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Do Institutional Structures Matter? A Comparative Analysis of Urban Carbon Management Policies in the UK and Germany

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Abstract

The paper addresses the important question of how institutional structures matter to the delivery of climate change policy for urban transport. It examines the strategic goals, policy tools in operation and initial progress towards carbon emission reduction in seven cities across the UK and Germany where different institutional structures exist. The UK has the presence of a strong national carbon target and strong hierarchical national-local government relationships whilst Germany has a more integrated system of local transport provision in a context where local and regional government is stronger. Our findings show that the carbon agenda has made very little difference to what is happening on the ground in the cities. Across all sites, progress is being made but largely through technological improvements which are being almost completely offset by population growth. Even in the more integrated city environments there has not be an additional stimulus to manage the demand for travel.

Contrary to previous research therefore, we cannot conclude that institutional structures are paramount in delivering effective carbon reduction policies. The institutional structures in the UK and in Germany are not perfectly aligned to carbon management but, given the cross policy impacts of most transport interventions, this is perhaps inevitable. We can clearly conclude however that "better" structures are not sufficient to achieve the implementation of more effective carbon policies. Whilst institutional structures must matter, it is the broader governance environment and the resources and politics involved in transport policy that seem to dominate the importance of the carbon agenda and implementation paths that emerge.

Keywords: Governance; carbon; climate change; targets; institutions; cross-national comparison; cities

1. Introduction

The debate about climate change mitigation is not about whether we should take action but how much, in what sectors and over what timescales. The proposition here is becoming much sharper. In order to limit warming to 2°C there is a requirement for governments in developed economies to achieve significant cuts in their total emissions in the period to 2020 as part of a pathway to very substantial decarbonisation of the whole economy by 2050. The European Commission for example is committed to a 20% reduction in CO_2 emissions by 2020 and has an objective to reduce such emissions by 80-95% by 2050 compared to 1990 levels (EC, 2011).

In the European Union "transport is responsible for around a quarter of EU greenhouse gas emissions making it the second biggest greenhouse gas emitting sector after energy. Road transport alone contributes about one-fifth of the EU's total emissions of carbon dioxide (CO_2), the main greenhouse gas. While emissions from other sectors are generally falling, those from transport have increased 36% since 1990" (EC, 2014, p1). Whilst it is not the case that all sectors have to

decarbonise at the same rate or to the same extent, the relative importance of transport emissions and the trajectory of progress to date suggests the need for an urgent emphasis on decarbonisation of the transport sector as part of this. The 2014 Intergovernmental Panel on Climate Change report concluded that "A range of strong and mutually-supportive policies will be needed for the transport sector to decarbonize and for the co-benefits to be exploited. (Robust evidence: high confidence)" (Sims and Schafer et al., 2014, p6)

The pathway to carbon reduction from transport will necessarily involve "a complex policy mix involving new technologies, reformed pricing structures and new forms of behaviour" (Marsden et al., 2014). The delivery of such a complex mix will require the coordinated action of the state and the private sector at a range of spatial scales in ways which are accepted and understood by the public. Governance of the system will be particularly important. Banister et al. (2012, p. 486) suggest that the necessity for action may not be well matched to the current organisational and institutional structures which "may be inappropriate when it comes to addressing climate change and transport". If correct, this is a critical issue. However, there are relatively few cross-national comparisons of progress against specific shared policy goals (see Rietveld and Stough, 2004 for discussion) on which to base claims that particular structures are necessary or better in some way. On climate change, whilst Marsden et al. (2014) have compared climate change policies between England and Scotland in the UK, the delivery environment is very interconnected (Mackinnon et al., 2008) and so limited in some respects for comparative analysis. Anderton (2010) explores the differences between EU and US, but does not shed significant light on the issue of how institutional structures matter.

This paper reports on a comparative analysis of the progress of cities in the UK and Germany on climate change policy. In doing so, it examines the policy goals, the policy tools, their perceived and initial effectiveness and the views of the actors engaged in the process. Cities are chosen as the spatial scale of analysis as they are the key focus of transport planning in a wide range of European Countries (EC, 2013) and, as major generators and attractors of trips, are a key contributor to the climate change problem causing approximately 40% (EC, 2007) of the road transport and 25% (EC, 2011) of all transport-related GHG emissions in the EU. There is also evidence that cities in different contexts are adopting different types of climate change strategies (Hickman and Banister, 2014).

Whilst both countries sit within the same overarching European policy framework and framing for climate change, the formal institutional structures through which policies are delivered are quite different, with the UK having a much stronger top-down governmental influence than Germany where the regional Länder are more significant. The UK also has a more fragmented and liberalised public transport market. Technological opportunities such as vehicle innovation and the potential for behavioural and infrastructural interventions would appear to be broadly similar (GHG TransPoRD, 2012). The paper therefore addresses the question of where, when and how institutional structures matter to the delivery of climate change policy in the transport sector. Whilst the findings reflect a comparative analysis within the EU, the framework for analysis is generically applicable.

2. Analytical Framework

Climate change is an externality requiring the action of agencies and people today to prevent significant impacts in places which may be distant from those of the source of the pollution and where the benefits may be some time in the future. This may be particularly true when considering urban transport mitigation policy where the contribution of a city to even the total national

emissions burden can be small[1]. Giddens (2009) sees the role of government as being critical to resolving such problems both as an important actor itself but also as one that steers the critical inputs from private sector actors and quasi-state actors such as the infrastructure monopolies. Steering is very much done through a network of stakeholders rather than a command and control process (Rhodes, 2007).

