genuine political will to incorporate pre-existing operators, municipal authorities experience many difficulties in conducting consultations and negotiations with paratransit operators. To begin with, this is a highly fragmented sector, in most cases lacking universal and legitimate representation. In South Africa, municipal authorities have debated whether to engage with operators individually, which increases transaction costs, or through transport associations, which at times are ripe with internal disputes and undemocratic. Furthermore, should administrations negotiate with all paratransit operators or only with those whose routes are directly affected by BRT? (Schalekamp and Behrens 2010, 2013).

The integration of old operators into the new system presents its own alternatives and problems. In some BRT systems, there have been attempts to transform paratransit operators into the firms that are contracted to provide transport services in BRT (Cape Town, Bogotá), while in other cases it was the operation of feeder routes what was on offer (Santiago). Either way, the incorporation of old operators requires a profound transformation of their practices (such as shareholding in the company, remuneration by contract, labour formalisation), as well as their consolidation into viable contracting partners, which requires training and support from the system manager (Schalekamp and Behrens 2013; Salazar Ferro and Behrens 2015).

Different models of integration have been tried, usually depending on the relative political power of the operators. Mexico City opted for the direct allocation of routes to old operators, while in Bogotá competitive bidding for routes gave incentives to existing operators (Paget-Seekins and Tironi 2016). However, whereas paratransit integration is seen as necessary to guarantee the political stability of the BRT project, opting for old operators as opposed to competitively selected bidders has been linked to problems further down the line. In the case of Mexico City, these have included resistance to further route reallocation, high costs, political, rather than technical, decision-making and the use of public funds to implicitly subsidise old operators in order to co-opt them politically in favour of BRT (Flores-Dewey and Zegras 2012).

The political viability of BRT-lite in locations such as Lagos may also be linked to the comfortable position awarded to paratransit operators in the BRT corridor: the operation of the system was wholly outsourced to NURTW (the National Union of Road Transport Workers). LAMATA (Lagos Metropolitan Area Transport Authority) provided

financial support to buy buses on behalf of NURTW and bought other buses that NURTW operates on lease (Mizuoka and Shimono 2013).

Irrespective of the conditions awarded to paratransit operators, not all incumbents have participated in consultations or been finally integrated into the new system. Despite mitigation strategies, many see their access to transport routes and their livelihoods threatened by BRT and existing transport operators have organized protest, and in some cases, forms of violent resistance to the plans for urban transport reform.[11] In South Africa, poorly conducted negotiations have contributed to a growing antagonism between authorities and paratransit operators and have inadvertently contributed to the creation of new associations with more coherent oppositional strategies and greater capacity to disrupt the BRT process (Schalekamp and Behrens 2010).

Drawing from the Latin American and South African experiences, it is clear that the integration of paratransit operators into BRT has been limited and problematic whenever it did take place. This difficulty has serious implications for the possibility of reducing carbon emissions through BRT. This dispels the idea that paratransit integration will happen spontaneously and without difficulty (Gauthier and Weinstock 2010). In the absence of contractual guarantees, considerable support and subsidies, the integration of paratransit operators would simply transfer the operational and financial costs and risks of a massive transport reform, whose success is unguaranteed, to precisely the groups that stand to lose their livelihoods from BRT adoption (Salazar Ferro and Behrens 2013). The complete eradication of paratransit operations advocated by the early BRT-proponents is unrealistic and, some argue, potentially harmful for the transport system as a whole.

Two alternatives are discussed in the literature: a slow and progressive formalisation and upgrading of existent operators with the long-term objective of switching to BRT corridors (which is probably a better characterization of the process taking place in Lagos) or simply a more effectively regulated but liberalised transport market (Schalekamp and

[11] All South African cities developing BRT systems experienced violent protests by paratransit operators in 2008 and 2009. The operators decried the lack of consultation and the prospective loss of employment in urban transport (Schalekamp and Behrens 2010).

Behrens 2010; Salazar Ferro and Behrens 2013).

In contrast to BRT narratives, paratransit operators account for the largest share of passengers transported in all cities without rail-based options – and even in some cities with metro and urban rail systems (e.g. Caracas) or in cities with large BRT operations (Mexico, Quito). In Bogotá, despite perceived accomplishments in the carrying capacity and utilisation of BRT, the system accounts for a mere 20 percent of modal split, with paratransit operators accounting for the remaining 80 percent (Salazar Ferro and Behrens 2013).

It is worth pointing out that there are complementarities and advantages in paratransit operation that have been largely ignored by BRT-proponents. These include: greater flexibility, responsiveness to changes in patterns of demand, and their specialisation in door-to-door type of services. It was estimated that before the introduction of Transantiago, 98 percent of the city's inhabitants lived less than 800 meters away from any of the paratransit routes on offer and around 10 percent of the trips required a transfer. As a consequence of BRT introduction, with its rigid trunk and feeder organisation, now upwards of 60 percent of the trips require transfers. Salazar and Behrens (2015) claim that cities developing BRT capacity need the complementary service of paratransit operators, as the complete formalisation of transport is probably not feasible. In fact, these cities should be understood as de facto hybrid systems in which both formal and informal systems operate.

Decentralisation, BRT and local electoral politics

BRT systems, proposed as a transit solution for urban centres of the developing world, are city-wide interventions that require large financial efforts, a reorganisation of urban space and tend to have implications for the day-to-day urban experience of users and non-users alike. But whereas the net benefits of the reorganisation of corridors in terms of travel-time and emissions have received ample attention, scholars are starting to propose an analytical approach that can account for the differentiated impact that the system has on different social groups. By avoiding generalisations and attending to the context-specific societal and economic forces shaping urban livelihoods, a more nuanced assessment of BRT-impacts emerges. In cities with strong socio-spatial fault-lines, BRT systems can reinforce and modulate class, race and gender cleavages. Emerging literature accounts for dynamics such as marginalisation and gentrification, as well as revealing problematic

assumptions and silences in the literature that advocates for BRT-type of interventions.

BRT packages are part of a set of political technologies that impact considerably on political power and decision-making at the national and the local scale. Rizzo (2014) argues that a key reason behind the slow progress in the construction work associated with BRT in Dar es Salaam was the city council's unwillingness to lose to the central government, which owned DART, as much as half of its direct revenue was previously earned through the council "ownership" of public transport.

The controversy that developed between the central and local governments over the ownership of the project, and of the many phases of the infrastructural work (including land surveys, the expropriation of land, the compensation of expropriated owners/occupiers, and the carrying out of demolition work) was the main reason behind the remarkably slow pace at which the building of the BRT system proceeded. In Delhi, the political power of car owners, typically the richer segment of the population, led to their prolonged opposition to the ways in which both the infrastructural work associated with BRT and its planned use of urban infrastructure, negatively affected them. This opposition ultimately led to the costly demise of BRT there (Gallagher 2017). While the politics that underpin the construction of BRT systems are context-specific, the key point is that the building of BRT tends to be politically charged and controversial.

By contrast, Mizuoka and Shimono (2013) argue that BRT has been a catalyser of global trends towards decentralisation and re-scaling whereby both the Fordist model of the central state bearing fiscal responsibility for public investment as well as the neoliberal model based on public transport 'laissez faire' are replaced with forms of hybrid ownership and regulated competition.

Other authors have noted that the emergence of BRT systems demands the development of a new set of institutions and management capabilities from local level authorities. These institutions are necessary to secure the financial leverage, coordination and private sector involvement needed for BRT implementation and are unprecedented in urban policy making (Wilkinson 2010; Finn 2013). Other authors register the tensions between the old national institutional framework and the newly empowered local administrations and regulatory systems - frequently supported directly by the World Bank. The failure to develop a local institutional framework is regularly blamed for limitations in BRT

implementation. For example, the lack of local urban planning capacity and urban land management institutions are blamed for the failure of BRT in Accra and India (Ponnaluri 2011; Agyemang 2015), while the reticence of national authorities to decentralise transport functions would explain the relatively late start of the BRT process in Senegal (Godard 2013).

Two characteristics of BRT projects are relevant for the proposed relocation of decision making:

- BRT projects are large-scale and politically visible, while at the same time they are discrete and manageable at the local level.

- BRT projects are led by local executive authorities and attributed, when perceived as successful, to 'strong political leadership'.

This combination of feasibility and political prestige has been attractive to technocratic politicians in charge of rapidly growing cities in the developing world, where- despite remaining conducive in the national arena- patronage politics may not operate. The different preferences of urban electorates make demonstrational interventions such as BRT necessary to legitimise the power of ruling urban coalitions. Mizuoka and Shimono's analysis of BRT-lite development by the Lagos Metropolitan Authority illustrates this point: "Politicians assume leadership, create rules and plan a more efficient transport service on the provincial scale. The citizens enjoying these efficiencies support the provincial government. This kind of positive 'circle' of democracy occurred in the governance exercised in this case" (2013: 70).

Similarly, unlike more ambitious infrastructure interventions, BRT projects can be implemented without leadership from the national level and can be parcelled into manageable phases. The first modules of a BRT project can be operational within months and can be easily capitalised by local administrations and political incumbents (Lindau et al. 2008; Deng and Nelson 2011). For instance, Changzhou is considered to have opted for BRT as a way bypassing the lengthy negotiations with the central Chinese state they would have had to engage with, had they insisted on a metro (Fjellstrom 2010).

This effect should be more pronounced wherever national politics are not aligned with urban politics, as in the case of capital and mega cities ruled by opposition parties, as well as in cities where the

demographic most likely to benefit from BRT has considerable electoral representation. In many cases local political figures in opposition parties or technocratic coalitions find leverage in BRT projects to improve their options in the national arena: this was the case of Narendra Modi as Chief Minister of Gujarat; Governor Sutiyoso in Jakarta; Lopez Obrador, the former Mayor of Mexico and head of the opposition PRD; Enrique Peñalosa, two times Major of Bogotá and once presidential candidate; Hellen Zille, the DA Mayor of Cape Town, now Premier of the Western Cape Province; Mayor Zhang Guangning from Guangzhou (Matsumoto 2007; Weinstock et al. 2011).[12]

However, a logical implication of this tendency is that in cases in which BRT fails to deliver on its promises or experiences resistance, the political costs similarly tend to revert to the political groups that backed it. Transantiago is the most prominent case of failed transport reform discrediting the ruling party (Gómez-Lobo 2012). In consequence, BRT-promoting authors argue that it is necessary to develop local institutional frameworks to manage BRT (Finn 2013), as well the legal framework for metropolitan entities to oversee BRT implementation when it straddles different municipalities (Lindau et al. 2008; Willoughby 2013).[13]

BRT as prestige project: Branding, image and the 'world class cities'

[12] In fact, Weinstock et al. hypothesise that the slower introduction of BRT in North American cities is closely linked to the fact that these are highly motorised systems, where potential bus riders are less politically powerful than car owners, and where other type of urban intervention would have more political traction with voters. Cities in which car owners, and car manufacturers can articulate their opposition to BRT have had more difficulties of implementation (e.g. Bangkok and Delhi) (Weinstock et al. 2011; Wu and Pojani 2016).

[13] For instance, the 1988 electoral reform in Brazil gave local authorities some of the functions formerly held by federal state, including relative autonomy for public transport investment and regulation. However, in terms of BRT development the reform was deemed insufficient as it empowered municipalities but failed to develop the legal framework for metropolitan authorities. BRT development in the greater Sao Paulo area required the administrative alignment of municipalities ruled by opposing political parties (Lindau et al. 2008).

Political economy analysis is important to understand potential allies of BRTs, as well as, barriers to their implementation. As has been discussed above, the implementation of BRT projects has rarely been driven solely by the need to address urban public transport challenges and there are a range of political agendas that municipal authorities frequently attempt to advance by embracing the implementation of a BRT system. [14] Central among the BRT-related narratives are the concepts of the 'smart city' and the 'world class city' (Bassett and Marpillero-Colomina 2013). These terms encapsulate the idea that cities in the developing world are players in their own right in the global competition to attract foreign investment, and that by developing a portfolio of services and displaying the right type of political leadership and efficiency indicators, they can bypass the financial constraints of the central state or delink from the developmental shortfalls of the national economy at large (Shatkin 2007; Gauthier and Weinstock 2010; Paget-Seekins 2015). Unsurprisingly, the development of BRT systems in cities in China, South Africa and Brazil has been closely linked to the hosting of major sporting events in these cities such as the World Cup and the Olympics (Ahmed et al. 2008; Wilkinson 2010).

Public transport projects feed into narratives of good local governance. BRT projects became a quintessential component of the aspiration of cities in the developing world to become 'world class cities'. To this effect, BRT-advocates insisted on the importance of brand coherence and image management of the system, including that of the visual and architectural aesthetics and day to day upkeep of buses, stations, logos and other identity material. Curating the image of the BRT system contributes to customer satisfaction, to attracting users into BRT and more broadly to a perception of urban modernity and efficiency, which local authorities can leverage as part of their global marketing strategy (Cao et al. 2016). This has also been linked to state-supported processes of inner city urban recovery and improvements in land value.[15] Paget-Seekins and Tironi (2016)

[14] A 2011 Economist Intelligence Unit survey of city mayors around the world found that 61 percent considered improving roads and public transport as the key investment that could make their cities more globally competitive, twice as many mayors as who instead would favour investment in education and schooling (cited in Cervero and Dai 2014).

[15] Linked to the 2008 Olympics, BRT development in Beijing involved the forced eviction of poor inhabitants from around the projected BRT corridors, and their

and Martínez et al. (2016) noted that 'publicness' and environmental sustainability are now widely accepted as tenets of the global BRT brand, although in practice BRTs are rarely public-provided systems and their linkages to sustainability oriented finance such as GEF is increasingly questioned.[16]

Affordability, access, marginalisation

Case studies debate the impact of BRT systems on ridership dynamics. This includes debates around the extent to which given population groups benefit from the implementation of the new system, as well as the different ways in which such changes can be measured. In general terms, BRT-proponents tend to focus on registering the evolution of ridership in the system, with less attention given to broader implications and differentiated impact. Among the aspects that receive less attention are, to cite some examples, the patterns of transport monopoly that corral users into the BRT system and undermine the claims around voluntary modal changes; the trade-offs created by improvements to transport time in the system that are coming at the expense of transport time for non-users (Echeverry et al. 2005) and route changes and fare spikes that result in the marginalisation of specific social groups, even in cases where ridership increases overall.

A case in point is the outlook of BRT in Dar es Salaam, now in its second year. According to original plans, no paratransit operators would operate alongside BRT lanes. However, when the proposed BRT fares were released, amounting to more than a 50 percent price hike, the plan was modified. Paratransit operators are now allowed to operate on two overcrowded lanes which they share with private vehicles drivers, and charge 400 Tanzanian shillings. BRT buses charge 650 Tanzanian shillings and operate on segregated lanes.

relocation away from the city centre (Ahmed et al. 2008).

[16] A paradoxical case of the branding of sustainability as a BRT component is that of Curitiba. According to Martinez et al. (2016), the narrative of Curitiba as an example of environmental friendly transport development is locked in place as a key example of continued reference by the city's many corporate and financial partners. The potency of this image is such that growing evidence of the looming environmental and economic crisis in the sustainability of the BRT system is regularly ignored, since it cannot be reconciled with the city's carefully cultivated global reputation which has benefitted entrenched political groups.

The implications of this dual mode of transport provision are complex and reveal important aspects of the political economy barrier to BRT. First, the public transport ridership becomes stratified. BRT ridership can afford to pay 50 percent more than paratransit passengers to access a service which provides a much more rapid, reliable, and less polluting form of public transport. BRT fare levels acts as barriers to access for the poor, so that paratransit passengers pay less for a considerably slower, less reliable and more polluting form of public transport. From this angle, BRT therefore might appear as a regressive intervention for the poor, as scarce tax-payer money is channeled towards the construction of a public transport system that the poor cannot afford. The coexistence of these modes of transport provision also has negative implications for the sustainability of the new BRT systems. While BRT business plans assumed no competition from paratransit operators, a significant share of the market is now captured by the latter, with negative ramifications for BRT operators' revenue. What remains to be see is whether BRT in Dar es Salaam will require public subsidy, and whether this will be politically feasible.

Conclusions

This analysis cautions against understanding BRT as a 'win-win' intervention. BRT is a mode of public transport that might deliver improvements in the quality of public transport. However, this is normally associated with:

1) increases in fare levels, with negative implications for the poor's access to BRT;
2) difficulties in the incorporation of pre-existing paratransit operators;
3) the need, against the narrative put forward by advocates of BRT, for public funding to make BRT systems sustainable;
4) neglect of other forms of low carbon transport.

In light of the above, the analysis concludes by suggesting two key areas for future research on BRT and public transport.

BRT and 'the public'

Independent research is required to genuinely explore the tension between urban mass transport, seen as a public entitlement, and as a commodified service, and how this debate has shaped the evolution of BRT systems in cities across the developing world. The adoption of a BRT system poses political questions about the role of the state in the creation of public goods and triggers debates about resource allocation, the creation of rights and rents, and requires authorities to perform a difficult balancing act between the interests of passengers and private operators. The way in which these

questions are framed, and by whom, is highly context specific.

A sub-stream of research under this theme is the analysis of the financing of BRTs (whether through loans, and from which institution, or through public expenditure) and whether and how financial architecture affects the politics of BRT implementation and the public/private interface.

