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CARBON AWARE TRAVEL CHOICE FOR SUSTAINABLE MOBILITY

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1 INTRODUCTION

1.1 Background

Climate change mitigation strategies need to incorporate land transport

The challenge of mitigating against climate change is increasing in prominence on all levels from the local to the international. The high and increasing level of anthropogenic emissions of CO_2 requires an economy wide response although efforts need to be focused more on some sectors than on others. The land transport sector is one where there is a particularly pressing need for a focused and strategic approach to climate change mitigation, and this is true for the sector on all geographic scales.

Internationally, the transport sector consumes more energy than any other sector and it is currently responsible for 23% of global energy related CO_2 emissions. If current trends continue then the International Energy Agency (IEA) predicts that emissions from the sector will increase by 50% by 2030 and by 80% by 2050 (IEA, 2009). These trends are mirrored in Europe where transport is responsible for approximately a third of all final energy consumption and more than 20% of GHG emissions (EEA, 2011b). The transport sector in the UK is also responsible for a large proportion of pollutants, specifically 21% of all UK GHG emissions in 2008. In the UK domestic transport GHG emissions increased by 6% between 1990 and 2008 – this compares with a total economy-wide decrease in emissions of 24% over the same period (DfT, 2010). As shown in Table 1 below the contribution of the land transport sector to total domestic emissions varies across Europe but the proportion remains high, and in many countries it continues to increase in a climate of economy-wide emission reductions. The message is therefore clear – if the EC is to meet its target of reducing emissions by between 80 to 95% by 2050 on 1990 levels (EC, 2011c), and if the UK is to meet its legally binding target of an 80% reduction in CO_2 emissions by 2050 (Department of Energy and Climate Change, 2008), then there must be significant emission reductions from the transport sector. This realisation has resulted in climate change mitigation becoming increasingly prominent in transport policy, both in the EC and within EU Member States.

Table 1 : CO_2 emissions from the domestic transport sector as a proportion of total domestic CO_2 emissions from the EU-15 countries in 2007 [countries featured in order of total domestic transport CO_2 emissions]

	Emissions from domestic transport (millions of tonnes of CO_2)	CO_2 emissions from domestic transport as a proportion of total CO_2 emissions
Germany	151.9	18.1%
France	136	34.3%
UK	131.8	24.1%
Italy	127.2	26.8%
Spain	109.1	29.8%
Netherlands	35.2	20.4%
Belgium	25.1	21.9%
Austria	23.9	32.3%
Greece	23.4	20.6%
Sweden	20.6	40%
Portugal	18.8	30%
Irish Republic	14.1	29.8%
Finland	14	21.2%
Denmark	14	26.3%
Luxembourg	6.6	55.5%

Source: adapted from DfT (2010).

Climate change mitigation strategies need to reduce demand for private road transport

The road transport sector is consistent in its high contribution to GHG emissions on the international, European, domestic and local levels. In Europe, road transport is responsible for 71.3% of GHG emissions from the transport sector (EEA, 2010b) and emissions rose between 1990 and 2007, as did car ownership levels and passenger car use (EEA, 2010a). In the UK road transport is responsible for 90% of emissions from the domestic transport sector, and its share of emissions increased by 6% between 1990 and 2008 making it responsible for 18.9% of total GHG emissions from all sources across the UK (DfT, 2010). As shown in Figure 1 below the majority of emissions from road transport in the UK come from passenger cars.

Source: DfT (2010).