There are many different aspects of the policy making and delivery environment that could form the start point for an investigation of the role of the state in delivering an effective climate policy but, as identified above, institutional structures seem to be at the fore of current debate. Our definition of institutional structures for this paper follows from Williamson (1985) who proposed four different dimensions of institutions which can be seen to shape the delivery of policy:

- Governance institutions (structures through which government operates);
- Informal institutions (values, norms, practices, customs, traditions);
- Formal institutions (statutes, constitutional provisions, laws, regulations); and
- Actions of actors in the decision environment (management behaviour, voting, lobbying).

Institutional structures are, for us, Williamson's governance institutions and formal institutions, i.e. the formalised organisations, mandatory reporting mechanisms and the policy development powers that reside with different organisations. It has long been posited that integration of transport and land-use policy and co-ordination of all modes of transport is central to effective achievement of urban policy goals (May and Roberts, 1995; Banister and Giovani, 2010). This paper therefore explores the role of institutional structures by taking a comparative analytical perspective between the UK (less integrated) and Germany (more integrated) to identify differences in policy approach. It would be anticipated that a more integrated set of institutions with greater delivery powers would be better placed to progress more radical policy measures. Other dimensions of institutions and how and why policy choices are made are an important part of the empirical work but did not form the basis of determining to undertake the comparison between the UK and Germany.

In the context of environmental decision-making in the EU, actions could be taken at EU, nation state, region or local level (Jordon and Adelle, 2012 and Kern and Bulkeley, 2009). The extent to which each tier might be engaged in such processes will vary substantially. For example, the EU and nation states are jointly engaged in setting the parameters for fuel tax, with local government not an actor in the network. By contrast, urban transport policy and mode shift is a 'reserved matter' for nation states (Marsden and Rye, 2010). Here, the extent to which the national government plays a role in local transport management will vary considerably. In Germany, for example, the regional tier is the most important interface for local government whilst in the UK the national tier is important. The scale of investigation is therefore an important variable to be clear on.

In this paper we focus on urban transport policy through a cross-national comparative study of seven cities in the UK and Germany. As identified in Section 1, cities are important to the mitigation pathway as they are a key determinant of the patterns of local journeys (93% of trips by car in the UK are under 25 miles and contribute 64% of car-based CO_2 (DfT, 2009)). They are also important as

[1] It is important to note that interventions which work for climate mitigation (such as mode shift) may have other benefits and vice-versa (often referred to as co-benefits). The extent to which this is reflected in approaches to date emerges in the data analysis.

the interface of national and international initiatives with the public. For example, whilst the funding and regulation for the roll out of electric vehicles is strongly influenced by the actions of manufacturers, the EU and member state governments, local authorities still send important signals by taking up grants for public charge points, greening their own fleets and allocating priority parking for ultra low emissions vehicles. In this paper therefore, the role of regional, national or European governments is not ignored, but those influences and the related issues for the implementation of local carbon-policies are seen through the lens of the city actors.

In order to explore the degree to which the different institutional structures make a difference to carbon mitigation we examine the policy tools which are deployed and the planned or measured performance of the policy packages in play. In summary, the institutional structures can only be said to matter to implementation if we see significant differences in policy approaches adopted (means) and expected outcomes (ends) on the ground (Howlett and Cashore, 2009). To do this, we deploy a classification of modes of governing to organize the comparative analysis of implementation. The classification was initially developed by Bulkeley and Kern (2006) for a broad range of city led environmental policies which included transport. They define four different modes:

- Self governing – which relates to the capacity of the government to manage its own activities, which here would relate to emissions of its own estate and vehicles.
- Governing by authority – which uses regulation and direction to effect a reduction in emissions such as the establishment of a low emissions zone, reallocation of roadspace, pricing policies (parking fees, tolls, taxes) as well as traffic control measures
- Governing by provision – shaping the nature of travel patterns, such as introducing infrastructure or subsidizing provision of public transport.
- Governing by enabling – which would use voluntary means such as workplace travel planning and promotion campaigns to facilitate change.

The literature suggests that an effective transport climate reduction strategy would involve integrated actions from across all four modes listed above (Hickman and Banister, 2012). Previous work by Marsden (2011) would suggest that there will be a distribution of commitment to carbon policy across cities and that those cities with more limited commitment would be more likely to adopt less confrontational policies characterized by “enabling” or “self governing”. In addition, Marsden et al. (2014) suggest that cities will also look to each other and to higher tiers of government for signals about how seriously they should take carbon reduction[2]. By taking a comparative analysis of cities in the UK and Germany the paper aims to provide insights into the type of carbon reduction policies being adopted, their intended effectiveness and the extent to which the institutional structures matter to what is implemented.

This paper combines the work of two independent research projects on local decarbonisation strategies in the UK and Germany. In both countries, the cities selected for study were chosen following a most-similar-cases logic (see Marsden et al., 2014 and Groer and Boltze, 2013 for full details). The data collection process was also similar with an initial analysis of the details of the cities’ stated carbon management intentions by reviewing official policy documents, followed by a series of

[2] There is a strand of literature which suggests that policy copying to avoid being seen to be left behind is a potential response. This involves more symbolic copying and implementation rather than signifying a commitment to progress (DiMaggio and Powell, 1983).

semi-structured interviews with city-officials and external experts (see Appendix 1 for details of interviewees). Whilst the studies were not designed specifically for a combined analysis the overarching approach, similarity in questions and the availability of the two data sets, which are suitable for a joint qualitative analysis as conducted for this paper, made this possible.