Alternatives to BRT

Very few BRT impact assessments extend their cost-benefit analysis to the possibility of reforming existing systems, as opposed to adopting BRTs (DeCorla-Souza 2005). Similarly, many of the indicators of success regularly used in BRT studies have contradictory effects on closer inspection. For example, the rise in land values - which is regularly praised for raising revenue potential for further BRT investment - has also led to instances of gentrification, displacement of marginalised urban dwellers away from transport hubs and a double increase in transport fees and housing rents for users (Ahmed et al. 2008; Delmelle and Casas 2012; Basset and Marpillero-Colomina 2013; Casas and Delmelle 2014; Stokenberga 2014; Bocarejo et al. 2015). [17] Similarly, modal shift and transport intensification has not always resulted from users being persuaded of the virtues of the system. With BRTs as monopolistic transport providers, alternative modes are regularly crowded out or outright stamped out. Finally, the BRT literature is symptomatically thin when accounting for cases of failure in BRT, which have received little or no attention at all.[18]

While empirical evidence may support some of the proposed effects of BRT systems, countervailing evidence has not been carefully examined, nor has it contributed to rethinking or reformulating BRT practice or scholarship. There are important methodological caveats to the blurry relationship between pro-BRT lobbies and BRT scholarship: BRTs have been in most cases only recently introduced, their effects are highly case-specific and there is not enough rigorous independent research to substantiate claims about universal effects.

[17] BRT-induced gentrification is euphemistically referred to as: ‘urban revitalisation of brownfields and abandoned properties’ (Wright and Hook 2007).

[18] Accra, Pune and Delhi are cases in point. In the case of India, the literature is quiet about the costly dismantling of the south corridor in Delhi and the failure of the Ahmedabad BRT system to operate profitably (*Times of India* 2016).

References

Adewumi, E. and D. Allopi. 2013. Rea Vaya: South Africa's First Bus Rapid Transit System. *South African Journal of Science* no.109 (7/8)

Agyemang, E. 2015. The Bus Rapid Transit System in the Greater Accra Metropolitan Area, Ghana: Looking Back to Look Forward. *Norsk Geografisk Tidsskrift - Norwegian Journal of Geography*, 69 (1): 28-37.

Ahmed, Q. I., H. Lu, and S. Ye. 2008. Urban Transportation and Equity: A Case Study of Beijing and Karachi. *Transportation Research Part A: Policy and Practice*, 42 (1): 125-139.

Alpkokin, P. and M. Ergun. 2012. Istanbul Metrobüs: First Intercontinental Bus Rapid Transit. *Journal of Transport Geography*, 24: 58-66.

Ardila Gómez, A. 2005. La olla a presión del transporte público en Bogotá. *Revista de Ingeniería* (Universidad de Los Andes), 21: 56-67.

Badami, Sudhir P. 2005. Case for a Bus Rapid Transit System in Mumbai. *Economic and Political Weekly*, 40 (41): 4409-4412.

Badami, Sudhir P. 2010. Will Mumbai Prioritise the Bus Rapid Transit System? *Economic and Political Weekly,* 45 (20): 32-34.

Bassett, Thomas. E. and A. Marpillero-Colomina. 2013. Sustaining Mobility: Bus Rapid Transit and the Role of Local Politics in Bogota. *Latin American Perspectives*, 40 (2): 135-145.

Bocarejo, J.P., I. Portilla, and D. Melendez. 2015. Social Fragmentation as a Consequence of Implementing a Bus Rapid Transit System in the City of Bogota. *Urban Studies*, 53 (8): 1617-1634.

Breithaupt, M. 2008. Recent Developments in Bus Rapid Transit (Including Financing). Paper read at Cities for Mobility – World Congress 2008, at Stuttgart, http: //www.cities-for-mobility.net/documents/wc08/cfm_world_congress_workshop_a_gtz.pdf

Cao, J., X. Cao, C. Zhang, and X. Huang. 2016. The Gaps in Satisfaction with Transit Services among BRT, Metro, and Bus Riders: Evidence from Guangzhou. *Journal of Transport and Land Use*, 9 (3): 97-109.

Casas, I. and E. C. Delmelle. 2014. Identifying Dimensions of Exclusion from a BRT

System in a Developing Country: A Content Analysis Approach. *Journal of Transport Geography*, 39: 228-237.

Cervero, R. and D. Dai. 2014. BRT TOD: Leveraging Transit Oriented Development with Bus Rapid Transit Investments. *Transport Policy*, 36: 127-138.

Danaher, A., H. S. Levinson and S. L. Zimmerman. 2007. *The Bus Rapid Transit Practitioner's Guide*. Washington, D.C.: Transportation Research Board.

DeCorla-Souza, P. 2005. Trade-Off for Road Pricing Between Transportation Performance and Financial Feasibility. *Transportation Research Record: Journal of the Transportation Research Board*, 1932: 23-32.

Delmelle, E. C. and I. Casas. 2012. Evaluating the Spatial Equity of Bus Rapid Transit-Based Accessibility Patterns in a Developing Country: The Case of Cali, Colombia. *Transport Policy*, 20: 36-46.

Deng, T., M. Ma, and J. Wang. 2013. Evaluation of Bus Rapid Transit Implementation in China: Current Performance and Progress. *Journal of Urban Planning and Development*, 139 (3): 226-234.

Deng, T. and J. D. Nelson. 2011. Recent Developments in Bus Rapid Transit: A Review of the Literature. *Transport Reviews*, 31 (1): 69-96.

Deng, T. and J. D. Nelson. 2013. Bus Rapid Transit implementation in Beijing: An Evaluation of Performance and Impacts. *Research in Transportation Economics*, 39 (1): 108-113.

Ealey, L. A. and A. C. Gross. 2008. The Global Market for Buses, 2000-2010. *Business Economics*, 43 (2): 69-76.

Echeverry, J. C., A. M. Ibáñez, and A. Moya. 2005. Una evaluación económica del Sistema TransMilenio. *Revista de Ingeniería* (Universidad de Los Andes), 21: 68-77.

Engelskirchen, M. 2011. Sustainable Transport: A Sourcebook for Policy-makers in Developing Cities. Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), http: //mirror.unhabitat.org/downloads/docs/8858_57875_2_Dakar2010_GTZ_Sourcebook_0710 2010.pdf

Filipe, L. N. and R. Macário. 2013. A First Glimpse on Policy Packaging for Implementation of BRT Projects. *Research in Transportation Economics*, 39 (1): 150-157.

Filipe, L. N. and R. Macário. 2014. Policy Packaging in BRT Projects: A Methodology for Case Study Analysis. *Research in Transportation Economics*, 48: 152-158.

Finn, B. 2013. Organisational Structures and Functions in Bus Rapid Transit, and Opportunities for Private Sector Participation. *Research in Transportation Economics*, 39 (1): 143-149.

Finn, B. and J. C. Muñoz. 2014. Workshop 2 Report: Bus Rapid Transit. *Research in Transportation Economics*, 48: 116-125.

Fjellstrom, K. 2010. Bus Rapid Transit in China. *Built Environment*, 36 (3): 363-374.

Flores-Dewey, O. and C. Zegras. 2012. The Costs of Inclusion: Incorporating Existing Bus Operators into Mexico City's Emerging Bus Rapid Transit System [Draft]. Department of Urban Studies and Planning, Massachusetts Institute of Technology, http: //web.mit.edu/czegras/www/Flores_Dewey_and_Zegras_Metrobus_FinalDraft.pdf

Fouracre, P., C. Dunkerley, and G. Gardner. 2003. Mass Rapid Transit Systems for Cities in the Developing World. *Transport Reviews*, 23 (3): 299-310.

Gallagher, C. 2017. *A political economy analysis of the Delhi Bus Rapid Transit System: the subjugation of a pro-poor plan*. SOAS, MSc Economics Dissertation.

Gauthier, A. and A Weinstock. 2010. Africa: Transforming Paratransit into BRT. *Built Environment*, 36 (3): 317-327.

Gilbert, A. 2008. Bus Rapid Transit: Is Transmilenio a Miracle Cure? *Transport Reviews*, 28 (4): 439-467.

Godard, X. 2013. Comparisons of Urban Transport Sustainability: Lessons from West and North Africa. *Research in Transportation Economics*, 40 (1): 96-103.

Gómez-Lobo, A. 2012. The Ups and Downs of a Public Transport Reform: The Case of Transantiago. Departamento de Economía, Universidad de Chile, Working Paper STD, 354, http: //www.econ.uchile.cl/uploads/publicacion/479bc827d4ea165274125814b5889d03b0353b8f.pdf

Gwilliam, K. 2002. *Cities on the Move: A World Bank Transport Strategy Review*. Washington, D.C.: The International Bank for Reconstruction and Development/The World Bank.

Gwilliam, K. 2013. Cities on the Move – Ten Years after. *Research in Transportation Economics,* 40 (1): 3-18.

Hidalgo, D. and A. Carrigan. 2010a. BRT in Latin America – High Capacity and Performance, Rapid Implementation and Low Cost *Built Environment*, 36 (3): 283-297.

Hidalgo, D. and A. Carrigan. 2010b. *EMBARQ: Modernizing Public Transportation. Lessons Learned from Major Bus Improvements in Latin America and Asia*. Washington, D.C.: World Resources Institute.

Hook, W. 2005. Institutional and Regulatory Options for Bus Rapid Transit in Developing Countries: Lessons from International Experience. The Institute for Transportation and Development Policy (New York), https: //www.itdp.org/wp-content/uploads/2014/07/Institutional_and_Regulatory_Options_for_Bus_Rapid_Transit_in_Developing_Countries.pdf

Kominek, Z. 2005. Filling the Gap in Urban Transport: Private Sector Participation in Transition Countries. European Bank for Reconstruction and Development, Working Paper 93, http://web.mit.edu/11.951/oldstuff/albacete/Other_Documents/Europe%20Transport%20Conference/innovative_transport_i/filling_the_gap_in1502.pdf

Kumar, A., S. Zimmerman, and O. P. Agarwal.2012. International Experience in Bus Rapid Transit (BRT) Implementation: Synthesis of Lessons Learned from Lagos, Johannesburg, Jakarta, Delhi, and Ahmedabad. Sub-Saharan Africa Transport Policy Program (SSATP)/Australian Agency for International Development Aid (AusAID), http: //documents.worldbank.org/curated/en/165891468193507898/pdf/693080ESW0P12100of0BRT0Experiences.pdf

Levinson, H. S., S. Zimmerman, J. Clinger, J. Gast, S. Rutherford, and E. Bruhm. 2003. *Bus Rapid Transit, vol. 2: Implementation Guidelines.* Washington, D.C.: Transportation Research Board.

Libertad y Desarrollo. 2011. Transporte público de Santiago: usuarios no perciben mejoras. *Libertad y Desarrollo*, 1.017: 1-4.

Lindau, L. A., L. A. dos Santos Senna, O. Strambi, and W. Colombini Martins. 2008. Alternative Financing for Bus Rapid Transit (BRT): The Case of Porto Alegre, Brazil. *Research in Transportation Economics*, 22 (1): 54-60.

Martínez, J. G., I. Boas, J. Lenhart, and A. P. J. Mol. 2016. Revealing Curitiba's Flawed Sustainability: How Discourse Can Prevent Institutional Change. *Habitat International*, 53: 350-359.

Mathur, S. 2015. Sale of Development Rights to Fund Public Transportation Projects: Insights from Rajkot, India, BRTS Project. *Habitat International*, 50: 234-239.

Matsumoto, N. 2007. Analysis of Policy Processes to Introduce Bus Rapid Transit Systems in Asian Cities from the Perspective of Lesson-drawing: Cases of Jakarta, Seoul, and Beijing. Institute for Global Environmental Strategies, https: //pub.iges.or.jp/system/files/publication_documents/pub/presentation/487/baq_matsumotopaper_revised0707.pdf

Mejía-Dugand, S., O. Hjelm, L. Baas, and R A. Ríos. 2013. Lessons from the Spread of Bus Rapid Transit in Latin America. *Journal of Cleaner Production*, 50: 82-90.

Menckhoff, G. 2012. Latin-American Experience with Bus Rapid Transit. Paper read at 5th International Environmentally Friendly Vehicle Conference, 10-12 September 2012, at Baltimore, https: //www.regonline.com/custImages/320000/324319/Menckhoff.pdf

Mitric, S. 2006. Urban Transport for Development: World Bank's Strategic Framework for Urban Transport. Paper read at Conference on Cooperation for Urban Mobility in Developing World (CODATU XII), 5-7 July 2006, at Lyon, www.codatu.org/wp-content/uploads/World-Banks-strategic-framework-for-urban-transport-S.-Mitric.pps

Mitric, S. 2013. Urban Transport Lending by the World Bank: The Last Decade. *Research in Transportation Economics*, 40 (1): 19-33.

Mizuoka, F. and K. Shimono. 2013. Capitalist Regulation and Rescaling of Public Transport Governance: A Case of Nigeria *Hitotsubashi Journal of Economics,* 54 (2): 251-277.

Muñoz, J. C., M. Batarce, and D. Hidalgo. 2014. Transantiago, Five Years after Its Launch. *Research in Transportation Economics*, 48: 184-193.

Muñoz, J. C. and D. Hidalgo. 2013. Workshop 2: Bus Rapid Transit as Part of Enhanced Service Provision. *Research in Transportation Economics*, 39 (1): 104-107.

Muñoz, J. C., J. de Dios Ortúzar, and A. Gschwender. 2008. Transantiago: The Fall and Rise of a Radical Public Transport Intervention. In *Success and Failure of Travel Demand Management: Is Road User Pricing the Most Feasible Option?*, edited by Wafaa Saleh and

Gerd Sammer, 151-172. Aldershot: Ashgate.

Paget-Seekins, L. 2015. Bus Rapid Transit as a Neoliberal Contradiction. *Journal of Transport Geography*, 48: 115-120.

Paget-Seekins, L. and M. Tironi. 2016. The Publicness of Public Transport: The Changing Nature of Public Transport in Latin American Cities. *Transport Policy*, 49: 176-183.

Patel, S. B. 2006. Advantages of Bus Rapid Transit Systems. *Economic and Political Weekly*, 41 (20): 2035.

Ponnaluri, R. V. 2011. Sustainable Bus Rapid Transit Initiatives in India: The Role of Decisive Leadership and Strong Institutions. *Transport Policy*, 18 (1): 269-275.

Rizzo, M. 2013. Informalisation and the End of Trade Unionism as We Knew It? Dissenting Remarks from a Tanzanian Case Study. *Review of African Political Economy*, 40 (136): 290-308.

Rizzo, M. 2014. The Political Economy of an Urban Megaproject: The Bus Rapid Transit Project in Tanzania. *African Affairs*, 114 (455): 249-270.

Ross, B. 2016. Big Philanthropy Takes the Bus. *Dissent* (Summer): 128-135.

Salazar Ferro, P. and R. Behrens. 2015. From Direct to Trunk-and-Feeder Public Transport Services in the Urban South: Territorial Implications. *Journal of Transport and Land Use*, 8 (1): 123.

Salazar Ferro, P., R. Behrens, and P. Wilkinson. 2013. Hybrid Urban Transport Systems in Developing Countries: Portents and Prospects. *Research in Transportation Economics*, 39 (1): 121-132.

Salon, D. and S. Shewmake. 2011. Opportunities for Value Capture to Fund Public Transport: A Comprehensive Review of the Literature with a Focus on East Asia. Asian Development Bank/The Institute for Transportation and Development Policy, https: //www.itdp.org/wp-content/uploads/2014/07/Salon_and_Shewmake_Opportunities_for_Value_Capture_to_Fund_Public_Transport.pdf

Schalekamp, H. and R. Behrens. 2010. Engaging Paratransit on Public Transport Reform Initiatives in South Africa: A Critique of Policy and an Investigation of Appropriate Engagement Approaches. *Research in Transportation Economics*, 29 (1): 371-378.

Schalekamp, H. and R. Behrens. 2013. Engaging the Paratransit Sector in Cape Town on Public Transport Reform: Progress, Process and Risks. *Research in Transportation Economics*, 39 (1): 185-190.

Shatkin, G. 2007. Global Cities of the South: Emerging Perspectives on Growth and Inequality. *Cities,* 24 (1): 1-15.

Smith, J. J. and T. A. Gihring. 2016. *Financing Transit Systems through Value Capture: An Annotated Bibliography*. Victoria Transport Policy Institute, http: //www.vtpi.org/smith.pdf

Stokenberga, A. 2014. Does Bus Rapid Transit Influence Urban Land Development and Property Values: A Review of the Literature. *Transport Reviews*, 34 (3): 276-296.

Suzuki, H., J. Murakami, Y-H. Hong, and B. Tamayose. 2015. *Financing Transit-oriented Development with Land Values: Adapting Land Value Capture in Developing Countries*. Washington, D.C.: World Bank.

UN-Habitat. 2015. *The Challenge of Local Government Financing in Developing Countries*. Nairobi: UN-Habitat.

Walters, J. and J.J. Cloete. 2007. The South African Experience with Negotiated Versus Competitively Tendered Bus Contracts. Conference proceedings of the 10th THREDBO Conference, 12-17 August 2007, at Hamilton Island (Australia), https: //ses.library.usyd.edu.au//bitstream/2123/6079/1/thredbo10-themeC-Walters-Cloete.pdf

Walters, J. and G. Heyns. 2012. Problems with the Implementation of Bus Transport Contracting in South Africa. *Journal of Transport and Supply Chain Management*, 6 (1): 35-54.

Weinstock, A., W. Hook, M. Replogle, and R. Cruz. 2011. *Recapturing Global Leadership in Bus Rapid Transit: A Survey of Select U.S. Cities*. New York: ITDP.

Wilkinson, P. 2010. The Regulatory Cycle Stalled? An Assessment of Current Institutional Obstacles to Regulatory Reform in the Provision of Road-based Public Transport in Cape Town, South Africa. *Research in Transportation Economics*, 29 (1): 387-394.

Willoughby, C. 2013. How Much Can Public Private Partnership Really Do for Urban Transport in Developing Countries? *Research in Transportation Economics*, 40 (1): 34-55.

Wirasinghe, S. C., L. Kattan, M. M. Rahman, J. Hubbell, R. Thilakaratne, and S. Anowar. 2013. Bus Rapid Transit – A Review. *International Journal of Urban Sciences*, 17 (1): 1-31.