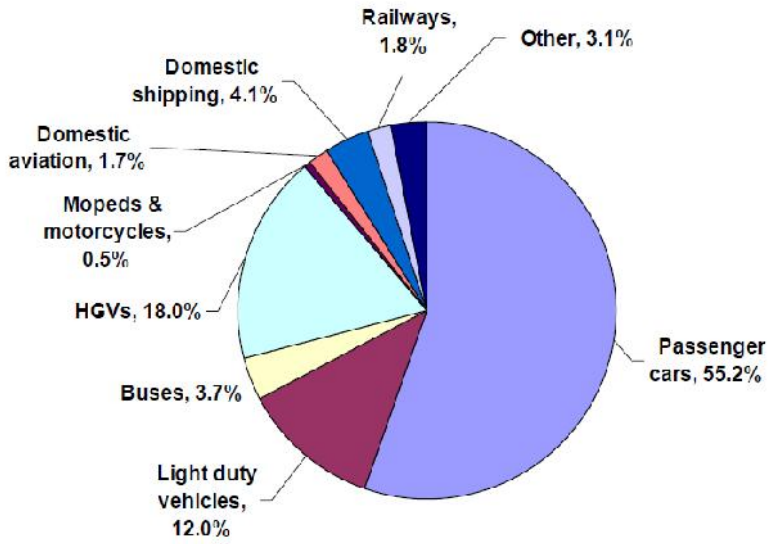

Figure 1 : The modal split of GHG emissions from UK domestic transport in 2008

There was a decrease in emissions of 3.3% from private cars between 2007 and 2008 in the UK although vehicle kilometres travelled have continued to increase (DfT, 2010). The DfT estimates that total emissions from private cars will fall a little further before stabilising slightly below current levels. This is based on the prediction that technological improvements and regulations on vehicle fuel efficiency and biofuels will lead to an emission reduction, but that demand for road transport will continue to increase (DfT, 2010). If the required level of emission reductions is to be achieved then demand for road transport will therefore need to be managed. This is again true for the European level where growth in demand for travel, and particularly for travel by private car, is increasing at approximately the same rate as average vehicle emissions are declining as a result of technological enhancements (EEA, 2010b).

Climate change mitigation strategies need to target emissions from cities

A large proportion of the emissions from road transport are emitted from urban areas. In Europe 40% of all CO_2 emissions and 70% of other pollutants from road transport are emitted on the urban level. It is also within urban areas that other negative impacts associated with high private vehicle use are experienced most acutely, such as congestion, which it has been estimated costs the EU almost €100 billion a year (EC, 2007a). It is again private cars that dominate the modal split within cities accounting for approximately 75% of passenger kilometres travelled despite the relatively highly developed nature of public transport and non-motorised transport networks in cities (EC, 2007b). The EC's Green Paper 'Towards a new culture for urban mobility' (2007b) highlights the unsustainable nature of urban mobility and the need for its efficiency to be enhanced to support the better functioning of the EU.

The same is true for cities in the UK. The DfT estimates that 25% of CO_2 emissions from road transport are emitted in cities, and that on average the proportion of distance travelled in English cities by private car is higher than in many other European cities (2009). The economic burden posed by this level of emissions is high. The cost of the CO_2 emissions from road transport in UK cities was estimated as being between £1.2 billion and £3.7 billion in 2009 alone (DfT, 2009).

This section has outlined the need for the land transport sector to be a part of climate change mitigation strategies formulated on all geographic levels. It has also highlighted the need for climate change mitigation strategies to incorporate measures designed to encourage behavioural change in an effort to prevent the continued offsetting of the positive impacts of technological improvements on CO_2 emissions from the sector. It is in this context that the CATCH project, which aims to encourage and facilitate low carbon transport behaviours in cities, was commissioned.

1.2 The CATCH (Carbon Aware Travel CHoice) project

CATCH (Carbon Aware Travel CHoice) is an EC project being conducted under the 7th Programme for Research (FP7). It was commissioned in recognition of the factors outlined above – the need for climate change mitigation, and the need for action in the transport sector, one of the highest emitting sectors of GHG emissions. It aims to reduce emissions from private cars on the city level through encouraging behavioural change and through capacity building.

The aim of the CATCH project is to develop and promote a trusted 'knowledge platform' that will be designed to encourage carbon friendly travel choices in a city context and in doing so contribute towards a reduction in CO_2 emissions from the transport sector. It will specifically seek to encourage carbon friendly travel choices by increasing awareness of the negative impacts of carbon intensive mobility as well as of potential solutions to their management.