3. Institutional Structures

3.1 National and Regional

In Germany, there are three levels of government - federal level, state (Länder) level and the level of cities and municipalities – where the Länder define the fields of responsibility of cities and municipalities and supervise their activities. State laws also set the respective framework for the political structure (electoral system, structure of municipal councils, governments etc.) at the municipal level. The direct political and legal influence of the federal government on cities and municipalities is therefore low. However, there are multiple financial relationships between the federal government and the municipal level, often in the form of support programmes which cities can benefit from when they comply with given standards or requirements. These programs have been of great importance to the transport sector and also exist for the field of climate protection. For regional spatial and transport planning, many cities and surrounding municipalities have established planning associations which differ in their institutional design and their competences.

In the UK, the governance picture is less consistent. In England there are two main tiers of government – the national (UK) and the local. Over time, there have been various regional governance structures that have been established but none have proved to have longevity. In the context of this study, the most important regional influences come from Integrated Transport Authorities which co-ordinate travel across cities in the major cities of the UK. In Scotland, where two of the case studies are drawn from, the arrangements are more complex. There is the UK government but also a Scottish Government to whom most transport powers are devolved (Mackinnon et al., 2008). There is a very weak regional tier of governance which is largely responsible for the development (but not delivery) of a transport strategy and a local level. There is much stronger influence from the national level (London for England and Edinburgh for Scotland) in the UK whereas the Länder matter more in Germany.

In both countries, the national level actors are important in signalling the overall ambition for the country and for negotiating with the EU as to the EU targets. The German federal governments set the goal to reduce the overall German GHG emissions by 40% (1990 baseline) until 2020. The UK, through the Climate Change Act 2008 has committed to a legally binding target of at least an 80% cut in greenhouse gas (GHG) emissions by 2050 (relative to 1990 levels). There are interim targets every five years and a commitment to reduce emissions by 34% by 2020 (CCC, 2012). In Scotland, these targets have been taken further, with the Climate Change (Scotland) Act 2009 setting an 'interim target' of a 42% reduction in GHG emissions by 2020. Broadly speaking, the national statements on ambition are comparable.

In Germany, goals for different sectors or Länder/ municipalities are not specified. A lot of climate-related activities are bundled together in the national climate initiative. The main component of the initiative addressing cities and municipalities is a programme which provides funds (e.g. for personnel) for the development of local climate actions plans (not for the actions included in the

plans[3]). In total, 128 mio Euros were spent on local activities reaching 18% of all German municipalities (Öko-Institut et al. 2012, p. 13). A similar position is adopted in the UK where sectoral targets are not specified and local government is left to determine whether or not to adopt a climate target and any associated level of ambition. By contrast however, the national government sees itself as a key determinant of progress towards carbon reduction in the transport sector. It publishes a Carbon Plan (HMG, 2011) which addresses policies including adjustment to taxation, funding for trials of electric vehicles (although these are bid for by local government) and tightening of fuel efficiency and CO_2 emissions at a European level. Whilst the national government maintains that it is a key actor in effecting the technological transformation to low carbon vehicles it believes will be necessary to meet the ambitious targets, its independent advisory body (the Committee on Climate Change) concluded that local authorities are critical actors with "significant scope to influence emissions in buildings, surface transport, and waste, which together account for 40% of UK greenhouse gas emissions" (CCC, 2012, p. 8-9). It estimates that opportunities to influence travel behaviour make up 20% of abatement potential in the sector.

In Germany, the Länder have also set up climate programmes which do not always contain quantified reduction goals. Again, the programmes do not address lower levels of government directly. The Länder also offer limited funding schemes for local climate initiatives. Like the national scheme, the funds are mainly provided for the development of and consulting on local climate plans rather than the implementation of measures[4]. Special plans for the transport sector are not part of the schemes.

3.2 Local

The three German cities that were examined in this study are Frankfurt a.M., Stuttgart and Munich. All three cities (see Table 1) are the centre of their metropolitan area and federal state, although Frankfurt is not a state capital. They belong to the largest cities of Germany and are economically strong. Thus they possess superior financial power, which is important when discussing issues with capital-intensive carbon-management actions like extending public transport networks. Like most major German cities the most important public transport services including subway and light rail are operated by a city-owned company. Some bus routes and the regional public transport including suburban trains are usually operated by private companies but are controlled by the local or regional transport association over which the cities have major influence. Operating costs for local public transport that cannot be covered by ticket fees usually have to be paid by the cities from their tax revenue. Infrastructure costs are (still) subsidised by federal and sometimes state governments. Higher government levels also fund parts of the regional public transport and road infrastructure of regional or national importance within the cities. In addition to the established local taxes (business tax, real estate tax) and their share of the combined taxes, German cities do not have the possibility to levy taxes or fees that could contribute significantly to fund transport projects.