Wood, A. 2014. Learning through Policy Tourism: Circulating Bus Rapid Transit from South America to South Africa. *Environment and Planning A*, 46 (11): 2654-2669.

Wood, A. 2015a. Competing for Knowledge: Leaders and Laggards of Bus Rapid Transit in South Africa. *Urban Forum*, 26 (2): 203-221.

Wood, A. 2015b. Multiple Temporalities of Policy Circulation: Gradual, Repetitive and Delayed Processes of BRT Adoption in South African Cities. *International Journal of Urban and Regional Research*, 39 (3): 568-580.

Wood, A. 2015c. The Politics of Policy Circulation: Unpacking the Relationship between South African and South American Cities in the Adoption of Bus Rapid Transit. *Antipode*, 47 (4): 1062-1079.

World Bank. 2010. From Chaos to Order: Implementing High Capacity Urban Transport Systems in Colombia. IBRD Results. Washington, D.C.: World Bank. http: //documents.worldbank.org/curated/en/660481468018057379/From-chaos-to-order-implementing-high-capacity-urban-transport-systems-in-Colombia

Wright, L. 2004a. *Bus Rapid Transit Planning Guide*. Eschborn: GTZ.

Wright, L. 2004b. *Sustainable Transport: A Sourcebook for Policy-makers in Developing Cities*, *Module 3b: Bus Rapid Transit.* Eschborn: GTZ.

Wright, L. 2010. Bus Rapid Transit: A Public Transport Renaissance. *Built Environment*, 36 (3): 268-273.

Wright, L. and K. Fjellstrom. 2005. *Sustainable Transport: A Sourcebook for Policy-makers in Developing Cities, Module 3a: Mass Transit Options.* Eschborn: GTZ.

Wright, L. and W. Hook. 2007. *Bus Rapid Transit Planning Guide.* New York: Institute for Transportation and Development Policy.

Wu, I. and D. Pojani. 2016. Obstacles to the Creation of Successful Bus Rapid Transit Systems: The Case of Bangkok. *Research in Transportation Economics* (in press).

Section 4: Engineering cultures: Knowledge and meaning in transport infrastructure

For anthropologists, objects carry meaning. Objects, such as transport infrastructure, are more than material and technology; they interact with the social world and become part of the social world. Anthropologists can therefore study objects such as roads and other transport infrastructures without considering engineering or land acquisition law, peculiar as this may sound for those who build infrastructures. Infrastructures are not simply technologies, they also establish the invisible rules that govern people's everyday lives.

This section provides an overview of the kinds of things anthropologists have studied with regards to roads, engineers and infrastructure messaging and then outlines what an anthropological approach to transport knowledge and project implementation might look like, demonstrating how critical engagement between anthropologists and city-level engineers could create possibilities for developing new transport agendas.

Roads, meaning and power

Augé (1995) famously theorised the 'non-place' of the motorway; however, the fame of this idea is rather at odds with the conventional wisdoms in anthropology where roads are seen as rather rich places, where a lot happens as part of the social lives of those who use them, live close by and for others who just know of or imagine them. Roads emerge in the literature as potent sites of meaning and culture in which ideas such as hope and desire, fear and danger, nationalism and hatred are brought into sharp relief (Trankell 1993; Masquelier 2002; Dalakoglou 2010; Lee 2012).

New urban roads variously divide communities or may become boundaries along which ethnic, tribal or class distinctions are traced. In other contexts, new roads may represent the state, modernity or some form of urban renewal. Often new urban roads and other infrastructures can symbolise the end of traditional ways of doing things (Taussig 1980; Roseman 1996; Mostowlansky 2017). In other words, roads alter the shape of things and have qualities all of their own, which exist outside the materials of their construction.

Roads are built to improve traffic flow, to temporarily reduce congestion, to bypass somewhere, to pass through

somewhere else and to reduce the unit cost of transport. Other people may build roads to bring civilisation to a rude country, to bring producers closer to a market, a port closer to a city, or an army closer to a site of potential conflict ('closer' here means in time and with oil, see Rosa 2013; Urry 2013). Some people believe that roads bring peace; others think roads bring trouble (Melly 2013). Roads may be part of an attempt to establish a democratic utopia, even if they often also deepen inequality. Many build roads for investment, seeing profits in tolls, kickbacks, land prices, corruption and allied construction opportunities. Roads have been analysed as symptoms of technological phases and financial fashions. Historical analysis of road finance, for example, reveals the coming and going of phases of public and private ownership, reflecting broader shifts in political mood (Guldi 2012). At another level altogether, roads are part of the continued appeal of the story of individual freedom and movement, and the grand narratives of modernisation and progress (Urry 2007; Cresswell and Merriman 2011).

In Africanist anthropology, for example, roads are often seen as symbolic of the former colonial period, and as such are markers of time. The colonial state in the Democratic Republic of Congo was known as *Bula Matari* (breaker of rocks), in part because of its rapacious road building agenda. *Bula Matari* also came to mean an irresistible force that crushed all resistance (Young and Turner 1985). In a similar vein, Freed (2010) has described how the French colonial administration of Central Africa used roads as tools of governance, but also as a flexible form of technology which allowed them to utilise local materials and unskilled forced labour, with road building as one of the most contested of the colonial encounters.

Building and maintaining roads through forced labour brought many Africans into contact with the colonial state (Masquelier 2002). Grand projects of road and rail construction facilitated population movements across empires, centralised authority, formed circuits of migrant labour, transformed social life and changed the face of a continent. In the Francophone colonies, road-building efforts were organised by the distinction between *Africa utile* and *Africa inutile* ('useful' and 'useless' Africa), resulting in a concentration of infrastructure focused on extractive industries and ports, while the hinterlands languished. Such ideas continue to shape regional political

economies in Africa today (Ferguson 2006).

Engineers have been studied as integral to these forms of colonial governance and processes of state formation. Historians have discussed ways in which transport and civil engineers became part of the 'infrastructural state' in Britain in the eighteenth and nineteenth centuries (Guldi 2012). In the colonial world, particularly so in South Asia, the engineering of monumental civic buildings, grand trunk routes, canal systems, docks and telegraph networks helped Britain develop the collective capacity to dominate and, as such, infrastructure became a foundational and legitimating principle of power (Mukerji 2003: 656).

The literature on colonial engineers and planners clearly demonstrates how their activities made concrete inequality and produced certain kinds of submissive subject, their work being often uneven, and conducted demonstrably in pursuit of colonial aims and ambitions. They contributed to making the self-serving ideas of colonial governments, inscribing hierarchies of race, gender and caste and tribe on populations. Understood in this way, infrastructure has the capacity to create and enforce meanings and messages far beyond its stated purpose.

Historians have hindsight on their side; it is much harder to untangle with such certainty the motivations and hidden messages in transport infrastructure and planning in urban centres today. There are, however, lessons to be learned from the historian's concern with power that alert us to some of the possible locations where ideology and state or private interest might orient particular kinds of decision-making (such as the rise and now fall of BRT, discussed below and in Section 3). It is also the case that in many cities the colonial legacy of land distribution and use, and the orientation of transport networks continue to play a significant role in the postcolonial construction of urban space.

In the post-colonial period, roads became symbolic of failed statehood (Mbembe 2000; Mains 2012). In Zaire (now the DRC) the diminishing network of tarred roads was seen as indicative of Mobutu's misrule more generally (Young and Turner 1985). Roitman (2006) reports how roads in the Chad Basin become central to new forms of extra-state regulation, carefully negotiated between urban merchants, state officials and bandits (known as *les coupeurs de route* or those who cut off the roads).

In addition to colonialism, power, governance and informality, another strand of the anthropological literature

on infrastructure in Africa focuses on the relationship between transport, modernity and the occult (Comaroff and Comaroff 1993; Geschiere 1997). In Ghana, for example, Klaeger (2009) associates roads with spiritual forces, bewitched vehicles and the curses of gods and ghosts. In Niger, Masquelier (1992, 2002) links deadly road spirits to the perils and possibilities of modern life. The road ghosts bear a striking resemblance to the seductive creatures of Western advertisements. Chilson's (1999) evocative account of road culture in Niger looks at, among other things, the sociality of humans and spirits on the road. Saunders (2008) examines the relationship between the privatisation of transport in Tanzania and the appearance of devils on the road. Morris (2010) argues that auto-mobility in South Africa is the condition of the rich, with symbolic and imaginative possibilities for the poor, which involve a mixture of fear, desire, speed, sexuality and sovereignty against a backdrop of a history of roads, cars and violent carjacking.

Other literature referring explicitly to roads in Africa examines (the following are representative rather than exhaustive) the semiotics of road signs and monuments (Oha 2000; Quayson 2010), the costs of maintenance (Gwilliam et al. 2008), the high casualty rates on the 'world's deadliest' roads (Peden et al. 2013), and the spread of HIV (Djemai 2009) and more recently Ebola (Leach et al 2010). Lamont (2012, 2013) has provocatively theorised mobility and the 'accidental' against the backdrop of development and 'infrastructural governance' and road safety campaigns in Kenya.

More generally, there is a useful body of work on the relationship between the state, citizenship and other forms of infrastructure, which makes a similar point about the relationship of the material to 'magical' or 'political' power: Wafer (2012) on municipal services in post-Apartheid Soweto; Schnitzler (2013) on electric meters and social contestation in South Africa; Chalfin (2014) on toilets and sanitation in Ghana; and Beck (2013) on the culture of highway stops.

The various bodies of work discussed above demonstrate the relationships between road building, power and control. However, we can also see how roads become the sites through which history is (re)made, notions of citizenship are forged, and where capitalism operates in its most extreme and enchanting forms (Dalakoglou 2012). Roads cease to be anodyne or the neutral means to a destination and instead become artefacts of culture and politics,

mediums of change and hope, and vehicles of state-building, liberation and oppression. Roads tie construction to notions of religion, time and agency (Verrips and Meyer 2001).

The claim of this section is that because transport infrastructures, such as roads, are potent and meaningful places, that there is mileage in connecting the engineering and planning aspects of infrastructure with anthropological approaches. From the perspective of anthropology, this engagement is twofold: first with the knowledge and practice of engineers themselves and, then, secondly, to theorise what happens in the gap between the two perspectives. Ultimately, this is to ask questions about the relationship between infrastructure as a technical object and its use and imagination as a social object. In this largely unfamiliar and un-theorised space, lie some of the most significant barriers and possible solutions to the reduction of carbon emissions in urban transport.

Messaging: Selling infrastructure and other ideas

Engineers, governments and politicians present and promote infrastructure to recipient and affected populations. This may take the form of outright hype or more subtle forms, in which infrastructure is associated with healthy and productive citizens. A better understanding of good and bad practices (intentional and unforeseen) seems essential given that urban infrastructure has once again reached the top of the development agenda (this time in the name of sustainability) and is presented as a key tool in resilience, mitigation and adaptation policies. The ways in which infrastructure is presented to people and tied to ideas about sustainability, carbon futures or citizenship can, we hypothesise, play a significant role in the ‘take up’ or abandonment of projects, i.e. the barriers to implementation. Importantly, such ‘messaging’ can also be used to promote other kinds of behaviour, such as those which reduce carbon consumption and therefore contribute to development goals. We suggest that successful infrastructure is more than ‘building stuff’ and ‘engineering’, it can also include the engineering of minds to create the conditions in

which change and sacrifice are acceptable and even desirable.

In this, we are not saying that adverts can be put on the side of buses. We are pointing to the invisible and unspoken powers of infrastructures to fashion subjectivities and to engage with the world in very particular ways, ways that are open to change – if understood in the way that anthropology treats these registers of knowledge and human engagement.

Transport infrastructures traverse the ground between the people and the state, through domains of private and entrepreneurial activity, offer visions or blueprints for the future, and are used as root metaphors in many social science understandings of the world today. To treat infrastructure solely as an engineering or logistical challenge is misguided, which, not only itself produces the possibility that the project will fail, but also neglects the opportunity to change ideas, ways of thinking, and the nature of urban space itself. The 'cultural work' of infrastructure is tied to powerful notions of modernity and progress, and can therefore also be harnessed to influence other ideas which may, for example, directly hinder the implementation of low carbon/collective transport.

The cities of the Global South are crowded and the deconstruction of urban certainties, heritage and communities required to make way for infrastructure often brings understandable discontent, protest and posturing. The technology itself may be rejected or underutilised (as in the case of the metro in Jaipur and BRT in Delhi where there was organised non-compliance). There is work to be done in understanding the history, reception and execution of each project. The influence and methods of local lobbyists, media and financial brokers play roles in the way infrastructure is communicated. What claims and judgements are presented and at what intervals? How and why do the claims made for infrastructure vary at different levels of government?

Many modern urban infrastructure projects are branded, employ teams of publicists and may even have their own promotional materials such as films, songs, posters and T-shirts. At stake here are questions of inequality, rights, mobility and collective and individualised modes of transport. Who is the infrastructure for? Whose sustainability is being planned for? And, to what end? Infrastructural messages are conveyed in speeches, passed to journalists and advertisers, and presented in rituals, nomenclature and imagery to

recipient and affected populations. These materials, produced by financiers, political backers, planners and engineers, are revealing of the ways in which they knowingly and unwittingly present infrastructure solutions.

Some projects fail because of poor engineering and planning, but others may fail because there is insufficient buy-in from affected populations, a mismatch between expectations and actual use, or, perhaps more commonly and influentially, there is a cultural reluctance to engage in a particular form of urban transport infrastructure. In contrast, other projects are tremendously successful, bringing about social justice, prosperity and pride and might become models of good practice (this was true of projects undertaken in Ahmedabad such as BRT). What can we learn for the future from the successes (and failings) of communication around infrastructure? We suggest and explore further below that there is a great deal of research to be done in this field. The structure of a research agenda has to be inter-disciplinary, reflexive and designed to understand the gap between the infrastructure of the engineer and the infrastructure of the anthropologist.

Transport engineering as cultural practice: Knowledge networks and everyday politics

This section will briefly outline what it is that anthropologists do, before considering what critical engagement between anthropologists, urban engineers and planners might illuminate, particularly with regards to the production of knowledge and the micro political processes through which transport infrastructure is brought into being.

To really understand the thinking and operational logic of another profession or discipline is to embark on a training in that discipline. Many anthropologists would see this as fieldwork, learning to see the world how the ‘natives’ see it (in this case, the ‘natives’ are engineers and planners). There is considerable effort involved in this process and it takes the time anthropologists think of as fieldwork. Fieldwork allows anthropologists to participate and observe in the daily lives of the ‘natives’, learning what is a joke and what is serious. Effort will be made to learn the vernacular language and to understand the idioms of expression. At a higher level, the aim is to learn about the culture of the ‘natives’ and how they see the world and understand those around them. However, this is only the first step.

The second move is to think beyond this culture – a process made easier by having

had to learn it, gradually, often painfully, through fieldwork – and to critically engage with its premises, assumptions, aims and objectives. This is what much qualitative social science research aims to do. In trying to explain what anthropologists do, Hastrup (2004) suggests anthropology is a kind of explanation beyond the truth of events themselves. Anthropology is not simply knowledge about particular events, practices and ideas, but about the processes by which these come to appear meaningful, inevitable or mandatory, contestable or ridiculous.

It is important to stress that anthropology is not just about elucidating and exposing what constitutes common sense. Rather, anthropology does the work to understand the logic of that common sense and then, significantly, makes an additional move to understand the values and meta-ideas which exist in order to allow something to appear as natural and proper – to appear as common sense. To take this a step further, common sense itself is a highly political and cultural value that has implications for the ways in which engineers engineer and planners plan. These observations also have consequences for those who interact with their work, whether as passengers, customers, protesters and saboteurs, or as those who wish to understand the barriers to the implementation of low carbon transport technologies.

The production of knowledge and its effects: The case of BRT

The knowledge of the engineer or planner might be seen as technical, applied and positivist. However, in the social science world there is a large body of literature that explores the fallacy of popular notions about the certainty and truthfulness of science. This literature points to the fact that many scientific innovations are based on serendipity, chance and funding regimes (Latour 1987). Anthropologists thus see engineering or transport theory not as a pristine terrain of logic and reason, but as a field of power, influence and competition in which different paradigms are promoted or decried as a reflection of the interests of powerful groups. In other words, engineering and planning knowledge is not value neutral, but part of the broader world in which knowledge is constructed and presented in particular ways.

BRT offers a useful starting point for thinking through how knowledge about infrastructure is produced, and the political consequences of the messages this technology communicates. This example shows how stories developed and packaged in terms of transport innovation can have particular effects. In the case of BRT, these messages are about success and have been aimed primarily at urban planners, city-level governments and engineers, rather than at urban populations.

In this instance, the story of BRT has been so successful that it has distorted decision-making and has itself become a barrier to the implementation of other low carbon transport solutions, such as walking or bicycles.

The evidence base on BRT is strongly political and built from the interplay between the economic and political interests that promote such schemes. There is a trend in BRT studies for scholars, researchers and consultants assessing BRT to work under commission for one or several of the organizations set up to promote this technology. This has contributed to creating a consensus around BRT practice – a standard narrative that posits BRT as a good thing – that is difficult to critically interrogate, without appearing contrary.

Furthermore, and significantly, it is difficult to understand the barriers to the implementation of BRT – protests, demonstrations and strikes – if the narrative only suggests that BRT is a 'win-win' intervention. Those who raise dissenting voices are evidently able to see other forms of truth and consequences. The idea of BRT as a straightforward technical fix can be questioned only when we understand something of the broader environment in which BRT knowledge has been created, distributed and sustained.

Behind much of the research on BRT, and supporting the narrative that portrays it as the solution to urban transport problems in developing countries, lies a tightly knit web of institutions with interests in the promotion of BRT. The World Bank is the key player, for it provides not only the loans to make BRTs happen in many instances, but also funding for some of the most supportive research.