The CATCH project and knowledge platform have two primary target groups – members of the general public and local transport professionals, such as practitioners and decision-makers. It will seek to empower travellers to make informed travel choices, and professionals to understand the potential impact and diversity of CO_2 emission reduction measures. The CATCH knowledge platform recognises that these two primary target user groups have very distinct motivations and information needs, so separate elements of the platform are being developed and linked to in a way that reflects these disparate needs. It is anticipated that the users of the platform will include other stakeholders working on the urban level and also in the fields of climate change and energy efficiency. Public transport operators are one example of a group which the knowledge platform could enable to more readily and accurately incorporate environmental considerations into planning and decision-making processes.

The CATCH 'knowledge platform' will be a web-based resource that will contain original research and interactive tools that can be used to access and manipulate city level data. It will also link to a far wider evidence base of research and best practices from secondary sources. This information will be presented in a way that best meets

the needs of the user groups. The knowledge platform will also be 'open,' enabling its users to add to, comment on, share and discuss its content.

The knowledge platform is being designed based on grounding research that has developed a detailed understanding of the perceptions and attitudes of citizens and other stakeholders towards GHG emission reduction in the transport sector of cities. A combination of desk-based research and user engagement has been conducted in an attempt to try to maximise understanding of the motivation triggers that can be incorporated in the platform to increase its impact on travel behaviours. The research methods employed in this grounding research are as follows:

- Literature review (to identify factors, with an emphasis on the socio-psychological, that may affect individual's use of information services and their propensity to change their behaviours in response to this information);
- A survey (with a sample size of 194 members of the general public from across Europe, to test responses to behavioural factors identified in the literature review);
- Interviews with eight transport professionals (these included representatives from government and business to better understand the needs of practitioners and design requirements of CATCH);
- Six focus groups (to test responses to behavioural factors identified in the literature review and associated tools developed by CATCH); and
- Design workshops with city representatives from transport departments (to test responses to behavioural factors identified in the literature review and associated tools developed by CATCH).

A first version of the CATCH knowledge platform was developed based on the outputs from these research methods. It is currently undergoing a period of evaluation and validation and it is due to be made available at the end of 2011.

1.3 Structure of this paper

This paper will start by outlining some of the key barriers that are being faced to managing the increase of GHG emissions from the transport sector. It will then briefly introduce ways in which CATCH might be able to contribute to alleviating some of the barriers often experienced by practitioners when pursuing low carbon transport interventions.

2 BARRIERS TO MANAGING CO_2 EMISSIONS

The introduction to this paper showed the pressing need for climate change mitigation in urban transport. The need for climate change mitigation is beginning to be recognised on the political level in the UK (DECC, 2011a) and in the EU (European Commission, 2011b). There is also specific recognition of the importance of policy interventions for urban areas for climate change mitigation, for example with the Covenant of Mayors Initiative[1] in the EU and for the role of local authorities in the UK (DECC, 2011b). The role of cities and the transport sector is prominent in

[1] See www.eumayors.eu.

associated strategies, but the gap between policy and local implementation is not an easy one to cross.

In the UK, the overarching goal of transport policy is achieving a sustainable transport system, and an important part of this is the reduction of GHG emissions from the transport system (DfT, 2008). The GEF-STAP (2010), for example, states that a "sustainable low carbon transport provides economically viable infrastructure and operation that offers safe and secure access for both persons and goods whilst reducing short and long term negative impacts on the local and global environments." Achieving a low carbon transport system is an intrinsic part of achieving a sustainable transport system. Indeed, as will be seen in the next section, the communication about the need for a low carbon transport system can be improved with this contextualisation, and this has been taken on board within the CATCH project.