In the UK, four case study areas were selected with Leeds and Manchester City Regions in England and Edinburgh and Glasgow City Regions in Scotland. All four are major city regions and both pairs of national case study cities are relatively close geographically, connected by major motorway and rail

[3] The initiative also offers possibilities for funding e.g. climate-friendly local energy supply projects. The evaluation report emphasizes that funding for putting the developed programmes into practice is necessary.
[4] An exemption is e.g. the energy-efficient renovation of municipal buildings in some federal states.

routes within one to two hours journey time (see Table 1 for details). In the UK, the rail services are, for the most part, specified by national government and provided by the private sector under franchise agreements. In the case study sites, public transport services are provided by the private sector in a deregulated environment, although Edinburgh City Council has joint ownership of one of the companies operating in its area. In England, the cities are responsible for developing an integrated transport strategy with adjacent local authorities and both have an Integrated Transport Authority which is tasked with developing the strategy and co-ordinating matters including public transport information and joint ticketing and additional service provision. In Manchester, a more formal structure for pooling funding for major infrastructure spending and coordinating implementation was established in 2011, although it was too early to have a significant impact on the findings reported here. Leeds has proposed a similar approach in 2014. Glasgow operates with a similar governance arrangement to that in place in Leeds at the time of the data collection although it is not obliged to produce a strategy but does have to report on certain key indicators (including road safety but not climate change) to the Scottish Government. Edinburgh is part of a regional transport grouping but this is a relatively weak coalition and Edinburgh essentially reports directly to the Scottish Government. In all of the UK case studies, local tax raising comprises only a small proportion of the funding which is spent on transport. At least three quarters of funding is channelled to the authorities from national government as funding for new capital projects or on-going resource funding for maintenance and travel planning initiatives.

Due to their far-reaching responsibilities especially in the public transport sector (but also in other areas that are important for carbon management) like energy supply, German cities have historically better developed and integrated public transport networks compared to UK cities (see also Bulkeley and Kern 2006). The question here is if and how they can use these better integrated structures to implement new or additional carbon management policies that are necessary to support the achievement of the national reduction goals or greater local ambitions.

Table 1: Key City Characteristics

	Frankfurt	Stuttgart	Munich	Leeds	Manchester	Edinburgh	Glasgow
population[1]	685,000	586,000	1,464,000	751,500	510,772	495,360	598,830
city area (km²)[1]	248	207	311	552	116	264	369
pop metro (million inhabitants) [1]	2.54	2.67	2.65	2.24	2.62	0.83	1.79
pop density metro (inhabitants/km²)[2]	592	732	485	1,098	2,061	484	486
metro type	Polycentric	more polycentric	more monocentric	polycentric	more monocentric	more monocentric	more monocentric
length subway/ light rail network (km) [1]	132	128	174	-	78	14	10.5
2010 GDP per capita (Euros) [3]	40,500	37,000	41,700	23,600	23,700	26,800	24,500

[1]: city/region data
[2]: NUTS 2 Region data (2010), Eurostat Metropolitan Regions Database 2014
[3]: Eurostat 2013

4. Comparative policy analysis

The results of the cross-national comparative analysis are presented in two sections. In this section, we take a look at the contents of the cities' carbon policies including their overall goals and concepts and their strategies for transport. In Section 5, key issues with developing and implementing carbon policies from a cities' perspective are identified on the basis of interview data.

4.1 Policy content

All of the cities have city-wide carbon management programmes (Table 2). The time span the programmes which have been in place varies notably from 17 years (Stuttgart) to 4 years (Munich[5]). The nature of these carbon management programmes varies considerably from looking at own activities (e.g. buildings, housing stock, own fleets as in Glasgow) to incorporating emissions from the whole transport sector (as in Leeds). Frankfurt is the only city in this context that does not include the transport sector in its carbon management strategy. In Germany, the goals the cities have set up are very similar, which may be because all of the cities are members of the European Climate Alliance that recommends and sets minimum goals for its members and also offers consulting and management tools for benchmarking and inventory development. In the UK different levels of ambition are adopted but with reference to different baselines, making direct comparison difficult. Whilst the sites all describe the importance of transport to the carbon targets, only the metropolitan area containing Leeds had adopted a specific transport carbon reduction target (see Section 5 for further discussion).

Table 2: Carbon Management Policy Status at Case Study Sites

	Frankfurt	Stuttgart	Munich	Leeds	Manchester	Edinburgh	Glasgow
general carbon management policy	✓	✓	✓	✓	✓	✓	✓
reduction goal	50% by 2030 (1990 baseline)			40% by 2020 (2005 baseline)	48% by 2020 (1990 baseline)	40% by 2020 (2005 baseline)	30% by 2020 (2010 baseline)
sub-strategy for transport	-	✓	✓	✓	✓	✓	✓
specific goals for transport	-	-	-	30% by 2026	-	-	-

Despite the lack of consistency in whether or not a carbon management strategy for transport is in place, many of the same policies are in place in the different cities. This reflects the fact that many transport interventions face towards many different objectives (e.g. cycling for health, congestion reduction and climate benefits) and that broader trends (e.g. introduction of electric vehicles in all countries) require some form of response. We map the key policies that are in place in the different cities against an Avoid, Shift and Improve categorisation (WCTRS and Institute for Transport Policy Studies 2004) in Table 3. We also provide a relative qualitative assessment of the intensity of application of the measures in the different cities.

[5] There were relevant precursor policies in Munich which did not explicitly address carbon management.

Table 3: Policies in Place across the Case Study Sites[6]

	Frankfurt	Stuttgart	Munich	Leeds	Manchester	Edinburgh	Glasgow
Avoid – Reduce Transport Demand							
A1 Low carbon neighbourhoods/ transit oriented development	✓✓	✓✓	✓✓	✓	✓	✓	✓
A2 Car pooling	✓	✓	✓	✓	✓	✓✓	
Shift – Move to less polluting modes							
S1 Cycle infrastructure	✓✓	✓	✓✓	✓✓	✓✓	✓✓	✓
S2 Promoting cycling	✓	✓	✓✓	✓	✓	✓	✓
S3 Public transport network development	✓	✓	✓	✓	✓✓	✓	✓
S4 Public transport fare promotions	✓	✓	✓				
S5 Workplace travel planning	✓	✓	✓	✓✓	✓✓	✓✓	✓✓
S6 School travel planning			✓	✓	✓	✓	✓
S7 Comprehensive transport demand management campaign			✓✓				
S8 Area-wide parking management		✓	✓✓	✓	✓		
Improve – Reduce Emissions per kilometre							
I1 Electric Vehicle charge points	✓	✓✓	✓	✓	✓✓	✓	✓
I2 Greening own fleet	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓
I3 Greening public transport fleet	✓✓	✓✓	✓✓	✓✓	✓	✓✓	✓
I4 Energy efficient traffic lights/street lighting		✓	✓✓	✓	✓	✓	✓
I5 Improve traffic flow (ITS, signal control, infrastructure, speed management)		✓✓		✓	✓	✓	✓
I6 Driver education	✓	✓					