Another important actor is Volvo, which supplies buses to many BRT systems. The Volvo Education Research Foundation also supports the 'Across Latitudes and Cultures – Bus Rapid Transit', which is the BRT Centre of Excellence, whose members include four academic institutions and EMBARQ.[19] EMBARQ (set up by Shell) is now the WRI Ross Centre for Sustainable Cities. It credits itself with having played a major role in expanding the BRT concept to cities throughout the world. It is also one of the organizations behind 'Global BRT data', the most up to date dataset on BRTs.[20]

The Institute for Transportation and Development Policy (ITDP), a Washington-based NGO, has been actively involved wherever BRTs are implemented. ITDP's growth, from a small advocacy NGO to an organization with over 60 staff members in

[19] See: http://www.brt.cl/about-us/members

[20] On the current figure see Global BRT Data <http://brtdata.org/#/location>.

offices across Africa, Asia and Latin America, has been associated with access to BRT funding. ITDP has played different roles in this capacity. It produced a BRT planning guide, carried out pre-feasibility studies in various cities, signposted potential new sources of funding for BRTs, and has been at the forefront of studies on BRT impacts (Matsumoto 2007).

In 2011, the ITDP Board of Directors, a proxy to whom the NGO is accountable, included the managing director of the Goldman Sachs Urban Investment Group, a representative from the global investment firm Carlyle Group, and two representatives of the World Bank, including a retired former Vice-President. These are all examples of institutions that present Bogotá's TransMilenio – and BRT more broadly – as a success.

Second, and related to the economic interests of the main actors promoting BRT, much of the literature on BRTs suffers from what might be thought of as apolitical technicalism. The strong focus on the technical features of BRTs, such as ridership numbers, speed of travel, distance between bus stops and CO_2 emissions, fails to pay adequate attention to the politics and distributional impacts that the adoption of BRT systems, and the move away from previous systems of public transport, present.

In sum, a key feature of the evidence base on BRTs is that it is largely produced by organizations and corporations with interests in promoting the BRT model, not least because this type of transport development fits with their commercial and/or political agendas. Funding from such sources may compromise or undermine the academic independence of much of the existing knowledge base on BRT and helps to explain its silence on the social and economic tensions generated by the adoption of BRTs, as well as the lack of attention towards those who stand to lose from their introduction.

That there are key institutions promoting a particular technology in a key transport sector is not in itself particularly surprising. Some sectors of international finance have taken interest in opening up urban public transport markets – and more broadly public utilities markets – in developing countries, and in the funding of the infrastructural work they require. [21] However, the degree and spread of such influence is perhaps hard to see for those inside this world, who view these connections as common-sensical, mundane and hardly worthy of comment.

[21] See Hall (2015) on the failings of public-private partnerships.

For the anthropologist, interested in where ideas come from and how they develop and maintain legitimacy, such webs of connections are deeply important. A standard narrative has emerged in which the BRT is a 'win-win' intervention in urban transport design. One of the consequences has been to prioritise BRT in many urban settings over and above other forms of low carbon transport. Despite the success of the BRT message and the unquestionable influence of its supporters, there are those who still manage to see around the hype, viewing BRT as little more than a Trojan horse for further urban highway development and for the continued expansion of bus and petrol-based transport solutions (Ross 2016).

As the BRT example usefully illustrates, those making decisions about transport are compelled to engage with various and intersecting networks of knowledge. In other words, sets or chains of expertise come together in particular configurations around urban transport projects. An attempt to understand the ways in which such distributed cognition effects the creation of networks of mobility is an understudied topic. How do the forms of knowledge that exist in the extensive range of institutions that come together in a particular transport project understand and relate to one another? What are the interfaces like between finance, marketing, political offices, construction firms and indeed engineers and planners? Such relationships are not only under-researched they are also often unwritten and tacit forms of knowledge that are difficult to articulate and codify. Anthropologists might call this knowledge 'embodied' as it is largely unspoken and becomes part of people's everyday activity. Understanding the embodied knowledge of engineers – and the ways in which a transport project may bring together a range of such knowledge – is, we argue, key to unpacking the ways in which transport projects come into being.

Engineers and planners, among others, have become part of globalised networks of decision makers. Many engineers are themselves part of global consultancy firms and networks of knowledge. These people might feel part of international discourse and see the possibilities for global agendas. However, there are many others, perhaps more influential at the local level, who work in vernacular ways and continue the traditions of their offices and institutions. There appears to be a disconnect between the two which also acts as a break in communication between local and global ideas and priorities. Careful ethnographic study of the ways in which knowledge – whether it be about BRT or climate change – is understood in any particular location, and how these situated understandings link to broader national and global discourses, would not only illuminate how transport knowledge is differentiated according to

context, but generate insights into how closer alignment between the multitude of different actors may be forged.

Engineers as political brokers: Unpacking the gap between policy and practice in transport infrastructure

Engineering is often casually thought of and represented as a technocratic process. As any practitioner can readily narrate, however, transport engineering is better defined by competing techniques and routines, varying regimes of fashion and theory, the manipulation of unruly materials (Harvey and Knox 2015), as much as local political pressures and events. Engineers, in other words, play various roles as brokers between policy and urban life, and are thus uniquely positioned to shed light on the gap between the two.

Anthropologists have long been concerned with illuminating discrepancies between what people say and what they do; indeed, much of the fieldwork endeavour could be conceptualised as exploring how this distinction emerges. This is often done through careful contextualisation, exploring the multiple and competing logics that structure people's everyday lives and decision-making processes.

Anthropological attention to processual details of this kind could lead to productive collaborations with engineers and urban planners. The work of planners and engineers, although different, are bound up in the spheres of activity and interaction to which standard rules and theories cannot apply; furthermore, the aims of their practice are often multiple and intended to fulfil many requirements simultaneously, even more so with the formalisation of a 'co-benefits' agenda. Engineers have clients, such as urban municipalities, but they also have publics and finances, as well as contracts and contractors to encourage and discipline. Therefore, there is a lot to be learned from them as to how a low carbon transport agenda can be built into the fabric of cities and what would need to be engineered in order for that transformation to become socially and politically possible.

Engineering, as these comments suggest, is not above politics. Scholars such as Barry (2001, 2013) have shown how technical calculations in decision-making resonate with broader political considerations. By looking at engineering and planning reflexively and in partnership with anthropologists it is possible to deconstruct, analyse and interrogate many of the everyday assumptions and processes that go into engineering and decision-making in transport practice in urban areas.

- How does government power work?
- What form does it take?

- How is government or private power understood in any particular context?
- Is it welcomed, feared or met with cynicism?
- What kinds of power and influence are well received? Why?
- Which institutions are influential in national planning and engineering contexts?
- What kind of curricula do they use?
- What are the major influences?
- What are the relationships between these national standards and international pressures and ways of doing things?
- How might coalitions with national partners work with such curricula to advance sustainability goals?

By looking at the ways in which engineers and planners understand and manage protest and contestation, as well as uptake, relating to urban transport we can untangle deeper logics about aspiration, rights and privileges. Significantly, by closing the gap between ground and practice, the focus on engineering also allows us to see the ways in which 'co-benefits' might be embedded in daily urban life. By turning up the resolution we can see in fine detail how global policy is interpreted by states, in cities, by engineers and on the ground in practice. There is unquestionably slippage and transformation between these levels, so understanding how, why and to what effect may lead to more thought being invested in the relationship between policy and practice.

Picon (2004) observes that infrastructure is an object and infrastructure is also a set of social and behavioural patterns. He suggests that quite a lot is known about both qualities but much less is understood about the relationship between the two. This is perhaps the key contribution that anthropologists working with engineers and planners could make to the field. This is the field in which both the success and failure of low carbon transport initiatives is to be best understood.

Of course, if we see infrastructure as a work of imagination as well as practice, then we have to contend with the materials and intent of infrastructure just as we do the ideological, visionary and revolutionary potential of such technologies. This goes beyond seeing engineers and planners as decision-makers, intermediaries and conduits for particular ideas, and places them at the forefront of being able to generate new ideas about what the future should hold.

References

Augé, M. 1995. *Non-Places: Introduction to an Anthropology of Supermodernity*. London: Verso.

Barry, A. 2001. *Political Machines: Governing a Technological Society*. London: Athlone Press.

Barry, A. 2013. *Material Politics: Disputes Along the Pipeline*. London: John Wiley & Sons.

Beck, K. 2013. Roadside Comforts: Truck Stops on the Forty Days Road in Western Sudan. *Africa* 83(3): 426–445.

Chalfin, B. 2014. Public Things, Excremental Politics, and the Infrastructure of Bare Life in Ghana's City of Tema. *American Ethnologist*, 41 (1): 92–109.

Chilson, P. 1999. *Riding the Demon: On the Road in West Africa*. Athens: University of Georgia Press.

Comaroff, J. and John Comaroff (eds) 1993. *Modernity and its Malcontents: Ritual and Power in Postcolonial Africa*. Chicago: University of Chicago Press.

Cresswell, T. and P. Merriman (eds) 2011. *Geographies of Mobilities: Practices, Spaces, Subjects*. Farnham: Ashgate Publishing.

Dalakoglou, D. 2010. *The Road: An Ethnography of Albanian-Greek Cross-Border Motorway. American Ethnologist*, 37 (1): 132–149.

Djemai, E. 2009. *How do Roads Spread Aids in Africa: A Critique of Received Policy Wisdom*. Ecole D'économie de Toulouse: Working Paper Series.

Ferguson, J. 2006. *Global Shadows: Africa in the Neo-Liberal World order.* Durham: Duke University Press.

Freed, L. 2010. Networks of (Colonial) Power: Roads in French Central Africa after World War I. *History & Technology*, 26 (3): 203–223.

Geschiere, P. 1997. *The Modernity of Witchcraft: Politics and the Occult in Postcolonial Africa*. Charlottesville: University of Virginia Press.

Guldi, J. 2012. *Roads to Power: Britain Invents the Infrastructure State*. Cambridge: Harvard University Press.

Gwilliam, K., V. Foster, R. Archondo-Callao, C. Briceño-Garmendia, A. Nogales and K. Sethi. 2008. *The Burden of Maintenance: Roads in Sub-Saharan Africa*. Washington: The World Bank, Africa Infrastructure Country Diagnostic Working Paper 14.

Hall, D. 2015. *Why Public-Private Partnerships Don't Work: The Many Advantages of the Public Alternative.* Ferney-Voltaire*:* Public Services International.

Harvey, P. and H. Knox. 2015. *Roads: An Anthropology of Infrastructure and Expertise*. Ithaca: Cornell University Press.

Hastrup, K. 2004. Getting it Right: Knowledge and Evidence in Anthropology. *Anthropological Theory*, 4 (4): 455-472.

Klaeger, G. 2009. Religion on the Road: The Spiritual Experience of Road Travel in Ghana. In *The Speed of Change: Motor Vehicles and People in Africa, 1890-*2000, (eds) J-B. Gewald, S. Luning and K. van Walraven, 212–223. Leiden: Brill.

Lamont, M. 2012. Accidents have no Cure! Road Death as Industrial Catastrophe in Eastern Africa. *African Studies*, 71 (2): 174–194.

Lamont, M. 2013. Speed Governors: Road Safety and Infrastructural Overload in Post-Colonial Kenya, c. 1963–2013. *Africa*, 83 (3): 367–384.

Latour, B. 1987. *Science in Action: How to Follow Scientists and Engineers through Society*. Cambridge, MA: Harvard University Press.

Leach, M., I. Scoones and A. Stirling. 2010. Governing Epidemics in an Age of Complexity: Narratives, Politics and Pathways to Sustainability. *Global Environmental Change*, 20: 369–377.

Lee, R. 2012. Death in Slow Motion: Funerals, Ritual Practice and Road Danger in South Africa. *African Studies*, 71 (2): 195–211.

Mains, D. 2012. Blackouts and Progress: Privatization, Infrastructure, and a Developmentalist State in Jimma, Ethiopia. *Cultural Anthropology*, 27 (1): 3–27.

Masquelier, A. 1992. Encounter with a Road Siren: Machines, Bodies and Commodities in the Imagination of a Mawri Healer. *Visual Anthropology Review*, 8 (1): 56–69.

Masquelier, A. 2002. Road Mythographies: Space, Mobility, and the Historical Imagination in Postcolonial Niger', *American Ethnologist*, 29 (4): 829–855.

Matsumoto, N. 2007. *Analysis of Policy Processes to Introduce Bus Rapid Transit Systems in Asian Cities from the Perspective of Lesson-drawing: Cases of Jakarta, Seoul, and Beijing*. Institute for Global Environmental Strategies, https: //pub.iges.or.jp/system/files/publication_documents/pub/presentation/487/baq_matsumotopaper_revised0707.pdf

Mbembe, A. 2000. At the Edge of the World: Boundaries, Territoriality, and Sovereignty in Africa. *Public Culture*, 12 (1): 259–284.

Melly, C. 2013. Ethnography on the Road: Infrastructural Vision and the Unruly Present in Contemporary Dakar. *Africa* 83 (3): 385–402.

Morris, R.C. 2010. Accidental Histories, Post-Historical Practice? Re-reading Body of Power, Spirit of Resistance in the Actuarial Age. *Anthropological Quarterly*, 83 (3): 581–624.

Mostowlansky, T. 2017. *Azan on the Moon: Entangling Modernity along Tajikistan's Pamir Highway*. Pittsburgh: University of Pittsburgh Press.

Mukerji, C. 2003. Intelligent Uses of Engineering and the Legitimacy of State Power. *Technology and Culture*, 44 (4): 655–676.

Oha, O. 2000. Signs, Cities and Designs of Capacities: The Semiotics of Road Monuments in some Nigerian Cities. *African Anthropology*, 7 (1): 33–47.

Peden, M., O. Kobusingye and M.E. Monono. 2013. Africa's Roads – the Deadliest in the World. *South Africa Medical Journal*, 103(4): 228–229.

Picon, A. 2004. Engineers and Engineering History: Problems and Perspectives. *History and Technology*, 20 (4): 421–436.

Quayson, O. 2010. Signs of the Times: Discourse Ecologies and Street Life on Oxford St., Accra. *City & Society*, 22 (1): 72–96.

Roitman, J. 2006. The Ethics of Illegality in the Chad Basin. In *Law and Disorder in the Postcolony*. (eds) J. Comaroff and J. Comaroff, Chicago: University of Chicago Press, pp 247-272.

Rosa, H. 2013. *Social Acceleration: A New Theory of Modernity.* Columbia: Columbia University Press.

Roseman, S. 1996. “How we Built the Road”: The Politics of Memory in Rural Galicia. *American Ethnologist*, 23 (4): 836–860.

Ross, B. 2016. Big Philanthropy Takes the Bus. *Dissent* (Summer): 128-135.

Saunders, T. 2008. Buses in Bongoland: Seductive Analytics and the Occult. Anthropological Theory, 8 (2): 107–132.

Schnitzler, A. 2013. Travelling Technologies: Infrastructure, Ethical Regimes, and the Materiality of Politics in South Africa. *Cultural Anthropology*, 28 (4): 670–693.

Taussig, M. 1980. *The Devil and Commodity Fetishism in South America*. Chapel Hill: University of North Carolina Press.

Trankell, I.-B. 1993. *On the Road in Laos: An Anthropological Study of Road Construction and Rural Communities*. Vol. 12. Uppsala Research Reports in Cultural Anthropology. Uppsala: Department of Cultural Anthropology, Uppsala University.

Urry, J. 2007. *Mobilities.* Cambridge: Polity Press.

Urry, J. 2013. *Societies Beyond Oil: Oil Dregs and Social Futures*. London: Zed Books.

Verrips, J. and B. Meyer. 2001. Kwaku's Car: The Struggles and Stories of a Ghanaian Long-Distance Taxi-Driver. In *Car Cultures: Materializing Culture*, ed. D. Miller. Oxford: Berg, pp 153-184.

Wafer, A. 2012. Discourses of Infrastructure and Citizenship in Post-Apartheid Soweto. *Urban Forum*, 23 (2): 233–243.

Young, C. and T. Turner. 1985. *The Rise and Decline of the Zairian State.* Madison: University of Wisconsin Press.

Section 5: Mobility and auto-mobility

Throughout this review we have identified disconnects between global climate change, national development and transport policies, and divergences between what people on the ground think and how they act in relation to the resources, networks and navigational tools they have at their disposal. We have described how stratospheric politics entered popular consciousness in the late twentieth century. From initial anxieties about aerosols, fridges and sun-burnt Australians, a global discourse on planetary warming and then climate change emerged. The politics of oil suddenly became more than a worry about the date on which the maximum rate of extraction had been reached ('peak oil') or, more drastically, what would happen when the wells ran dry. The utilisation of carbon for movement, power and plastic became indicative of a 'runaway world' (Leach 1968, then Giddens 2003).

In some countries, movements emerged promoting the reduced consumption of carbon. Elsewhere, however, incomes in poorer parts of the world began to rise, along with the capacity to consume. The production of cars increased and prices fell as manufacturers competed for shares in new markets. Accompanying new wealth came (and is coming) in the form of suburbanised lives, gated communities and auto-dependency. Increasing incomes saw a retreat from communal and shared living spaces, to isolation and insulation.

A new paradigm of thinking about the world emerged: the Anthropocene.

The Anthropocene is the era in which humanity emerged as a geological agent, i.e. a species with the capacity to transform or destroy its own conditions of existence (Chakrabarty 2009). The term has overcome initial faddishness and gained traction, powerfully highlighting the agency of humanity to significantly affect prevailing conditions on the planet (Hann 2017).

Earlier, sceptics attempted to discredit the science of climate change. Gradually, however, the language of climate change entered a peculiarly bureaucratic layer of international diplomacy. Initiatives were established to understand and then plan to act against climate change. The United Nations Framework Convention on Climate Change was opened for signature at the 1992 UN Conference on Environment and Development (UNCED) in Rio de Janeiro (popularly and evocatively

known as the 'Earth Summit'). More than 150 countries signed that convention to reduce 'greenhouse gases' in the belief that 'anthropogenic activity' was interfering with climatic conditions.