The challenges in moving to a low carbon transport system therefore necessarily need to be thought of in the context of the move towards a sustainable transport system as a whole. There are a number of barriers that pose the greatest challenge to realising sustainable transport in cities. May *et* al (2005) and Crane-Droesch *et al* (2006) have identified a number of barriers that have been grouped into four categories and outlined in Table 2 below.

Table 2 : Barriers to implementing sustainable urban transport strategies.

Barrier	Description
Institutional and cultural barriers	These include a lack of legal mandate to implement a particular instrument (such as road pricing) and the division of responsibilities between agencies. Local policies are also influenced by other local, regional, national and European policies, which adds further complexity to the decision-making process.
Technical	Technology plays an important role in the move to low carbon transport systems. Barriers to implementation include knowledge about the available solutions and how they can be best adapted to local conditions.
Financial	These are primarily a restricted volume of finance and a lack of flexibility in how the available budget can be used.
Political and cultural	The political and public acceptability of a measure can impact whether it is implemented and how effectively it operates.

Source : Adapted from May et al, 2005 and Crane-Droesch *et al* (2006).

May et al (2005) also state that a lack of expertise can be a significant barrier to developing and implementing sustainable urban transport strategies. This can be particularly true when looking at the reduction of GHG emissions from the transport sector, since there are complex drivers to the emissions and climate change mitigation strategies need to vary accordingly. Interviews conducted with practitioners under the CATCH project found that for those who are just beginning to explore sustainable transport, greater guidance on projects and prescriptive advice will likely help (Waygood and Avineri, 2011).

Climate change mitigation activities in the transport sector can be said to broadly follow three (parallel) strands: reducing the need to travel, shifting demand for travel to lower carbon modes, and improving the energy efficiency of transport (GIZ, 2011). The balance of each of these three strategy components, along with the constituent policy options, needs to be considered in the context of local characteristics. There is no universal 'silver bullet' when it comes to achieving CO_2 reductions in the transport sector. Once appropriate instruments have been selected and developed they also need to be effectively integrated and phased. Therefore, if the capacity at the local level does not exist to develop and maintain the most appropriate interventions for any given city then the effectiveness of any response will be compromised. Scoping work within the CATCH project shows that although climate change mitigation is growing higher on city agendas, there is some uncertainty in terms of how to realise their aspirations. Lack of knowledge can therefore be a significant barrier to GHG emission reduction in transport.

The wide range of available policy instruments, and particularly the number of interventions that are in their relative infancy, can also create another related barrier as there can be a lack of knowledge on the real impacts of climate change mitigation measures in transport, especially in urban areas. The calculation of the benefits in terms of CO_2e emissions from climate change mitigation activities is not straightforward, particularly in the transport sector where emissions come from a large number of small and diffuse sources whose use is ultimately controlled by individual decisions. The lack of clear, easily communicable data makes it difficult to communicate the need for a shift towards low carbon mobility, as with many other actions in the shift towards a low carbon society as a whole. The CATCH project found that practitioners who are relatively experienced in the field of sustainable transport would benefit from information that would support them to ascertain the impact of climate change mitigation activities on CO_2 emissions but also on other criteria, such as time and cost.

The lack of clear data to support the need for low carbon transport can be seen as one of the barriers faced to addressing the sometimes low general public acceptance of a transition to a low carbon transport system. This can be a particular challenge when there are also financial barriers to be overcome, as is the case with many such interventions in the current economic climate. The way that climate change is communicated can play an important role in overcoming this barrier (Ockwell *et al,* 2009). Indeed effective communication plays a role in both communicating the need for government intervention and in encouraging individuals to engage with low carbon transport choices.