Key: ✓ = moderate intensity ✓✓ = higher intensity

[6] Space constraints preclude a review of every possible policy. However, we note that other policies may be being introduced that lead to increased greenhouse gas emissions such as lorry bans which lead to re-routing.

Some overarching findings from the analysis of policies emerge. First, there are very few policies which are in play seeking to reduce the demand for transport. Whilst each of the cities has some parking pricing in place, there are no further restrictive price based measures focussed on managing demand. Planning policies are in place that seek to reduce the amount of travel which new developments generate but this is a relatively weak policy. In Germany, a stronger emphasis on Transit Oriented Development exists.

On the whole, the package of policy measures that are in play in each of the different sites have a similar set of core policies. Overall, these policies could be characterised as a relatively weak emphasis on 'Avoid' strategies, a spread of activities on 'Shift' but mostly without a strong intensity across all modes and a strong reliance on 'Improve' through technological measures (e.g. vehicles, new traffic signal controllers) including public transport (e.g. hybrid electric buses in the UK). An emphasis on encouraging mode shift by improving alternatives and on reducing emissions by engaging with state of art developments in technology dominates.

There are small variations in the selection of policies in this overall framing. In German cities, new residential developments are combined with public transport extensions or located at existing transit lines (transit oriented development). The UK also encourages development location to reduce car trips but focuses more on mitigation measures through workplace/school/residential travel plans. There are also different levels of intensity of application of measures (Manchester has a significant tram network expansion programme whilst Leeds and Edinburgh have more modest mass transit system expansions planned and Glasgow a major refurbishment of its Subway). A distinctiveness in this comparison is the transport demand management policy in Munich that is also regarded as a prototype in the other German study cities. The city has established a comprehensive campaign, trying to address different groups (e.g. elderly, migrants, employers) as tailored as possible in different situations (e.g. starting a family, relocation).

Other policies appear distinct but this may be more a lack of joining up policy presentation than it is operationally significant. For example, Frankfurt has not expanded its parking management strategy in recent years within the framework of its carbon policies. This does not mean there is a parking free for all in the city, it is still managed but not linked explicitly to the climate change strategy. By contrast, whilst cities such as Leeds do have a parking management strategy which they see as contributing to the climate change plan, the city council does not own much of the off-street parking stock and so, whilst the policy exists, the use of it to deliver climate change goals in reality is limited.

Given the relatively small distinctiveness of policies at the operational level, it is also worth considering the extent to which the polices gathered together under climate change mitigation represent anything new. In Munich, for example, the parking management scheme has a broader range of goals and has been in existence since the late 1990s. Although the main purpose of such schemes is to improve the parking situation for residents and small businesses, they also influence mode choice for commuters and contribute to carbon mitigation. Packages aiming at improving the traffic flow by ITS and enforcement measures have a more limited impact on carbon emissions but are still labelled, by some cities, as carbon-management policies, even if they might be focussed on other aspects of environmental improvement such as air quality or catering for demand growth.

4.2 Modes of governing

We now turn to the degree to which the different modes of governing in the UK and Germany matter. We do this by clustering the measures according to the four modes of governing developed in Section 2 as shown in Table 5.

Table 4: Policy Matrix for UK and Germany

	Avoid		Shift		Improve	
	Germany	UK	Germany	UK	Germany	UK
Self-governing		**A2**	**S4**		I1, I2, **I3**, I4, **I6**	I1, I2, I4
Governing by authority	A1, A2	A1, A2	S8	**S5, S6**, S8	I5	I5
Governing by provision			S1, S3, **S4**	S1, S3 (tram only)	I1	I1
Governing through enabling			S2, **S5**	S2	**I6**	**I3**
differences highlighted in **bold**						

Regarding modes of governing, Table 4 shows the cities in both countries to be engaging in a range of improve actions in the self-governing category which signifies better operational efficiency for them as an organisation, lower energy bills and concomitant carbon reductions. The installation of alternative fuel infrastructure is limited in the UK to own fleet operations such as waste collection whereas in Germany it extends to public transport fleet fuelling. In the UK (and for the tendered bus lines in Germany) that would be a decision for the private sector operators. In reality, in the UK, national government grant funding has stimulated a significant uptake of hybrid-electric buses. The source of subsidy is distinct (national government in the UK and the city public transport operator in Germany) and the means of channelling the funding is also distinct (a competitive bidding process in the UK rather than an in-house business decision by the municipal company in Germany) but the outcomes are both driven by the level of financial support available to subsidise the fleet renewal.