Agenda 21 emerged as a plan for sustainable global development. Chapter 9 of the Agenda document suggests measures to protect the atmosphere. The claim that transport placed 'harmful emissions into the atmosphere and had other adverse environmental effects' was at the heart of the proposals. Agenda 21 demanded that organizations at all levels:

> Develop and promote, as appropriate, cost-effective, more efficient, less polluting and safer transport systems, particularly integrated rural and urban mass transit, as well as environmentally sound road networks, taking into account the needs for sustainable social, economic and development priorities, particularly in developing countries.[22]

There was enthusiasm for reducing emissions, delegates jetted home from Rio with a new knowledge of sustainable development, the fragility of indigenous livelihoods and the dangers of carbon. In the following years, the ideas of Agenda 21 found their way into national and local government policy, albeit in a very piecemeal and unequal fashion. The document and its legacies helped establish the atmosphere in which reports such as Gwilliam's (2002) land-mark *Cities on the Move* was produced by the World Bank.

The Intergovernmental Panel on Climate Change (IPCC) formed a few years before the Rio conference, in 1988, to establish an 'objective' and 'scientific' view of climate change and its consequences (Bolin 2008). In many ways, the IPCC has set the terms of debate on carbon reduction. Subsequent summits ('COP' or Conference of Parties) in Kyoto and Durban, in particular, encouraged alternative ways of thinking about transport and carbon. In Paris in 2015 pledges

[22] *Agenda 21*. Rio de Janerio: United Nations Conference on Environment and Development, p. 79.

were again made to reduce emissions to limit global temperature increase to 2°C.[23]

The IPCC's most recent report (2014) stated: 'Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia' (IPPC 2014a: 1). Other key observations included: 'Increasing magnitudes of [global] warming increase the likelihood of severe, pervasive, and irreversible impacts' (IPPC 2014: 14), and 'A first step towards adaptation to future climate change is reducing vulnerability and exposure to present climate variability'.

The message from the IPPC is clear; however, the seemingly pressing implications of these claims are far removed from the direction of travel in many parts of the world. Most estimates suggest that transport accounts for around a quarter of current global carbon emissions and an even higher percentage of oil consumption. Urban transport infrastructures are therefore central to both traditional developmental agendas and progressive low-carbon sustainability initiatives and development goals, as well as for the improved quality of life in cities. Transport infrastructure has become an 'asset class' (promoted by development banks and stock exchanges) and presented as something of a panacea for the problems of congestion and pollution. These sometimes-contradictory forces have led to an infrastructural construction boom in much of the urban Global South.

The background to the IPPC and global climate change debate is well known, by laying the story out at some length we can make two moves away from this received knowledge. The first is to look at climate change inaction as described in western sociological literature. The second is to suggest that while climate change discourse represents a reality of high-level international diplomacy, and perhaps national diplomacy, it is not embedded in the day-to-day running of poorer countries, and crucially plays little to no role in the relationship between politicians and those who elect them, quite the contrary in fact. Therefore, we see the barrier to the

[23] United Nations Framework Convention on Climate Change: CP/2015/L.9/Rev.1.

implementation of low carbon transport as the absence of political and moral will.

Social science thinking on climate change

Many social scientists writing on climate change have recently begun to think through the knowledge politics behind public and individual opinion. They have attempted to address why the question of climate change has provoked such disagreement, befuddlement and faltering action. These investigations lead them into big philosophical, sociological and moral questions, akin to asking why some people and not others believe in god or gods and why some are left wing and others right. Such questions cannot be explained by applying sociologically-adhesive labels such as 'socialisation', 'genes' or 'class'; nor can quantitative approaches provide adequate explanatory power for either understanding or creating conditions for change.

Giddens (2009; also Urry 2011) argues that because the dangers of global warming are intangible in everyday life, many will sit on their hands and do nothing. According to him, such inaction is accentuated by 'future discounting', a condition in which people find it hard to give the same level of reality to the future as they do to the present. For others, the dynamics of globalisation and accumulation inherent in capitalist society, and the competitive nature of the interstate system, have combined to produce a form of global development which is centered on systems of production and mobility (Paterson 2007). In this view, methods of production have inertia and momentum of their own. They cannot simply change or be stopped because too much is dependent on these things continuing.

Global warming has been 'marketised', both as a business opportunity and as a way of dealing with the problem through carbon markets and trading. Stern goes as far as to suggest that a low carbon economy could be a 'new-energy industrial revolution' (Stern 2015: 33). In essence, and if Stern has his way, the free market has been left to negotiate our future. The result, according to critics such as Parr (2013), is that decisions that should be collective have been splintered into a disparate and confusing array of choices. The crisis has been restructured and privatised. The free market is not the political

response to climate change that it pretends to be; rather it is 'a political ghost emptied of its collective aspirations' (Parr 2013: 5-6). Beck (2016) usefully shows how the discourse and debate on climate change have themselves been agents of metamorphosis. Climate change debate and the spirit of Agenda 21, for one example of many, have produced new realties and possibilities.

Climate change thinking on the ground

The second move we wish to make away from the IPPC framing of climate change is to look at the way climate change is a 'non-issue' in much of the world – and this we suggest is perhaps the single biggest barrier to the implementation of low carbon transport technologies. Positions might vary, from 'climate is not a concern because there are more pressing priorities' to 'there is no climate change' or 'changes to the climate are a result of the actions of already-wealthy countries'. This is not simply the same debate about 'climate change skepticism' that we are more familiar with in the UK. These views are often framed in terms of historical inequality, global equity, justice and neo-colonialism.

In an excellent study of the micro politics of climate change in Norway, Norgaard (2011) describes the socially-organised denial of climate change, suggesting that the norms of emotion, conversation and attention keep the issue out of everyday life – the problem is just too big to be there. For her, this is not a matter of 'information' or 'science', but rather a matter of sociality.

Fieldwork undertaken in South Asia suggests that there is a pervasive disconnect between global climate change politics and domestic political agendas, in which climate change features rarely. India's national policy frameworks, for example, do not mention transport. Instead, transport is a question of development, rather than climate; it is a form of development which is receiving tremendous investment and growth and therefore is an area in which carbon emissions will continue to rise, off-setting improvements in technology, efficiency and other forms of engineering.

Further, there is a more specific disconnect between road and car transport, and climate change. In the DFID-funded BBC Climate Asia project, one of the questions was about aspirations and car ownership. However, those running the survey made no attempt to link projected increases in car ownership to climate change or personal transport to carbon emissions – it possibly did not occur to them. The survey, nonetheless, took as a starting point the fact that climate change was part of the daily lives of people.[24]

Likewise, the influential *Cities on the Move* (Gwilliam 2002) report from the World Bank presents car ownership as a 'natural', or at least a rational, function of increasing wealth, as if there were no vested interests in the promotion of the automobile as a way of organising social, economic and political life. The report assumes that the redesign of cities to accommodate the car (and thus to become dependent on the car) is an inevitable, rather than a socio-economic and political process.

Implications for transport agendas

The threat, responsibility and frames of reference within which climate change is understood vary around the world. Climate change might appear as a natural and self-evident fact to many – but the way in which the idea is received and understood is a product of local contexts, histories and cultures, as well as notions of equality and rights, which often exceed national boundaries and have roots in colonial and anti-colonial movements. The important role climate change negotiations have played in international diplomacy has not filtered down to domestic policy and party-political concerns in many countries. Therefore, arguably one of the most significant barriers to the implementation of low carbon transport solutions is the lack of local appetite, whether political or popular.

Agarwal and Narain (1991) argued that climate change discourse, which at that time emanated from Washington, was a form of 'environmental colonialism'. They reasoned that the focus on current flows over the historic accumulation of carbon emissions, calculating responsibility by gross emissions per nation rather than normalising them to a per capita measure, and equating

[24] http://dataportal.bbcmediaaction.org/site/

luxury consumption of the rich with the survival emissions of the poor was to act in favour of western and industrialised nations over developing nations, such as India and China.

This line of reasoning found a ready home in India where climate change remains a 'non-issue' in electoral politics (Dubash 2012). Internationally, India has consistently argued that the North and South have different responsibilities and obligations. In line with the international stance, the domestic focus has been on economic growth as a developmental ethos. Development in India is often shorthand for people becoming wealthier and leading increasingly resource-consumption intensive life-styles (often labelled as 'western'). Key to this, and the language of development deployed by the last few governments, has been the promotion of mobility through road infrastructure. At the same time, the market for cars has expanded rapidly.

There is a 'disconnect' between the automobile and the 'problem' of climate change. In India, as elsewhere in the world, various other powerful ideas about progress, the right to consume, and equalities of privilege seem to render the automobile immune to critical scrutiny. In India, roads and cars have been promoted as two of the key planks of development policy and as clear evidence of 'progress' being made. Roads are commonly and powerfully associated with efficient and strong governance and the arrival of modernity. Given this, coupled with the brute fact of persistent and widespread poverty, it is perhaps unsurprising that transport in India is not connected to national climate change policy. As already mentioned, there is no mention whatsoever of transport or vehicle emissions in any of the national policy statements, including the National Climate Action Plan. The brief discussion of transport in Dubash's *Handbook of Climate Change and India* states 'the developmental priorities of this sector - to facilitate mobility while enabling access for the poor, improve energy security, and reduce cost and pollution - are well aligned with the global objective of climate mitigation' (2012: 299). This sentiment seems to contradict India's current policy of hyper promoting road infrastructure, almost as if it were a liberation technology.

Numerous studies have shown that vehicle emissions in India are already rising quickly and look set to rise at even faster rates in coming years. The current government has turned road infrastructure into front page and feel-good news. The responsible

minister has become a celebrity and found himself a place in the national imagination; his pronouncements on other political issues also carry a great deal of weight. The agency responsible for highway construction (NHAI) has set ambitious targets for the length of four-lane highways to be constructed each day. By 2040, the government claims it will have the capacity to build 50 km per day.

Roads have multiplier effects and the quantity of traffic these arrangements will generate will far exceed carbon targets, particulate emissions and congestion. Although the global urban population is growing, there is a parallel trend of decreasing urban density, as cities are redesigned to accommodate the automobile. As cities grow to make room for the car, they tend to develop low-density suburban areas on their outskirts. Consequently, cities get larger and travel times and distances the population travel also tend to increase.

It is also the case that cities are increasingly congested and average traffic speeds have continued to fall. Planning for the car encourages low-density development in suburban areas, which in turn has to be low-density to allow for parking and the movement of vehicles. As cities become wealthier, there is a rise in car ownership which makes it increasingly difficult to sustain profitable urban public transport in suburbs. In most parts of the world, despite significant roadbuilding programmes, average travel speeds continue to decline, as the rate of car ownership continues to rise faster than the ability to create meaningful road networks.

Urban planning is so dominated by the car that there is surprisingly little accommodation of the poor, who, for the most part, remain pedestrians. The car increases both public and private costs of infrastructure per residence. In many areas, free parking on roads amounts to a state subsidy for the car. Walking and other forms of non-motorised transport play second fiddle to the motorcar in the eyes of planners and those at large on city streets. Congestion and particulate pollution does not only affect car drivers, but all road users, as the poor frequently have to walk or travel in slow-moving and overcrowded buses.

Questioning auto-mobility

Social science literature on roads demonstrates how such infrastructures become far more than engineering and materiality, but the very sites through which history is (re)made, notions of citizenship

forged, and where capitalism operates in its most extreme and enchanting forms. Much of the power and significance of roads stems from their coupling with the idea of mobility; an idea and practice promoted and capitalised like no other over the course of the nineteenth and twentieth centuries.

The literature on roads is vibrant, including the ethnography of life on the road (Dalakoglou 2017), at the side of the road (Stewart 1996) and among those building roads (Harvey and Knox 2015). Augé (1995) theorised the 'non-place' of the motorway; others productively see roads as potent sites of meaning and culture where ideas such as hope and desire, fear and danger, nationalism and hatred are brought into sharp relief (Masquelier 2002). In this sense, roads variously divide or shape communities; represent either the state, modernity or the most aggressive forms of private service provision; reflect the end of traditional ways of doing things through commodification and are imbued with notions of domination by the city or the West or something else. Roads alter the shape of things and have qualities all of their own, which exist outside the materials of their construction. Roads carry with them, and can be made to represent, ideas, power and knowledge. Consequently, roads are often key to the development of territorial projects such as that of the national socialists in Germany in the early-twentieth century (Zeller 2006), and the 'infrastructural Europeanism' of the European Union (Schipper 2008).

Weston (2012) argues that Fordism's most iconic product, the automobile, is a pedagogical device, schooling an affectively sensual and toxicity-infused relationship to the environment. In this sense, a car is not just a symbol of freedom or open roads or class mobility and modernisation; rather, it is one of the technologies most intimately and corporeally implicated in the creation of new ecologies. The car organises the idea that we can poison the world without limit by extending contemporary relations of production and mobility into the future. At the same time, we recognise that a limit must be out there somewhere, but it remains an abstraction and a distant intellectual realisation, rather than a practical or material one.

In much of Europe, the car was *the* post-war vehicle of modernization. Cars became the commodity form. Workers made the product they most wished to buy. Many needed their produce in order to reach the place of their labours, i.e. they drove cars to

work. In her account of the Americanisation of France, Ross elegantly argues that the car is so central to the story of the twentieth century that it is often consigned to the edges of historical discourse. Such marginalisation is not spun from banality or ubiquity but because the historicity of the car is 'emptied out' during production, transformation into discourse (advertising) and consumption. In her words, 'For the car is not only implicated in a certain type of mobilisation by capital, it is also an active though partial agent in the reproduction of that structure – thus its embeddedness' (1998: 19).

Following the liberalisation of the Indian economy in the 1990s and the 'opening up' of the car market for foreign manufacturers, automobility has become central to the lives, consumption habits and aspirational goals of many. Investment in the car industry stimulated other industries notably those of oil, steel and construction. Following this line of reasoning, Paterson (2007) outlines the complexes through which support for the car has helped to promote and reproduce the state power. This happens through the combination of (a) road building and the neglect of public transport (b) fiscal measures which effectively subsidise car use and (c) collusion between states and car manufacturers. National and international road lobbies emerged as a coalition of car, oil and construction companies, allied with highway and municipal engineers. Cars and roads became central to everything, but at the same time, echoing Ross's characterisation of the car as naturalised and self-evident, the car has not met with critical discussion in South Asia.

The Ford Foundation is one of the major funding agencies to have supported climate change research in India. Vehicle testing agencies in India are often supported by car manufacturers. As in other parts of the world, the government, in partnership with the automobile industry, has launched a new think-offensive in favor of new cars, 'green' cars, electric cars or even flying cars, but not no cars. Might it be a bad bet to rely on car manufactures to save us from climate change?

Focusing on the car as a source of emissions obscures the fact that the mobility complex requires roads and is carbon intensive. Cars are part of systems of production, consumption and mobility that must be seen as a whole. A holistic vision of what puts the car in such a role is required. Efforts that focus on the reduction of carbon produced by cars through

engine design, aerodynamic technologies or other engineering solutions rather miss the point. With countries across Asia gearing up for tremendous growth in car markets, reducing the carbon emissions of each vehicle becomes a tokenistic gesture, given that the overall quantity of vehicles on the road is set to expand to much greater carbon effect.

The automobile, and range of associated industries that produce it, refuses to be upstaged, even by the climatic threat to the planet. Questioning the centrality of the car in ideas about the development of anywhere is not to adopt a stance against technology but to ask two sets of rhetorical and inter-related questions. First, what is the point of mass auto-mobility? Who is it for and whom does it serve? How has it come to appear as a fundamental right? Secondly, how is it that the object associated with Fordism and Taylorism, and carbon emissions has become fetishised to such a degree that its manufacturers now also promise to deliver the world from the very evils it appears to have brought upon us?

Is there salvation in the 'green' and 'electric' cars of the automobile industry? The same manufacturers have put their own expansion over and above human welfare. It is an irony mediated by various sensual bonds and visual paradigms: smell, design, style and speed. To ask why the car should have emerged as a leading protagonist in quest narratives on the route to a perpetually inhabitable planet is to ask about the relationship of sensation to prosthetic embodiment of the sort that the automobile teaches. This is, the kind of embodiment in which industrial products, however toxic, return to people as extensions of their own physicality (Weston 2012: 439-440). Continuous sensory engagement with industrially-sourced experiences of consumption discourages any meaningful reorganization of a system that represents immense short-term profitability for some and political office for others.

References

Agarwal, A. and S. Narain. 1991. *Global Warming in an Unequal World: A Case of Environmental Colonialism*. New Delhi: Centre for Science and Environment.

Augé, M. 1995. *Non-Places: Introduction to an Anthropology of Supermodernity*. London: Verso.

Beck, U. 2016. *The Metamorphosis of the World*. Cambridge: Polity Press.

Bolin, B. 2008. *A History of the Science and Politics of Climate Change: The Role of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press.

Chakrabarty, D. 2009. The Climate of History: Four Theses. *Critical Inquiry*, 35(2): 197-222.

Dubash, N.K. (ed.) 2012. *Handbook of Climate Change and India: Development, Politics and Governance*. New Delhi: Oxford University Press.

Giddens, A. 2003. *Runaway World: How Globalization is Reshaping our Lives*. New York: Routledge.

Giddens, A. 2009. *The Politics of Climate Change*. Cambridge: Polity Press.

Gwilliam, K. 2002. *Cities on the Move: A World Bank Transport Strategy Review*. Washington, DC: The World Bank.

Hann, C. 2017. The Anthropocene and Anthropology: Micro and Macro Perspectives. *European Journal of Social Theory*, 20 (1): 183-196.

Harvey, P. and H. Knox. 2015. *Roads: An Anthropology of Infrastructure and Expertise*. Ithaca: Cornell University Press.

IPCC, 2014a. *Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Geneva: IPPC.