The effective communication of climate change concerns will be essential if low carbon transport is to be realised as there must be a change in travel behaviours if UK, European and international climate change mitigation targets are to be met (see e.g. Skinner et al., 2010). There exists no alternative fuel which can replace existing petrol and diesel use (European Commission, 2011a). Additionally, energy efficiency gains in vehicles are to a large part eroded by increased consumption. This is, for example, through increased demand (EEA, 2010b) and through the purchase of larger cars (for example SUVs) (EEA, 2011b). A change in behaviour therefore needs to take place in parallel to other climate change mitigation interventions, but any such action could face a number of cultural barriers owing to attitudes towards interventions that are targeted at changing the way that individuals behave. Thus this

need for behavioural change (both from those using and those designing transport systems) can act also as a political barrier owing to the perceived complexity of bringing about behavioural change.

3 THE ROLE OF CATCH IN OVERCOMING THESE BARRIERS

CATCH can play a role in overcoming some of the barriers that city level professionals can experience when seeking to conduct climate change mitigation activities in the land transport sector. This will largely be through information provided in the online 'knowledge platform' being developed by CATCH. The online knowledge platform, as outlined in the introduction to this paper, will contain information and links that CATCH grounding research indicates can support a shift to a low carbon transport system. The platform will be 'open' allowing users to add content and join discussions to increase its utility. In doing so it is hoped that it can create a community of experts who will use the platform as a discussion forum as well as a point of call to help them to find solutions in the move towards a low carbon sustainable transport system.

The CATCH knowledge platform will provide access to information to support decision-making by both citizens and professionals working in the fields of transport, energy and climate change. Research has found that information measures tend to experience considerably fewer barriers to their development and implementation than other forms of sustainable transport intervention (May *et al* 2005). This section provides an overview of some of the ways in which CATCH hopes to tailor the information provided to maximise its impact and in doing so contribute to GHG emissions reductions in the transport sector.

3.1 CATCH can increase awareness of the impacts of taking or not taking action

In order to better understand travel choices and policy interventions in relation to their impact on CO_2 emissions (and ultimately to act to reduce these emissions), the starting point for CATCH was to think about how to best present CO_2 information to citizens and practitioners. CO_2 information is presented in many different contexts (for example in travel planners, carbon calculators, and car sales) in the hope that greater awareness of CO_2 impact will lead to smarter (more sustainable) choices. However, individuals who use online tools such as carbon calculators have professed little understanding of the results presented as a mass (Coulter et al., 2009), and as a result they are less motivated to change their behaviour when it is presented in this format (Waygood and Avineri, 2010[2]). Research suggests that even practitioners involved in sustainable transport projects may not have the necessary background knowledge to identify whether a given amount of CO_2 emissions is 'sustainable' in the absence of any other contextual information (Waygood and Avineri, 2011 working paper).

Research conducted by CATCH found that with respect to usability and motivation, the best way to present CO_2 information may be to include a recommended limit (Waygood and Avineri, 2010). This finding has been developed further in consultation

2 Based on a study that included citizens from the UK, Italy, Spain, and Brazil.

with end-users of the knowledge platform, and the CATCH team have produced a way of presenting CO_2 in a more contextualised format (see Figure 2 below). The tool presents per capita CO_2 information from transport for a city (that can be selected by the user) and allows comparison with other cities. The CO_2 rating is currently with respect to the overall range of CO_2 outputs with the 2020 target provided below the actual current emission level.