A range of 'governing by authority' policies are found in the cities although these predominantly deal with road space allocation in a broader sense (e.g. cycling lanes, parking space for car-pooling). Hard regulatory policies such as pricing can only be found in the form of parking management schemes. Whilst the cities in the UK have the legal right to adopt a congestion charge such charging options are currently not open for discussion (even in interview). Despite the success of the London congestion charge both Manchester and Edinburgh had congestion charge proposals heavily defeated in local referenda (Rye et al., 2008; Vigar et al., 2011). We did not find evidence that the German cities had accelerated their 'avoid' strategies despite a greater baseline proportion of non-car trips (see Table 5). Institutional structures appear to matter in the pro-active use of the planning system across all developments in the UK to try and minimise additional car trips generated (S5). This also extends to a requirement for all schools to have a travel plan (S6) and programmes to encourage large employers to reduce car travel to their sites which was driven by compliance with

national guidance but where strong local support exists. In Germany those programmes have a voluntary character and programmes are focussed on individuals rather than through schools. Whilst distinctive, this is still a relatively weak tool or limited in the scale of its application (Rye et al., 2011).

Potentially more significant is the ability of German local authorities to control the amount of public transport provision (S3) in their areas and fares (S4) and to govern by provision. In the UK authorities typically work through partnership agreements with the private sector. Whilst this is *potentially* significant, this difference has not led to a change in the ambition of the German cities specifically to meet climate objectives. Current network provision is good and subsidy levels may preclude further expansion. Comparatively the UK appears to be losing some ground as subsidised evening and weekend services have been cut back due to post recessionary budget cuts.

Governing by enabling is politically appealing but is not believed to be sufficient even by those engaged in its promotion (Marsden et al., 2014). Enabling is an essential part of a policy package but the aim of enabling actions is often to promote awareness of lower carbon opportunities. These need to be provided in the first instance. Although different cities exercise enabling in different ways this does not appear to be strongly influenced by institutional structures.

4.3 Changes in emissions

This section provides a reflection on the change in carbon emissions over time. The figures are more contextually important than indicative of the impacts of the strategies because the data pre-dates the adoption of formal carbon reduction targets where they exist and have a significant time lag to them. It is also important to caveat the data for such a comparison. In both countries there remains considerable dispute and uncertainty amongst the cities about how to account for their carbon emissions and this has not been resolved in 2015. The data therefore draws on nationally available benchmarking tools (ecoregion in Germany (provided by Climate Alliance; no open access) and DECC (2013) in the UK) and was not available and/or used in determining progress over time within the cities. Different methodologies are used in the two countries and so the most important comparison is the relative change. It is also important to note that the figures reported relate to the core city and not the wider transport area over which the carbon management strategy is delivered. This would incorporate significant amounts of less dense areas and longer commutes with fewer public transport trips. A regional total (where available) is also therefore provided as context in Table 5.

Table 5: Change in CO_2 performance

Indicator	Frankfurt	Stuttgart	Munich	Leeds	Manchester	Edinburgh	Glasgow
CO_2 emissions per capita (t) (transport related); city data	2.4 (2005) 2.6 (1995)	2.1 (2010) 2.3 (2005) 2.3 (2000) 2.7 (1995)	1.7 (2010) 1.7 (2005) 1.6 (2000) 1.5 (1995)	City only 2.1 (2010) 2.3 (2005) Region 2.0 (2010) 2.3 (2005)	City only 1.3 (2010) 1.6 (2005) Region 2.0 (2010) 2.2 (2005)	1.5 (2011)	1.3 (2011)
Modal Split (trips); city data	2008; 2003	2011; 1998	2008; 2002	2010; 2002 (City)	2010; 2002	2010; 2001 travel to work:	2011; 2001 travel to work;
car / motor. %	34.0; 38.0	44.1; 45.0	37.0; 41.0	56.1; 60.9	% trips to regional centre by non-car 69.4; 63	42; 69	35.7; 39
transit %	23.0; 23.0	24.2; 22.0	21.0; 21.0	38.2; 35.6		30; 29	39.8; 33
bike %	13.0; 9.0	5.3; 6.0	14.0; 10.0	1.6 (inc;0.4 . m/bike)		19; 7 (bike and walk)	4.3; 1
walk %	30.0; 30.0	26.4; 27.0	28.0; 28.0	4.2; 2.6			28.6; 27

The CO_2 data shows, that in general, emissions per capita have fallen over time. This is as much as 19% in central Manchester between 2005 and 2010 but typically more like 10% in Leeds, Stuttgart and the wider North West of England over that period. This seems to be, in significant part, due to the improvements in vehicle fuel efficiency which have occurred across the EU as a result of voluntary and now mandatory agreements on new car fuel efficiency. The reductions are in the same range as the realised fuel economy savings in the EU during that time (GFEI, 2014). Munich appears to be an anomaly given that the mode share for car has fallen over the period and yet emissions have risen. Such findings contribute towards the limited credibility which the benchmarking tools yet have with the cities[7]. In addition, whilst per capita emissions have fallen, populations are growing and forecast to continue growing in the major cities. West Yorkshire (the transport planning area for Leeds), for example, has seen a 7.5% growth in the period 1999 to 2009. Total carbon reductions are therefore comparatively small which makes the apparent lack of local ambition or credible policy paths to match the stated ambitions more concerning in the context of a search for significant overall reductions in carbon.

5. Perspectives on carbon management

The review of carbon management strategies in place finds that only Leeds has adopted a formal carbon management plan with specific goals for transport. Looking across the policies in place at each site however suggests that the presence or absence of a plan and local target for CO_2 reduction makes little difference to what is done on the ground. This section explores this through use of the interview data from both sites. Having reviewed the data separately (Groer and Boltze, 2013; Marsden and Mullen, 2014 and Marsden, Ferreira et al., 2014) we have identified three critical common themes most of which transcend the differences in institutional structures in the two countries.