IPCC, 2014b: *Summary for Policymakers Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Geneva: IPPC,

Leach, E.R. 1968. *A Runaway World? The Reith Lectures, 1967*. London: B.B.C.

Masquelier, A. 2002. Road Mythographies: Space, Mobility, and the Historical Imagination in Postcolonial Niger. *American Ethnologist*, 29 (4): 829–855.

Norgaard, K.M. 2011. *Living in Denial: Climate Change, Emotions, and Everyday Life*. London: MIT Press.

Parr, A. 2013. *The Wrath of Capital: Neoliberalism and Climate Change Politics*. New York: Columbia University Press.

Paterson, M. 2007. *Automobile Politics: Ecology and Cultural Political Economy*. Cambridge: Cambridge University Press.

Ross, K. 1999. *Fast Cars, Clean Bodies: Decolonization and the Reordering of French Culture*. Cambridge, MA: The MIT Press.

Schipper, F. 2009. *Driving Europe: Building Europe on roads in the twentieth century. Eindhoven:* Tecnische Universiteit Eindhoven.

Stern, N. 2015. *Why Are We Waiting? The Logic, Urgency, and Promise of Tackling Climate Change*. Cambridge: MIT Press.

Stewart, K. 1996. *A Space on the Side of the Road: Cultural Poetics in an "Other" America*. Princeton: Princeton University Press.

Urry, J. 2011. *Climate Change and Society*. Cambridge: Polity Press.

Weston, K. 2012. Political Ecologies of the Precarious. *Anthropological Quarterly*, 85 (2), 429-455.

Zeller, T. 2007. *Driving Germany: The Landscape of the German Autobahn, 1930-1970*. New York: Berghahn Books.

Appendix 1

Global Overview: Major Trends in Transport within Global Climate Policy

This section traces the development of climate instruments and the changing role and position of the transport sector within them. The analysis is funnel-shaped, starting broad and moving to a specific point in the policy landscape in which 'coalition' and 'co-benefit' are the organising principles of the present and lead to the organisation of the author-institutions behind the *Global Mobility Report* (2017).

Environmental assessment and the leadership framework

The link between transport and climate change was first highlighted through the Intergovernmental Panel on Climate Change (IPCC) in the context of global environmental assessment. Although climate change had been signalled in the nineteenth century, it was only in 1979 that the issue was discussed at the global level, at the first World Climate Conference. In the 1980s, discussion led by the World Commission on Environment and Development placed climate change in the context of other global environmental and development problems (Gupta 2010).

The IPCC was established as a scientific advisory body in 1988 by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO). In 1990, IPPC published its First Assessment Report, identifying options for mitigation in energy, industry, agriculture, and forestry sectors. Transport's relevance to the climate debate was then understood through the categorisation of transport as one of the main fossil fuel end-users within the energy sector. The report recommended public education and information, technological development and transfer, and economic, financial, legal and institutional mechanisms as policy instruments. This policy framework remains largely relevant today, although emphasis has changed over time.

By the time the IPCC First Assessment Report was published, there was already political recognition that climate change was a serious problem. However, the strong North-South divide on global environmental issues led to fundamental and protracted debates on how responsibilities with respect to the problem of climate change should be defined and addressed. This too remains a central and challenging issue in both international negotiation and within the scientific literature.

Early political declarations on climate change emphasised the differential roles of developed and developing countries in causing the problem. Such differentiated roles called for differentiated responsibilities and targets. This was articulated in the idea of leadership in the

Noordwijk Declaration, in the UN Economic Commission for Europe (ECE) Conference statement, and in the Declaration of the Second World Climate Conference (para 5). Leadership as a political concept implied that developed countries would lead in reducing their own emissions of greenhouse gases (GHG) while also assisting developing countries, to both adopt technologies that would reduce their rate of emissions growth and adapt to climate change.

In 1990, the end of the cold war brought with it a general sense of political optimism and expectations of a 'peace dividend'. Resources previously devoted to military use could now be made available for environmental and development issues. In 1992, the United Nations Framework Convention on Climate Change (FCCC1992) were adopted. The treaty was rapidly ratified and entered into force in 1994. However, the targets in the Convention were ambiguously worded as a result of pressure from the United States. The principles of common but differentiated responsibilities (CBDR) established under the treaty - all countries have common responsibilities; these responsibilities are differentiated on the basis of their contribution to causing the problem and their capabilities to address the problem – later become an excuse for delayed measures at a national level and presented considerable challenge to the scientific community in addressing the 'equity' issue in modelling (Kartha et al. 2017).

Beck and Forsyth (2015) describe the coproduction of science and social orders to explain how the IPCC had contributed to the signing of the UNFCCC, by translating the observed 'regional' change of climate patterns into a 'global' environmental crisis, and by inventing procedural rules to present itself as the 'unified voice of science'. They also documented the IPCC's rocky relationship with developing countries. The IPCC consisted mainly of scientists from the US, EU and Japan. Their representation of the 'world' was highly contested to the extent that the IPCC had struggled to win support from the developing country leaders to maintain its advisory role under the UNFCCC.

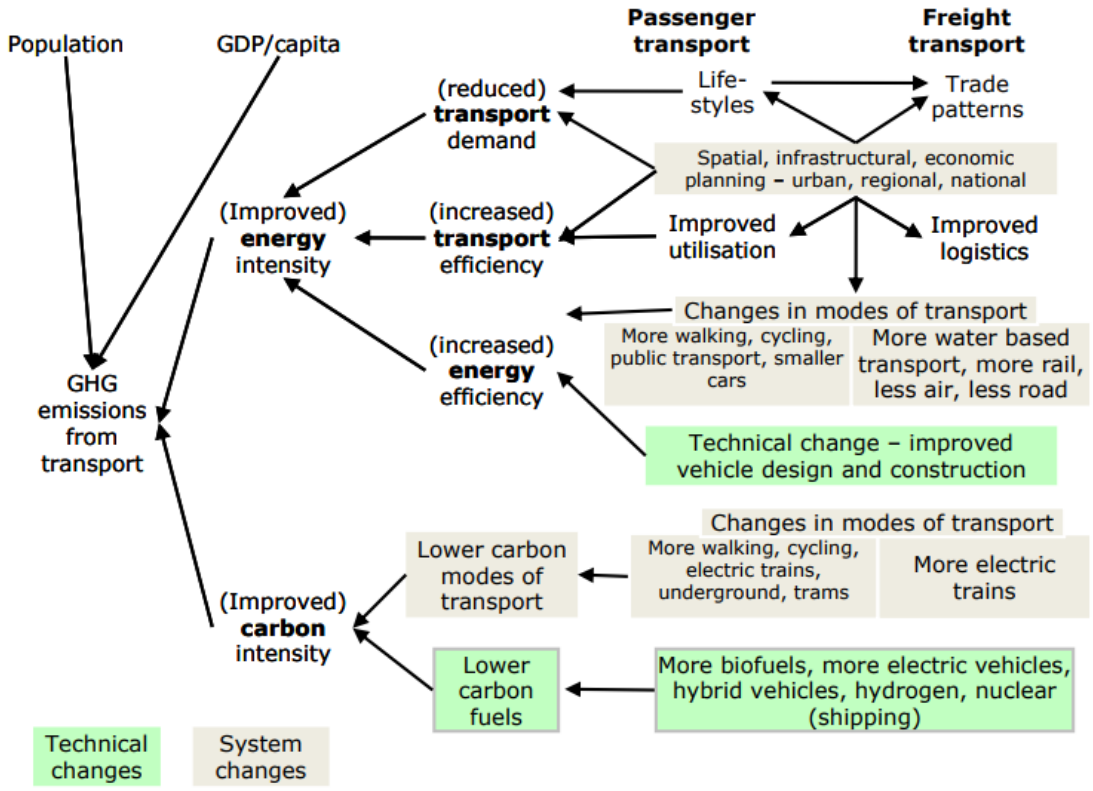
Apart from the vital issue of 'inclusiveness', the IPCC's methodology – particularly in relation to future forecasting and the allocation of responsibility – has also been challenged. From the beginning, data has been contested and deeply politicised. Although structural and procedural changes made within the IPCC have succeeded in establishing the panel as a main advisory body under the UNFCCC (IPCC 2000, Beck and Forsyth 2015, Vardy et al. 2017), debates over the soundness of the IPCC GHG emission scenarios, the accuracy of emissions calculations (Parikh 1992), and later, debates on the relevance of calculations with respect to the costs of the effect of climate change (for instance, the monetary value of

human life in developing countries) have continued to cloud the authority of the IPCC's reports (Gupta 2010).

The Kaya identity played a central role in the development of the IPCC emission scenarios (IPCC 2000). It formed the conceptual framework underlying today's understanding of the transport sector's climate change mitigation options (see diagram 1 below) (Urban 2016). The Kaya identity was developed by Japanese energy economist Yoichi Kaya in 1989 as a formula for computing the total anthropogenic CO_2 emissions generated by energy consumption. It was modified from the *I=PAT equation* (Impact=Population x Affluence x Technology) that was previously widely used to calculate human impact on the environment. The Kaya Identity states that the total emission level of the greenhouse gas carbon dioxide can be expressed as the product of four factors: *human population*, *GDP per capita*, *energy intensity* (per unit of GDP), and *carbon intensity* (emissions per unit of energy consumed) (Kaya 1989).

The Kaya Identity identified *energy intensity* and *carbon intensity* as the two key factors affecting the level of GHG emissions other than population and GDP growth. Since upward population trends and GDP growth are unlikely to be halted, the climate change policy recommendations developed based on this mathematical notion have centred on the available options with the potential to "de-couple" the lineal relationship between population/GDP growth and increasing energy and carbon intensity.

Diagram 1 shows the transport sector's emission mitigation options based on Kaya Identity principles.



(Source Urban 2016)

Issues:

Technology-fix

The I=PAT identity was developed at a time when environmental politics in the US were centred on the role of production technologies, both positive and negative. Therefore, the importance of technology is overly emphasised in this equation. As a result, policy recommendations based on this equation have been criticised for being intrinsically biased towards a "technology-fix" approach (Alcott 2010).

> Significant reductions in net greenhouse gas emissions are technically possible and can be economically feasible. These reductions can be achieved by utilizing an extensive array of technologies and policy measures that accelerate technology development, diffusion and transfer (IPCC 1995).

The integrated assessment models (IAMs) that dominate IPCC's assessment focus on fuel and technological efficiency gains as transport mitigation solutions (Creutzig 2016).

Carbon leakage/rebound effect

The I=PAT equation has been criticized for being too simplistic by assuming that factors of population (P), affluence (A), and technology (T) are independent of each other. In reality, there are at least seven interdependencies between P, A, and T that could exist, indicating that it is more accurate to rewrite the equation as I = f(P,A,T) (Alcott 2010). For example, a doubling of technological efficiency, or equivalently a reduction of the T-factor by 50 percent, does not necessarily reduce the environmental impact (I) by 50 percent if efficiency induced price reductions stimulate additional consumption of the resource that was supposed to be conserved. This phenomenon is called the 'rebound effect' (conservation), or the Jevons Paradox. Despite significant improvements since 1980 in the carbon intensity of Gross Domestic Product (GDP, i.e., the efficiency in carbon use), world fossil energy consumption has increased in line with economic and population growth (see Alcott, 2010: Fig. 5). Similarly, an extensive historical analysis of technological efficiency improvements has conclusively shown that improvements in the efficiency of energy and material use were almost always outpaced by economic growth, resulting in a net increase in resource use and associated pollution (Huesemann and Huesemann 2011).

By 2001, literature in transport studies had established that the main challenges in the transport sector were (a) the ever-increasing demand for transport/mobility as GDP per capita increases and (b) economic development policies that further encouraged car use. This was reflected in both the IPCC third assessment (IPCC 2001) and the World Bank Transport Strategy Review (Gwilliam 2002).

Recent reports from the European Environmental Agency (EEA) on transport and climate change also discuss the problem of 'rebound effects':

> Many past technological advances in the transport sector have historically been offset by the ever-increasing demand for transport (EEA 2016a: 8).
>
> New passenger cars have been put on a trajectory towards emissions of 95 g CO_2/km by 2020 — almost a 50 per cent cut compared to 1990. Unfortunately, traffic levels are growing at around the same rate as average emissions are projected to fall, meaning that the net effect may still be far from what we need (EEA 2016b).
>
> Initiatives exist to include vans and, with a longer time perspective, trucks into the emissions target. But without complementary measures there is still a risk that most improvements will be offset by the growth in traffic. Indeed, more efficient vehicles may lower transport costs in the long run, thereby increasing the demand for transport. This process is already apparent in the airline

> industry. Half a century ago few could afford a vacation in Thailand but now it is available to a broad segment of society (EEA 2016b).
>
> If vehicles become more fuel efficient, they become cheaper to drive meaning we may drive more often. This might give a significant rebound effect, causing more mobility and thus lowering environmental pressures to a lesser degree than previously expected (EEA 2016a: 61).
>
> Funds for improving accessibility are often reserved for investments in transport networks which reduce travel time by increasing travel speed. However, travelling at higher speeds encourages longer trips and therefore increases energy use and environmental pressures (EEA 2016a: 57).

Economic measures, transport-centred research, and the equity framework

By 1996, the post-cold war optimism had faded, and it had become clear that it would not be easy to decouple economic growth from GHG emissions. Against this general pessimism, hope was building that perhaps an agreement could be reached at COP-3 in Kyoto in 1997. However, prior to Kyoto, the Byrd–Hagel Resolution was adopted in the United States in 1997. This resolution called on the United States not to accept any future binding quantitative targets until and unless the key developing countries also participated meaningfully, especially in light of the increased costs associated with taking action for the United States. Despite pessimism in the United States, in December 1997, the Kyoto Protocol was adopted against all odds. However, it proved much more difficult to actually ensure ratification of the Kyoto Protocol. The United States withdrew from the Kyoto Protocol in 2001 and the European Union invested heavily in collaborative leadership to ensure that Russia and Japan ratified the Protocol leading to it coming into force in 2005 (Gupta 2010).

Barriers identified:

This period witnessed growing contributions from economists to IAM and more discussions on economic measures, as well as increases in transport sector specific modelling. The key policy debates centred on whether and how cost-benefit analysis could be applied to climate change, and how ‘equity’ should be defined with respect to developing countries rights to economic growth.

A recent review of the IAM models revealed that economically-focused studies concentrated on undesired welfare loss (Creutzig 2016: 345), with the decarbonisation of the transport

sector understood to be comparatively challenging. This is because low-carbon transport technologies are costly and require technological change for billions of end-users, compared to technological change for a limited number of agents in the power sector. Low carbon transport raises costly questions about how energy is stored. The structural change of economies from industrial societies toward service economies also predicts a greater proportional increase in the size of the transport sector. As a result of an inelastic demand with respect to the oil price, strong behavioural effects, and assumed high costs in technology deployment, a global carbon price is assumed to be less effective in decarbonizing transport, compared to other sectors (Creutzig 2016: 345). Within such a scenario, oil remained the main source of primary energy that powers transportation, rendering the transport sector the main emitter of CO_2 emissions at the end of the twenty-first century (Creutzig 2016: 345).

In 2000, the IPCC published a special report on Technology Transfer, focusing on the kinds of technologies and mechanisms that accelerate or hinder technology transfer. In the Third Assessment Report of IPCC, technological risks to car manufacturers were identified as a key barrier in transport mitigation:

> (i) Risk to manufacturers of transportation equipment is an important barrier to more rapid adoption of energy efficient technologies in transport. Achieving significant energy efficiency improvements generally requires a “clean sheet” redesign of vehicles, along with multibillion dollar investments in new production facilities; (ii) on the other hand, the value of greater efficiency to customers is the difference between the pre- sent value of fuel savings and increased purchase price, which net can often be a small quantity. Although markets for transport vehicles are dominated by a very small number of companies in the technical sense, they are nonetheless highly competitive in the sense that strategic errors can be very costly; (iii) finally, many of the benefits of increased energy efficiency accrue in the form of social rather than private benefits. For all these reasons, the risk to manufacturers of sweeping technological change to improve energy efficiency is generally perceived to outweigh the direct market benefits. Enormous public and private investments in transportation infrastructure and a built environment adapted to motor vehicle travel pose significant barriers to changing the modal structure of transportation in many countries (IPCC 2001).

The Stern Review of 2006 is the largest economic analysis on climate change to date. Through extensive economic modelling, Stern suggests that the GDP costs of climate change would be much worse than previously predicted: ‘without further action, costs and

risks would be ‘equivalent to losing 5 percent of global GDP each year, now and forever’ and possibly higher if other risks were accounted for. He called for strong and immediate government response with much higher GDP investment and his review addresses the importance of economic measures, in particular carbon pricing and carbon trading mechanism.

Stern (2006) pointed out that economic modelling is particularly challenging for the transport sector because various stakeholders’ behaviour over long time spans is very difficult to predict. IPCC (2007) also mentioned that the limited number and scope of available studies of mitigation potential and cost is a problem for a credible assessment and for extending funding opportunities. The issue of a lack of local data was addressed in the Paris Agreement with increasing reporting responsibilities to the parties. GIZ (2016) also addressed the same issue: ‘Comprehensive and reliable databases are essential in order to identify effective strategies for reducing emissions. However, in most cases existing data is inadequate: detailed inventories and information on trends in transport demand are not yet available’ (GIZ 2016, Advancing Transport Climate Strategies (project) 2016-2019).

The EEA has made the following comments on carbon pricing and the carbon trading potential of the transport sector:

> Transport is generally not exposed to international competition, meaning that a trip from Paris to Poznan cannot be replaced by one from Singapore to Sidney. There is therefore no real risk of ‘carbon leakage’ with emissions that are regulated in Europe simply moving abroad. This, in principle, makes transport a good candidate for emission trading as a means to regulate emissions (EEA 2016b).
>
> Two other criteria should also be met before embarking on a trading scheme. First, the number of operators in the market must be limited in order to make the allocation of allowances manageable. Aviation meets this criterion and emission trading will start in coming years. Maritime transport could also meet this criterion, but verification is more difficult because ships can carry fuel for longer periods of time than planes. Rail is already covered by emission trading as the electricity used is bought from a sector under emission trading. Road transport, however, cannot meet the ‘limited number of operators’ criterion as each driver is essentially an operator (EEA 2016b).