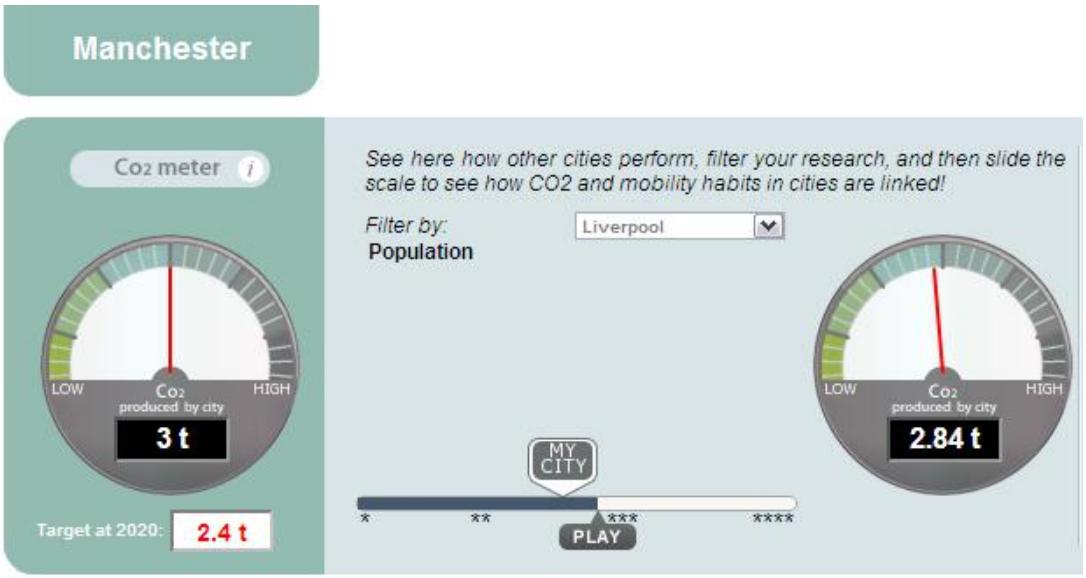

Figure 2 Prototype of CO_2 widget that contextualises CO_2 information (current information is for testing only and is not meant as an accurate account of either city).

To better provide information that will help to change behaviour, a key aspect is how information is 'framed.' Research has found that people prefer to feel as though they are avoiding losses to acquiring gains (Kahneman and Tversky 1979), and this knowledge can be used to help 'frame' appropriate messages about carbon reduction in mobility, and specifically to increase the likelihood of behavioural change in terms of transport. An example of how this can be used is given in Figure 3 below, where different ways of presenting commuting choices are given. Such gain/loss framing was shown to impact the understanding of CO_2 information in relation to transport (Waygood and Avineri 2011). For example, rather than say what the positive impact of changing a behaviour would be (e.g. you'll reduce your CO_2 impact by 15% if you cycle to work once a week), the negative impact of not doing that action should be highlighted (e.g. you'll produce 15% more CO_2 by not cycling to work once a week). The information is the same, but people were found to notice the difference more often when it is presented in the loss framing format (Waygood and Avineri 2011).

i. *Loss framing for comparison set 1*:
Mode X produces 132g of CO_2 for a 5 mile trip.
The amount produced by mode Y is 368g higher (i.e. worse).

ii. *Gain framing for comparison set 1*:
Mode X produces 500g of CO_2 for a 5 mile trip.
The amount produced by mode Y is 368g lower (i.e. better).

iii. *Loss framing for comparison set 2*:
Mode X produces 500g of CO_2 for a 5 mile trip.
The amount produced by mode Y is 2900g higher (i.e. worse).

iv. *Gain framing for comparison set 2*:
Mode X produces 3400g of CO_2 for a 5 mile trip.
The amount produced by mode Y is 2900g lower (i.e. better).

Figure 3 : An example of gain / loss framing (adapted from Waygood and Avineri, 2011a).

This principle has been incorporated in the CATCH platform where messages presented to the general public will be framed in order to 'nudge' visitors to low carbon mobility behaviours. The way that the messages are presented could also be adopted by practitioners to help them to communicate with citizens and policy-makers to improve the response to the information that they are providing. This technique does not only have a positive impact when talking about CO_2 emissions, but it can also increase awareness of benefits to changing travelling behaviours when used in the context of other associated 'co-benefits,' as discussed below.

3.2 CATCH can make links to wider benefits of climate change mitigation activities

In terms of understanding the need and scope for climate change mitigation in transport, few people are sufficiently motivated by environmental concerns to make behaviour changes. Policy and decision-makers also tend to be hesitant to support measures that may be seen to only support one objective, and particularly ones that could be perceived as restricting freedom. Interviews with transport professionals (Waygood and Avineri, 2010) found that although climate change is a major concern, it lacks precedent to other problems. May *et* al (2005) found that cities are increasingly concerned with the wider impacts of transport on other social issues, such as health, education and accessibility, which translates to a preference to support interventions that can contribute to multiple objectives.