5.1 The Political Environment

The carbon reduction challenge has come at a time of recession in Europe, albeit one which played out more significantly over the period of this research in the UK than Germany. In the UK, the

[7] Credible responsive data is fundamental to setting and monitoring progress towards targets. The data issues which seem to persist in city carbon accounting are problematic.

interviewees were quite clear that the national and local signals were aligned with economic growth and job creation over and above carbon.

"*politicians….they wanted to focus primarily on promoting growth and the economy*" (West Yorkshire local government official)

In both countries, there was also a clear and well understood reluctance to raise significant demand management policies. It was seen to be OK to encourage people to shift through the provision of attractive alternatives but measures that limit the amount of traffic were sometimes not even open to discussion.

"*Even the green mayors militate spontaneously against a congestion charge. There you wonder how that can be*" (Stuttgart city administration official)

The economic downturn provided an additional stimulus to arguments and resources for investment in transport infrastructure to 'unlock jobs' and for this to be associated with pro-travel growth narratives in the UK. It was certainly important in influencing in how national funds were spent on local transport. However, the bigger issue appears to be the lack of overall political acceptability of anything that looks like demand management with teeth as this could threaten jobs. This was common with the German cities with more choice being the key narrative.

"*In reality, our transport policy is a hybrid concept, everything for everybody*." (Munich city administration official)

Apathy or even opposition to interventions from the public was a further important political environment theme pointed at in numerous interviews. In the UK, a lack of engagement with transport planning was clearly identified but the failed referenda on congestion charging in Edinburgh and Manchester made the revisiting of price related policies impossible. In Germany, objections to tram line expansion because of well understood local NIMBYism caused delays and extra costs in projects. There is no apparent public clamour to do something to cut carbon. This leaves transport planners seeking to pursue carbon cutting measures to satisfy other objectives.

"*We do not implement a policy only because it is included in the city's carbon reduction programme*." (Stuttgart city administration official)

This may be a sensible and necessary approach given the impact of some interventions on multiple objectives. However, it is essential to ask whether there are enough carbon reduction measures available that occur as a result of co-benefits of other policies that are likely to be implemented. Our evidence suggests not.

5.2 The Resource Environment

This category comprises both the lack of financial resources for investment in and operation of carbon policies and the lack of qualified personnel resources (which may be a consequence of scarce financial resources). Whilst a scarcity of public resources is a recurrent theme in all domains of governmental action there are some important features in the context of this study.

In the UK, the cities are very heavily dependent on national government resources for new projects and for personnel and funding to subsidise the operation of transport. Immediately after 2009 there

was a very significant cut back in all types of resource. Whilst funding for capital projects has recovered, much of this relates to national infrastructure. Local resourcing has been cut by 25% or more and further cuts are likely (Crawford and Phillips, 2012). This has had a very significant impact on staffing levels and the amount of funding available for governing by enabling and governing by provision.

"*We have had our budget cut by £170 million over two years, last year and this year. And we are working on the basis that there are going to be further cuts in subsequent years... I think we've lost about a fifth of our staff across the board*." (Greater Manchester local government official)

Although the German cities seem to have suffered less in the financial crisis, resources were a major theme across all of the interviews in the three German cities. Whilst more limited funding streams come from the Federal government, these are important for public transport infrastructure projects and to enabling actions and technical analysis. Yet, those programmes are being phased out in the upcoming years. A lot of administrative personnel that are currently working on the topic have temporary employment financed out of national and state funding programs.

"*I got four employees with out-running contracts and I need all of them. I don't know how to organize that*." (Frankfurt city administration official)

In both countries, where national funding is targeted at implementation of measures on the ground this is typically time limited pilot schemes which may then lack a solid financial base once in regular operation. At a workshop discussing the findings of the UK study a local official summed up the situation:

"*We used to have policy, now we have funding streams*" (UK local government workshop participant).

5.3 The Governance Environment

There is a clear distinction between the UK and German case studies in the vertical institutional structures, with the national level being far more influential in the UK than in Germany. In all of the UK cities, interviewees regularly referred to national carbon reduction goals as an important parameter even though it still needed translating to a local level and to a transport context. German transport officials hardly mentioned the national goals but referred more to locally-embedded aims like quality of life in a city or seeing their own city as a role-model. This might be a consequence of the federal architecture as described above. It can be stated that carbon-management in transport in Germany seems to have a more voluntary character than in the UK. In fact, there are no concrete goals and almost no pressure for carbon mitigation from upper governmental levels in this area.

"*[Concrete thresholds] are painful but helpful. Insofar I'd say that we need more pressure. Up to now it has always been possible to muddle through.*" (Frankfurt city administration official)

Whilst this distinction is interesting to observe, in the UK, local government officials noted that because the carbon targets were national and not sectoral the nominal contribution of transport was important to them but not to their political leaders. This was contrasted with local air quality where local government has a legal responsibility to act. The political and resource factors highlighted above appear crucial in the absence of any definitive mandate to act.

In both the UK and Germany there continues to be a debate about how best to organise institutions to deliver joined up policies. A big issue for all cities is the handling of the massive commuter flows to and from the city centres. The population of all of the cities is predicted to grow in the next years, in the core cities and the surroundings, crossing administrative boundaries. Key roads and the main axes of the public transport systems are operating at their capacity limits in peak hours. In Germany, the suburban rail transport planned and organized is either by the state government, regional transport associations or regional legislative bodies where the influence of the core cities, that bear most of the transport problems, is limited.