> Second, the carbon price should be high enough to induce a change in behaviour. The current carbon prices would add less than 1 ¢ per kilometre to the cost of driving a car (less than 4 ¢ per litre of fuel). Compared to present fuel taxes it is insignificant and therefore unlikely to have any impact on behaviour (EEA 2016b).

The Paris Process on Mobility and Climate (PPMC) reported the following:

> Deep reforms of transport pricing are required to ensure that users pay a price which reflects the full marginal social costs of transport (e.g. noise, infrastructure, accidents, delays, as well as GHG emissions and air pollution etc.). This will ensure fair modal competition, stimulate innovation by allowing market forces to drive the transformation of transport (PPMC 2017: 17).

Gwilliam (2013) also advocates full-cost pricing.

> One of the key outcomes of COP21 has been the strengthened resolve to adopt carbon pricing to promote action on climate change. In Paris it was argued that pricing CO_2 at around 50 $/ton could give a strong push to alternative energies and that pricing it at around 100 $/ ton would make certain technologies like carbon capture and sequestration become economically viable. Discussions continue both on price levels/trajectories and ways to foster a level playing field. Putting a value on carbon --be it in the form of carbon tax or emissions trading e.g. by making transport part of carbon markets -- is a major lever to inform player decisions towards low carbon solutions (PPMC 2017:17).
>
> Until now carbon pricing in the Transport sector has been poorly developed in comparison to other sectors, and additional efforts will have to be made to catch up. It is encouraging that a number of transport related companies have started to introduce an internal or shadow carbon price (PPMC 2017:18).
>
> This new economic instrument, if implemented at scale, will provide much needed market signals and help generate income to be pumped back into the economy, preferably through sustainable transport related infrastructural investment (PPMC 2017:18).

Characterisation: Extensive linkages between transport and other factors

In the Technical Annex on transport, Stern (2006) comments:

> Transport is one of the more expensive sectors to cut emissions from because the low carbon technologies tend to be expensive and the welfare costs of reducing demand for travel are high. Transport is also expected to be one of the fastest growing sectors in the future. For these two reasons, studies tend to find that transport will be among the last sectors to bring its emissions down below current levels (Technical Annex: Transport, Stern 2006: 3).

Stern (2006) explained the issue of welfare costs for reduced mobility: 'The demand for transport is a derived demand: it is not demanded for its own sake, but rather for the things it enables people to do (such as get to work, take leisure trips, and move goods from one place to another)' (Stern 2006: 13).

Transport scholars, as well as the World Bank, have long observed the growing constraints and demands that the global trade pattern has imposed on urban transport (IPCC 2001, Gwilliam 2002). Energy and development scholar Urban (2016) further commented on this aspect and pointed out that like the energy sector, transport is a derived demand. However, a crucial difference of the transport sector lies in the extent of end-user engagement.

Urban (2016) pointed out that end-user engagement is associated with the extensive linkages between transport and other factors, such as linkages between:

- transport technologies and wider infrastructural and institutional systems;
- the transport sector and wider spatial, infrastructural, social and economic planning;
- the transport sector and settlement;
- the transport sector and environmental and social issues.

The EEA also addressed this issue from a different but similar angle in its latest report, highlighting the close and complex linkages between transport and other societal functions, such as trade, food and tourism (EEA 2016a: 58).

These linkages have profound policy implications, including:

(i) Stern path-dependency and technology lock-in

These close linkages mean that there is a very high degree of path dependency and 'lock-in' to current transport systems, both from the mobility system and other systems, due to private and public investment in infrastructure, equipment and other forms of capital associated with or dependent upon particular forms of transport. For example, the transport system is closely connected to the energy system and replacing conventional vehicles with electrical vehicles

(EVs) can help reduce emissions, although this is dependent upon the source of the electricity used. Historical investments in carbon intensive electricity generation, therefore, may form a lock-in for a transition towards electrical mobility, as these plants have long life-spans and obstruct low-emission mobility (EEA 2016a: 58). These are particularly challenging aspects for developed countries (Urban 2016).

The EEA (2016a) suggests that a key challenge for the current EU emission mitigation efforts in the transport sector is the extensive and incumbent interests of various stakeholders. These range from transport operators, state confined systems and car manufacturers, to private companies, biomass farmers and food retailers and their consumers, to name but a few.

(ii) Policy implementation outcomes hinge upon external factors

The European Environment Agency emphasised the policy implication of such linkages:

> *Because of these links, actions designed to improve the environmental performance of transport can become more complex, as the outcomes also depend on factors that are external to the mobility system (EEA 2016a:9).*

(iii) Cost implications of new modes of transport

Development of infrastructure for new modes of transport may also be very costly due to the number of stakeholders involved. For example, the development of new railway tracks in urban areas not only incurs the construction costs of the new track but also high costs in avoiding, or compensating damage to existing and expensive infrastructure such as roads, buildings and factories (Urban 2016).

These features make transport policy highly political, with different stakeholder groups making uneven gains and losses from various transport improvement options. This can hold back or drive forward mitigation options. Nevertheless, Urban (2016) has argued that such features also offer opportunities for integrated solutions that address the environmental performance of transport *via* other societal systems. For example, Hallegatte et al. (2016) show the significance of transport in the context of climate change through its entanglement with the food security and physical safety of the urban poor, as well as in terms of the rural poor's access to market and the right to work.

Taking this crucial feature of the transport sector into account, the PPMC has remarked:

> *The transport sector alone cannot realize such ambitious action and so will need to gain the full cooperation of other sectors that interact with it, especially the energy sector and urban development* (PPMC 2017: 6).

Transport demand models

In contrast to the IPCC's energy/economy/environment models which limit themselves to the transport sector, transport demand models, such as those developed by the IEA, also address transport-specific issues like accidents and congestion alongside climate mitigation. Hence, the fuel shift in the electricity/power sector is taken as a boundary consideration; optimal mitigation strategies across sectors are included in the investigation. Infrastructure and modal shift options are well represented, highlighting the contribution of climate change mitigation on the demand side (Creutzig 2016: 346).

In its 2009 report, *Transport, Energy and CO_2: Moving Towards Sustainability*, the IEA identifies 'how [by 2050] the introduction and widespread adoption of new vehicle technologies and fuels, along with some shifting in passenger and freight transport to more efficient modes, can result in a 40 percent reduction in CO_2 emissions below 2005 levels'. The language suggests the prioritisation of technological options, such as fuel economy, followed by the identification of modal shift options (Creutzig 2016:346). Nevertheless, the report also shows a clear trend, as transport demand models converged with place-based studies in the late 2000s. This will be discussed further below.

Place-based research and the emergence of the 'co-benefit' framework

In the first decade of this century, there was a growing trend to increasingly link climate change to development issues. Commitment and resources for climate assistance during this period were low, and a new discussion emerged about the need for main-streaming climate change into development and development cooperation.

A key element in this period was the changing nature of the leadership discourse. The idea that the developed countries should lead by reducing their emissions was shattered by the US Byrd–Hagel Resolution and the subsequent withdrawal of the United States from the Kyoto negotiations. This was justified by the White House's argument that the world economy would collapse if the United States were to take on strong stabilization or reduction targets. Developing countries experienced this lack of leadership as a failure in the

implementation of the Convention. Concurrently, there was growing pressure on newly developing countries to take appropriate action at a national level.

Efforts to address climate issues through alternative political spaces have led to increasing engagement with sub-national actors. There is growing interest in the potential of policies that can be taken at local government level. The International Council for Local Environmental Initiatives (ICLEI) had already been engaging local governments across the developed and developing world to participate in climate policy. National governments that were reluctant to sign up the Kyoto Protocol in this period found that their own sub-national government authorities were more active. Research into state policy also revealed that through past processes of decentralization and federalism, power to take decisions in some fields had been transferred to sub-national government levels (Gupta 2010).

There have been at least two major waves of activity in municipal action on climate change since the 1990s. The first involved individual cities and transnational municipal networks, such as ICLEI's Cities for Climate Protection (CCP), Climate Alliance, and Energy Cities, which started to mobilize action for reducing greenhouse gas (GHG) emissions. For the most part, national governments and the emerging international regimes for governing climate change showed little interest in these activities (Bulkeley and Betsill 2013). It was dominated by a few pioneer cities, predominantly in North America and Europe and focused on mitigation (Bulkeley and Betsill 2013). The second, and more-recent wave, saw transnational municipal networks grow and multiply as a more geographically diverse range of actors emerged. The emergence of the C40 Cities Climate Leadership Group and the Rockefeller Foundation Climate Change Initiative, together with the continued work of ICLEI, has led to an increasing involvement of global and megacities in the urban climate change agenda. At the same time, the predominant focus on mitigation is giving way to the emergence of municipal climate policy in which both mitigation and adaptation are considered significant. With regard to this shift, the World Bank has been particularly influential.

This trend gave rise to increasing place-based research in the low carbon transport literature, specifying idiosyncratic behavioural and infrastructural mitigation options that are likely to be beneficial in realizing local co-benefits. These specific local approaches could mitigate urban transport emissions by 20-50 percent, a figure higher than that revealed in aggregate global models (Creutzig 2016: 342).

Place-specific models limit themselves to one or a small number of locations, often cities. They comprise a variety of methodological approaches, such as those based on econometrics, or on agent-based modelling, and investigate infrastructure effects, demand-side responses to policies, and urban development. Location-specific analysis is highly

relevant as urban transport emissions constitute 40 percent of all transport emissions. Activity reduction opportunities, largely, but not exclusively, in private urban transport have been best studied. Public health and environmentally-minded models tend to be more optimistic, focussing more on welfare benefits. In contrast, more economically focused studies tend to be more conservative, and emphasize undesired economic welfare losses.

Urban modelling studies mostly consider multiple objectives besides climate change mitigation, specify local co-objectives such as congestion, physical activity benefits, air quality and accessibility. In this, they are closer to transport demand modelling methodologies.

World Bank and climate change financing

Another approach has been climate financing, which calls for the mainstreaming of climate change in development cooperation. This has led to new opportunities and actors in low carbon transport. Considerable progress has been made since Clean Development Mechanism (CDM) first became operational in 2001.

CDM was established under the Kyoto Protocol in 1997. The Protocol explicitly includes five mechanisms—joint fulfilment (JF), joint implementation (JI), the clean development mechanism (CDM), emissions trading (ET), and the financial mechanism to promote the implementation of the agreement. Joint fulfilment allows countries to adopt a joint target for implementation. The CDM allows investors to invest in developing countries in return for emission credits, named certified emission reductions (CERs). CDM has proved to be a useful mechanism for soliciting interest from the private sector. The possibility of CDM together with other climate funds also facilitated development banks' investment in sustainable transport. However, the actual financial support from CDM for transport projects were far less than expected and political and procedural factors such the withdrawal of the United States and carbon accounting led to the collapse of the CER market.

According to the Overseas Development Institute (ODI), currently the largest sources of international public finance for climate mitigation in developing countries are the World Bank administered Clean Technology Fund (CTF) and the Global Environment Facility (GEF), while the EU's Global Energy Efficiency and Renewable Energy Fund (GEEREF) and the World Bank's Scaling up Renewable Energy Program (SREP) provide mitigation financing on a smaller scale (ODI CFF 2016).

The key influences of the World Bank include: (a) its approach to combining knowledge and development solutions from transport, poverty reduction, environmental protection and urban planning and (b) its success in promoting Bus Rapid Transit (BRT) as a flagship intervention in low carbon urban transport solutions.

The World Bank and the GEF: Priority setting

In 1989, France proposed that the World Bank be provided with additional resources to fund environmental projects, offering to support it with a contribution of 900 million French francs over a three-year period. Its proposal, to the Bank's Development Committee, was quickly seconded by Germany. In November 1990, after the Bank had developed the proposal through extensive consultations and negotiations, 27 countries, including nine developing ones, agreed to set up a pilot Global Environment Facility (GEF). The first three years funding amounted to approximately $1 billion[25].

The GEF was jointly supported by the World Bank, the UNEP and the UNDP and was envisioned at the outset as independent. However, by 1994 the initial attempt at developing the GEF into an independent organisation had failed. Since the French government had clearly stated its preference for the World Bank, the World Bank won the political fight amongst the three agencies and ended up running the GEF.

TABLE 4 APPROVED SUSTAINABLE URBAN TRANSPORT PROJECTS BY THE GEF AGENCIES (1991–2012)

	Number of projects	GEF financing ($ millions)	Co-financing ($ millions)
ADB	3	9.2	276.4
IDB	1	3.4	16.2
UNDP	19	84.8	581.4
UNEP	8	16.8	212.4
World Bank	18	152.9	1,730.0
World Bank/ UNDP	1	25.4	352.7
Total	**50**	**292.5**	**3,169.1**

The World Bank had viewed the GEF as an opportunity not only to improve its reputation in environmental protection but also to extend its influence and resources in the new, environmental field. Since the World Bank became the trustee and the administrator of the GEF, the power relations between the World Bank, the UNEP and the UNDP changed from cooperation and pooling of expertise, to competition for project funding. In the past decade, funding from GEF went mostly to the World Bank's projects, whilst the second largest share went to UNDP projects. Only a relatively small amount of money was allocated to UNEP work.

[25] https://www.thegef.org/news/gef-how-it-all-began

The GEF was established around the time when the Climate Change Convention and the Biodiversity Convention were both signed. GEF has a committed fund larger than the total fund available for the UNEP. Subsequently, it has become the official financing mechanism for both Conventions. Upon taking over the GEF in 1994, the World Bank quickly directed resources and efforts to the field of climate change. By 1999, it was reported that around 45 percent of the GEF total budget was allocated to climate change projects.

In 1995 the World Bank launched the Global Overlays Program under the GEF, with major support from the Government of Denmark. The program is designed to help countries analyse policy options so as to integrate global climate change considerations into their national economic planning. By 1999, development and testing of energy sector methodologies was essentially completed and comprehensive guidance was issued. Efforts then refocused on the transport sector. In 2002, the World Bank's Urban Transport Strategies (UTS) were developed through the Gwilliam 2002 report, which brought the bank's previous reviewed strategies on transport and on urban development together with a clear emphasis on the relationship between urban transport and poverty alleviation, the critical role of non-motorised transport, and the effects of the external environment on the transport sector.

The central concerns with transport and climate change identified by the World Bank UTS were similar to those outlined in the IPCC2001, but also addressed the problem of urban settlement patterns. These included the relationship between the high growth rate in per-capita vehicle ownership and local government transport policies which encourage sprawling settlement patterns, thus leading to a further increase in reliance on private motor vehicles. Another two challenging trends that were addressed in the World Bank UTS were: (a) the growing and pivotal role that cities play in global trade, which underlines the need for efficient transport systems; and (b) the deterioration in urban transport systems that was partly linked to drastic cutbacks in funding for public transport systems.

The UTS notes the difficulty of convincing urban transport policymakers in the developing world to prioritise climate change-related interventions. It recommended options linking GHG mitigation to near-term benefits, such as reducing local air pollution. The World Bank's UTS proposes that in the short-term emphasis should be placed on policy reforms, such as fuel pricing and taxation. In the long term, greater attention should be paid to technological changes including non-motorised transport (NMT) and increased reliance on public transport systems with the aim of breaking the link between economic growth and increasing demand for individual transportation (Gwilliam et al. 2002; World Bank 2003). In sharp contrast to developed countries' interest in investing in new vehicle and fuel technologies, additional

capital and operational costs were seen to be major constraints upon the introduction of new technologies or fuels in developing countries. The World Bank commented openly on its funding priorities, stating that its main funding source, the GEF, was unlikely to continue to cover the incremental cost of new technologies or fuel, as it had in its early days. It also drew on research to repeatedly address the practical point that transporting people via efficient modes of public transport, regardless of the technology, can have a large impact on reducing energy consumption and GHG emissions.

Below is a table detailing the World Bank's UTS priorities and cautions, in response to key issues-

Main responses	Preferences and priorities	Cautions
Structural Changes to Land Use	• Removal of fiscal and public expenditure distortions that encourage the growth of megacities • The need for coordinated and integrated planning of land use and for development of urban transport infrastructure • A good road infrastructure does not necessarily result in auto dependency	• Question the feasibility of trying to solve traffic congestion by shifting activity away from megacities.
Improved Operational Efficiency	• Better road system management: technical assistance and investment in this field can yield high returns • Efforts to reverse urban road decay:	• Less enthusiastic about the viability of non-exclusive bus lanes combined with automated priority at intersections: enforcement proven to be very difficult

	(improving clarity in responsibility and source of funding) • NMT infrastructure investment addressed through transport policy, road fund statutes and procedures: it serves people in all income groups, not only the poor • Support to the bicycle sector • Exclusive busways: low cost and can deliver performance levels only slightly lower than much costlier rail-based mass transit system	• Cautious about urban rail systems: high capital and operational cost. Experience demonstrated that poorly planned urban rail systems can harm the interests of poor bus users and impose a large financial burden on cities.
Better Focusing of Interventions to Assist the Poor	• Improving access to slum areas • Improving public transport to peripheral locations • NMT and bus systems: more directly serve the poor • Safety and security measures such as street lighting	• Investments in primary roads and high-cost transit systems can change the value of land and eventually drive the poor out of the area
Policy, Institution, and Fiscal Reforms	• Integrated package of strategies for infrastructure and	Technical measure alone are unlikely to adequately

service pricing and for system financing. • Greater integration of the disparate authorities and agencies that currently oversee the urban transport subsector. • Involvement of the information sector	address the challenges due to structural characteristics: 1) The separation of infrastructure from operations. 2) The separation of interactive modes of transport. 3) The separation of infrastructure financing from infrastructure pricing.