"*[Politicains] should tell us: Do they really want regional cooperation [...] or do we stick to hollow words? [...] I think that any sustainability strategy will fail if we don't involve the region.*" (Frankfurt city administration official)

In England, similar debates are held and institutional re-organisations are now underway in Greater Manchester and Leeds and the surrounding region. The reality is that the competition between cities and regions is for funding to deal with a growth challenge and this is not driven by nor necessarily aligned with carbon reduction in a coherent way.

6. Conclusion

This paper set out to understand the extent to which institutional structures matter to the delivery of climate change policy in the transport sector. It has done this through an analysis of the adoption of strategies and implementation of policy measures in seven cities in the UK and Germany. Whilst there are significant, and potentially important, differences between the institutional structures and competencies of cities in Germany and the UK, there is an overwhelming similarity of policy tools in play and approach to their deployment. The research suggests that in both contexts a dominant pro-growth political narrative exists which supports supply side expansion and works against restraint based measures. This sits alongside substantial resource constraints resulting from the recession and slow recovery since 2008, albeit playing out more aggressively in the UK. It is not a time where significant supply-side operational subsidy expansion appears possible and policies which promote mode shift are also therefore under pressure. The fuzzy accountability arrangements which exist for carbon reduction, where the legal obligation sits with the national government and where sectoral or city level contributions are left to be defined or divined, fail to provide sufficient incentive for local politicians to act to tackle the issue. In the transport sector, at a local level, it appears that the discussion of climate change has largely been subsumed as part of other policy agendas. Whilst it is necessary to consider the co-benefits of some policy interventions, the repackaging of existing tools does not present the ambitious step-change pathway which the EU and national level targets imply is necessary. In addition, whilst co-benefits do exist, some policies also work against climate emission reduction and the slow progress on developing transparent accounting procedures is allowing these challenging trade-offs to be side-stepped.

These broader issues appear to dominate the reasons for change (or stasis) in local climate policy. It is perhaps surprising that the more integrated and comprehensive German institutional structures and delivery arrangements have not stimulated a more aggressive or comprehensive set of policies towards avoiding climate change emissions. The possibility remains that the German set up may be better suited to a more radical response were it to be deemed necessary. The ownership and operation arrangement for local public transport could make a difference to the extent to which

these are deployed to affect a mode shift. However, German cities do not currently have a significant stick (congestion charging) to go with the carrot and a solely supply side expansion strategy is limited in affordability and effectiveness. Paradoxically, the UK cities have the restraint option but not the control over public transport supply. So, whilst the institutional structures and competencies differ the constraints on delivery seem likely to limit significant divergence in approach from current positions. As expected, we identified other examples of different applications of policy tools which connected to structures but these were relatively minor differences in the context of the reduction packages discussed.

The UK cities are all more attuned to the national goals for carbon reduction than the German cities, although only one has yet adopted a local transport carbon reduction goal. However, there is a large degree of symbolism and repackaging of policies in all of the cities rather than a clear change in commitment to act. The emphasis on weakly expanding choice through limited provision expansion and governing through self-regulation and enabling measures was not believed, by local authority officials, to be sufficient to tackle the carbon problem, particularly in the face of growing populations and stronger economies. They acknowledge that many of the gains that will be achieved will be swallowed up by growth. The packages of policies are a pragmatic recognition that this is the best that can be done in an environment where political and public opinion does not yet seem to demand significant change. Indeed, the tightening public resource environment also diminishes the resources available for provision and enabling measures. There appears to be an urgent need to identify cities which have taken a more comprehensive approach to carbon emission reduction and yet still flourish economically. Without such examples it will be difficult to unlock the political mindsets which are so influential to the resource flows and policy packages that are considered.

Contrary to previous research therefore, we cannot conclude that institutional structures are paramount in delivering effective carbon reduction policies. The institutional structures in the UK and in Germany are not perfectly aligned to carbon management but, given the cross policy impacts of most transport interventions, this is perhaps not surprising. We can clearly conclude however that “better” structures are not sufficient to achieve the implementation of more effective carbon policies. Whilst institutional structures must matter, it is the broader governance environment and the resources and politics involved in transport policy that seem to dominate the importance of the carbon agenda and implementation paths that emerge. If we are to move beyond symbolic carbon mitigation policy then there is a research challenge to re-design incentive and sanction measures so that carbon matters more.

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Appendix 1: Interviewees

Location	Description of interviewees
European level	Two environment officers; one politician; one environmental NGO
UK	One advisory body; one transport infrastructure organisation; two private sector transport providers; five NGO actors
Germany	One environmental NGO
England	Two national government officials, one transport infrastructure organisation
Scotland	Two current/former governmental actors (one politician, one civil servant); one local authority official; three governmental agencies for transport and business; two private sector transport providers; industry networking body; NGO
Edinburgh City Region	Regional Transport officer; Edinburgh City Council; private sector transport provider; NGO
Glasgow City Region	Regional Transport officer; Glasgow City Council; sustainability partnership; Chamber of Commerce
Leeds City Region	Passenger Transport Executive; Leeds City Council official; NGO
Manchester City Region	Transport for Greater Manchester; Manchester City Council official, Stockport Council official; Chamber of Commerce; private sector transport provider; NGO
Frankfurt City Region	Local transport planning official; local transport operations official; local public transport association; local environmental department official; environmental NGO
Stuttgart City Region	Local transport planning official; local transport operations official; local public transport association; local environmental department official; regional planning official
Munich City Region	Local transport planning official; local transport operations official; local public transport operator; local environmental department official; transport research consultant