(Source: World Bank 2003: 5-13)

Around the same time, the GEF's limited funding scope was criticised by the GEF Council for being 'too technical'. In response, funding structures were reviewed with the aim of broadening their scope so as to fulfil the initial mandate of promoting modal shift and non-motorised transport. Four new priorities were recommended for OP11 in 2002 which were more in line with the World Bank's UTS:

(i) Public rapid transit, including BRT, light rail transit, and trolley electric buses.

(ii) Transport-and traffic-demand management, including parking measures, traffic cells, area licensing (restricted zones), and congestion pricing.

(iii) NMT and maintaining physically separate NMT networks, traffic calming, strengthening NMT manufacturing and maintenance enterprises, and improving NMT vehicle design.

(iv) Land use planning through regulatory measures (zoning laws) and placing new public facilities such as schools, hospitals, police stations, and playgrounds in transit-friendly locations.

The scope of OP11 has continued to broaden with increasing 'non-technical' priorities. In its 2013 report on sustainable urban transport, the GEF described the key issues of urban transport in the developing countries as symptomatic of lacking institutional and legal/regulatory capacities, reporting:

> Most of the GEF transport and urban projects can be grouped into three general categories: (i) technology solutions; (ii) improvements in urban transport systems;

> and (iii) integrated urban systems. While early GEF's investments focused on technology solutions, the recent emphasis has shifted to comprehensive and integrated strategy options at the urban level (STAP GEF 2013:12).

In 2003, the World Bank made an effort to compare its UTS with GEF OP11 priorities in order to identify interventions that are consistent with both strategies, and to help its transport staff explore funding opportunities from the GEF. Four overlapping areas were identified as promising: modal shifts to public transport, NMT, combined transport and urban planning and transport demand management (TDM). BRT was considered to be a good cost-effective example, with potentially large benefits on local air quality as well as global climate change. In addition, significant scope for the GEF to support the development of BRT was recognised in this review (World Bank 2003: 21-22).

As of 2009, 29% of the GEF transport projects involved BRT systems or some form of transit system priority or spatial restructuring. Another 29% focused on some form of NMT infrastructure, normally cycling lanes, but also some pedestrian facilities. Another 8% were for some form of TDM measures. 6% of the projects dealt with alternative vehicles such as electric, hydrogen or hybrid vehicles. Another 28% was spent on 'other' activities; including capacity building, land use programmes, awareness raising, policy making, freight and bicycle manufacturing (STAP GEF 2013).

GEF support for transport has been concentrated in cities with higher mitigation potential in Argentina, Brazil, China, India, Indonesia and Mexico (with China receiving most funding, followed by India coming second). In these counties GEF support for transport is implemented in conjunction with a range of other international and domestic efforts aimed at sustainable transport (STAP GEF 2013).

By 2013, Asia was home to 22 projects which were either completed or in the process of implementation, in a total of 46 cities with a combined number of inhabitants of 180 million. Furthermore, it is notable that GEF's partner, the Asian Development Bank (ADB), also launched a transport programme called the 'Asian Sustainable Transport and Urban Development Program (ASTUD)' in 2011 (STAP GEF 2013: 13).

In Africa, eight projects have been developed and/or implemented, covering 18 cities with a combined number of inhabitants of 40 million.

CDM demonstration projects

The key impact of the World Bank on developing countries' transport mitigation options was its investment in, and promotion of BRT. In 2002, the World Bank coordinated funding from

CDM, GEF and other funds to its BRT project in Bogota. It later rolled out funding to several major BRT projects, typically co-funding work with other agencies.

Table 1. Overview of transport projects in existing climate instruments

	Year of 1st project	No. of Projects	Funding [$ million]	Reported/expected direct emission reductions [$MtCO_2$-eq/yr]
CDM	2006	30(3)[a]	567 (CERs)[b] (63)	2.7 (0.3)
GEF2-4	2006	37	201 (grants)	3.1[c]
CTF	2009	7	600 (loans)	10[d]

[a] In pipeline (registered, requesting registration and at validation), bracketed numbers registered projects only; [b] expected total undiscounted revenues at 10 $/CER, 3x7 years crediting, excluding transaction cost; [c] assuming 10 years lifetime; [d] assuming 10-20 years life time depending on type of investment.

Source: Huizenga C. and Bakker S. (2010) Applicability of post 2012 Climate Instruments to the Transport Sector, ADB – IDB- SLoCaT, Final Consultants Report

Clean Development Mechanism

The CDM was proposed during the negotiation of the Kyoto Protocol by the US government as a means of reducing the shock of mitigation targets for developed countries' national economies and a source of investment for developing countries.

Developing countries and NGOs' initial responses to this mechanism varied. Some criticised and protested against its inclusion, seeing it as an unethical practice which justified bringing environmentally unfriendly 'big (dirty) projects', such as the construction of hydropower plants, to developing countries. However, some, especially emerging countries, saw it as a chance to increase infrastructure investment for national energy security, as well providing potential opportunities for technology transfer which could improve their countries' global competitiveness in the technology based knowledge economy.

Stern (2006), Gwilliam (2002) and Grütter (2007) addressed CDM as an important funding resource. However up to 2012, amongst the 8,000 registered CDM projects only 30 were in the transport sector. Gwilliam (2013) points out that the World Bank had great expectations for the CDM, but that the Clean Development Mechanism had not worked for the urban transport sector in the ways it had initially been hoped it would. Stern (2006) cautioned that the stringent requirement to prove 'additionality' and the project-based methodology of the CDM would make the application process too complex and expensive for the least developed countries and thus favour emerging countries. Calculating and comparing CO_2 emissions of different mitigation options would be challenging for sectors like transport. Stern also echoed the already common criticism of CDM, that its limited impact is due to its project-based nature and methodology.

Further studies suggest that the two issues outlined by Stern (2006) as short-comings of CDM are also responsible for the under-representation of the transport sector in the programme (Wittneben et al 2009; Millard-Ball and Ortolano 2010). Grütter comments that there are three problematic areas under the CDM, which are methodologies, validators and the additionality procedure. There was high complexity in methodologies and far more is demanded in the transport sector than in other sectors. According to Hone (2017), the CDM failed due to the collapse of the CER market. He also reported that the discussions of the Parties to the Paris Agreement in May this year had not come to agreement on any arrangement as to the future of CDM.

In an interview on BRT, Grütter commented that because the infrastructure costs are high, carbon financing's impact is limited, even in the context of the higher CER prices of the past. However, carbon financing's potential impact lies in the possibility of reducing the financial risk of operational deficits (quoted in Yu 2014: 36). Yu (2014) analysed a BRT project Grütter highlighted to illustrate the impact of the failing CDM:

> The Chongqing BRT was managed and operated by a public company, Chongqing Bus Rapid Transit Development Co. Ltd. According to Grütter, the BRT Chongqing recently ceased operation, returning to the city's former bus transit system run by private companies affiliated with the government. This outcome is a result of the operating deficit unable to be covered by the CER income related to the low CER price as well as the lack of a credit buyer in the second contract period (Yu 2014: 39).

Purdon (2017) suggests that CDM survived the 2012 UN climate change negotiation during a period where a much less ambitious second commitment period for the Kyoto Protocol was agreed. However, the idea of exchange of carbon credits between developed and developing world is arguably losing political support. According to Purdon:

> Disappointed with the approach of the Kyoto Protocol and CDM, some have called for climate funds as an alternative strategy. Such funds have arisen rapidly following a commitment in Copenhagen towards $30 billion in 'fast-start' finance for 2010-2012. The UNFCCC is also establishing a Green Climate Fund [GCF] that is intended to 'play a key role in channelling new, additional, adequate and predictable financial resources to developing countries and will catalyse climate finance, both public and private, and at the international and national levels (Purdon 2015: 3).

Cost-effective, equality or needs?

The ODI has reported that prior to the operationalization of the GCF in 2015, multilateral climate financing has been efficiently spent in countries with relatively high GHG emissions (ODI CFF 2016). During the negotiation of the GCF, questions were raised as to whether such a 'cost-effective' approach is appropriate. The majority of the funding went to large middle income countries such as China, India and Mexico. Others argued that 'equality' between the countries should be the organising principle, while others suggested that actually funding support 'needs' should be the priority. As an example, according to the 'needs' strategy, whilst China may have the highest levels of emissions it is probably less likely that China is unable to raise funds for its transport projects.

The GCF's current 50:50 mitigation/adaptation allocation framework reflects something of a political victory for non-Annex I countries that have fought to position adaptation as a priority in UNFCCC negotiations (Ciplet et al. 2013). After years of fruitless negotiations for a mitigation regime, and in the face of rising numbers of natural disasters (Khan and Roberts 2013), many developing countries have organized to push for action that supports adaptation (Brechin and Espinoza 2017: 313).

Mitigation provides a global public good with its benefits dispersed globally and experienced over long-time scales, while adaptation provides local benefits over a shorter time span (Watkiss et al. 2015). It is thus not surprising that mitigation—a strategy that reduces fossil fuel-based growth—is perceived as having higher political opportunity costs, making adaptation more attractive to developing and emerging economies (Kane and Shogren 2000).

Most importantly, the GCF marks a new direction in climate financing mechanisms by allowing direct access for recipient countries and including the private sector**.** The GCF can attract the private sector by reducing the costs and risks of climate investments that may not be considered commercially viable without its intervention (e.g., buying-down upfront costs of projects that are considered excessively risky).

In terms of geographical distribution of funds, unlike CDM, where Africa had little access, within GCF, 20 percent of funding went to Africa. The general distribution to priority countries is as follows: 19 percent to African states, 13 percent to least developed countries (LDCs) and 8 percent to small-island developing states (SIDS), totalling 40 percent of available funds. Judging from the information that is available on the GCF website, the only current

project under the GCF that has a clear theme on transport is a project co-funded by the KfW Development Bank to build 80km of storm-proof roads.

‘Co-benefit’ and coalition

Very recent scholarship of the ‘big picture’ shows how the underlying domestic politics of major rising powers (China, India, Brazil and South Africa) influence their global positioning in climate negotiations. Schmitz (2016) puts it strongly:

> The key actors behind climate-relevant policies are not primarily concerned with environmental or climate issues. Their prime concerns are securing energy for the nation or particular regions, fostering new green industries and making them competitive, creating jobs and incomes in these industries, or laying the foundation for increasing public revenue. Reducing the risk of climate change is at best seen as a ‘co-benefit’ (Schmitz 2016: 5).

With the growing success of the security framework in formulating national climate strategies for the energy sector, the search for synergies between low carbon transport and development goals is further complicated by potential conflict between national interests and local needs. For example, the World Bank and the PPMC have both suggested to start by looking for areas with synergies in goals, such as reduction in air pollution. However, even in terms of air pollution, there are conflicting solutions. The sustainable transport instruments with perhaps the most mixed response to pollutant and GHG reductions are those relating to cleaner or alternative fuels, where GHG emissions can actually increase (Dalkmann and Brannigan 2007: 37). Examples include improving fuel quality (e.g. lower sulphur), adding oxidation or 3-way catalyst, switching to compressed natural gas (CNG) or blending ethanol (Dalkmann and Brannigan 2007:36). Myanmar’s role in supplying cheap CNG as a means of ensuring national and regional energy security has had a crucial influence on its transport fuel policy. In spite of the growing controversy over CNG’s environmental impact, the product has remained a key element in Myanmar’s low carbon measures.

The idea of ‘co-benefits’ (sometimes called ‘sustainable development benefits’; GIZ Report) offers the potential to address multi-policy objectives simultaneously and to support the creation of coalitions.

The notion of co-benefits is useful in so much as it points to potential synergies with other policy objectives; efforts can be combined to be greater than the sum of their parts; and once areas of overlap are identified it is theoretically easier to build further coalitions and to

overcome barriers. The idea can be sensibly split between developed and developing countries and might be further refined into primary and secondary benefits (Huizenga and Bakker 2009) or direct and indirect benefits.

The turn towards ‘policy holism’ at the intersection of climate and transport thinking opens the door to a social science contribution. Holism has traditionally been at the core of the social science approach to understanding society. For social scientists the idea that different domains of life, such as religion and politics, might be separated from one another categorically is problematic. A social scientific approach would see these various ideas as intertwined to the degree that one cannot be understood without the other. So too in the realm of everyday transport thinking, where people make decisions about how to move around cities that are deeply rooted in their cultural lives. Many of these decisions have nothing to do with transport but are motivated by the compulsions of social life, a domain which is the established realm of the social sciences.

References

Alcott, B. 2010. Impact caps: Why population, affluence and technology strategies should be abandoned. *Journal of Cleaner Production,* 18: 552–560.

Beck, S. and T. Forsyth. 2015. The IPCC and adaptation to climate change, in: *Science and Democracy: Making knowledge and making power in the biosciences and beyond*. Routledge, pp 113–32.

Brechin, S.R. and M.I. Espinoza. 2017. A case for further refinement of the Green Climate Fund's 50:50 ratio climate change mitigation and adaptation allocation framework: toward a more targeted approach. *Climatic Change*, 142: 311–320.

Bulkeley, H. and M.M. Betsill. 2013. Revisiting the urban politics of climate change. *Environmental Politics*, 22: 136–154.

Ciplet, D., J. T. Roberts and M. Khan. 2013. The Politics of International Climate Adaptation Funding: Justice and Divisions in the Greenhouse. *Global Environmental Politics*, 13: 49–68.

Creutzig, F. 2016. Evolving Narratives of Low-Carbon Futures in Transportation. *Transport Reviews*, 36: 341–360.

Dalkmann, H. and C. Brannigan. 2007. *Transport and climate change*. GIZ.

EEA, 2016a. *Transition towards a more sustainable mobility system (No. EEA Report No 34/2016)*. European Environmental Agency.

EEA, 2016b. *Climate change "mitigation impossible" without transport*. European Environment Agency.

GIZ, 2016. *Advancing transport climate strategies (TraCS)*. GIZ.

Grütter, J.M. 2007. *The CDM in the Transport Sector*. GTZ, Federal Ministry of Economic Cooperation and Development.

Gupta, J. 2010. A history of international climate change policy. *Wiley Interdisciplinary Reviews: Climate Change*, 1: 636–653.

Gwilliam, K. 2002. *Cities on the Move: A World Bank Urban Transport Strategy Review*. The World Bank.

Gwilliam, K. 2013. Cities on the move: Ten years after. *Research in Transport Economics*, 40(1): 3–18.

International Energy Agency, 2009. *Transport, Energy and CO_2: Moving Towards Sustainability*. IEA: Paris.

IPCC, 2001. *Climate Change 2001: Mitigation - A Report of Working Group III of the Intergovernmental Panel on Climate Change*. IPCC.

IPCC, 2000. *Emissions Scenarios: A Special Report of IPCC Working Group III (Summary for Policymakers)*. IPCC.

IPCC, 1995. *IPCC Second Assessment Climate Change 1995*. IPCC.

Kane, S. and J. F. Shogren. 2000. Linking Adaptation and Mitigation in Climate Change Policy. *Climatic Change*, 45: 75–102.

Kartha, S., T. Athanasiou, S. Caney, E. Cripps, K. Dooley, N. Dubash, P. Harris, C. Holz, B. Lahn, D. Moellendorf, B. Muller, J.T. Roberts, A.D. Sagar, H. Shue, P. Singer, and H. Winkler. 2017. *Inequitable Mitigation: Cascading Biases Against Poorer Countries: Response to Robiou Du Pont Et Al on Climate Equity. Correspondence to Nature Climate Change (SSRN Scholarly Paper No. ID 3022357)*. Social Science Research Network, Rochester, NY.

Kaya, Y. 1989. *Impact of carbon dioxide emission on GNP growth: Interpretation of proposed scenarios, Presentation to the Energy and Industry Subgroup, Response Strategies Working Group*. Paris: Response Strategies Working Group, IPCC.

Millard-Ball, A. and L. Ortolano. 2010. Constructing carbon offsets: The obstacles to quantifying emission reductions. *Energy Policy*, 38: 533–546.

Parikh, J.K. 1992. IPCC strategies unfair to the South. *Nature*.

PPMC, 2017a. *An Actionable Vision on Transport Decarbonization Implementing the Paris Agreement in a Global Roadmap Aiming at Net-Zero Emissions Transport (Discussion Paper)*. Global Climate Action Agenda.

PPMC, 2017b. *Global-Macro-Roadmap-Consultation-Draft-March-2017*. Paris Process on Mobility and Climate.

Purdon, M. 2015. Advancing Comparative Climate Change Politics: Theory and Method. *Global Environmental Politics*, 15(3): 1-26.

Schmitz, H. 2016. *Who Drives Climate-relevant Policies in the Rising Powers?* Institute for Development Studies.

Stern, N. 2006. *Stern Review: Economics of Climate Change*. Grantham Research Institute on Climate Change and the Environment.

Urban, F. 2016. *Climate Change and Development P108 (P524) Module and Study Guide*. CeDEP/SOAS, University of London, London.

Vardy, M., M. Oppenheimer, N.K. Dubash, J. O'Reilly and D. Jamieson, 2017. The Intergovernmental Panel on Climate Change: Challenges and Opportunities. *Annual Review of Environment and Resources*, 42: 55–75

Wittneben, B., D. Bongardt, H. Dalkmann, W. Sterk and C. Baatz. 2009. Integrating Sustainable Transport Measures into the Clean Development Mechanism. *Transport Reviews*, 29: 91–113.

World Bank, 2017. *Sustainable Mobility for All. Global Mobility Report 2017: Tracking Sector Performance*. Washington, DC: World Bank.

Yu, J.Y. 2014. *Carbon Finance Opportunities in Transportation and Clean Development Mechanism in Developing Countries–Examining the Interplay of Investment, Emission Reduction, and Carbon Credit Revenue*. Dissertation, Columbia University.