In order to better communicate and understand the need for low carbon sustainable transport solutions, it is important to highlight the 'co-benefits' of low carbon transport on other environmental, social and economic factors. For example, an individual may not be motivated by CO_2 information, but they may want to support their local shops, and the associated shorter journey distance can reduce CO_2 emissions. Similarly, a decision-maker may aim to improve the health of citizens through daily exercise, and increasing their awareness of the ability of this to be facilitated through improved

pedestrian and cyclist infrastructure could lead to a reduction in CO_2 emissions from the transport sector.

Figure 2 above gave an example of how CO_2 emissions can be viewed on the CATCH knowledge platform, and CATCH also features a 'co-benefits tool' that shows data for different indicators. These indicators are categorised into six main themes: planning; time and accessibility; safety; health; budget; and community.[3] Informing decision-makers of these impacts can help to encourage cross-sector working. It can also increase the competitiveness of low carbon transport interventions relative to other areas of resource use by helping them to build a case for investment.

The CATCH knowledge platform user can explore a co-benefit area in their city and look for cities that are performing better. The cities can be filtered by aspects such as population or country to help users to ascertain whether they are comparing performance in their city with that of a city that has a number of similar characteristics. Assuming that a better performing city is found, the user can investigate why that difference exists through the knowledge platform. If information on that city exists, then the user can read further about it. In some cases where information is limited, questioning an expert from that country might help. As the community of experts who use the site grows, their ability to help each other move forward will increase.

3.3 CATCH can help decision-makers and practitioners to communicate with citizens

This section has so far suggested ways in which CO_2 information can be communicated in a more meaningful format, and how CO_2 impacts of travel behaviours can be linked with wider benefits (co-benefits) of behavioural change. If presented in an appropriate context then these ways of framing information can both serve to increase the public acceptability of climate change mitigation interventions in the transport sector. If government uses these techniques when they communicate about travel behaviours to citizens then it could increase the effectiveness of the messages relayed. This could be particularly important in the current climate where fewer policy decisions can be taken solely by government. Decision-making responsibilities in the urban transport sector can be particularly complex and increasingly end-users and those who will be otherwise affected by interventions are expected to be fully involved in the decision-making process (May *et* al, 2005). This increases the value for cities of investing resources in considering the way that they present information.

3.4 CATCH can increase knowledge of effective low carbon transport interventions

CATCH interviews with transport professionals identified two requirements to facilitate the development of low carbon transport initiatives: one is finding relevant information (for example on the technical options to consider, or the benefits of a particular measure under consideration); the other is finding individuals with experience relating to this information. The CATCH knowledge platform cannot automatically identify the most appropriate information, but the community of experts that will be developed by the platform, combined with its intelligent and interactive

[3] extensions to cover transport justice and economic categories are currently under consideration.

functions, could make it easier and faster to find relevant information through this channel than through others. Once a few pieces of relevant information have been found, the knowledge platform can begin to suggest other pieces. Through use, the community will identify the most useful sources, which will filter back to the knowledge platform in a positive reinforcing cycle.

Transport practitioners, for example, may want to identify the value of benefits associated with low carbon travel behaviours, such as intrinsic exercise gained through active travel, but it may not be obvious where such information could be found. Such a question could be posted on the CATCH knowledge platform, voted on (e.g. "I am interested in this too"), and experts would suggest resources.[4] The cycle of the community and the knowledge platform working towards a solution could then begin.

As mentioned earlier in the context of barriers, finding individuals with relevant expertise is key to many practitioners. One city might be an expert in cycle lanes, while another may be innovative with parking schemes. Taking positive steps towards implementing such low carbon initiatives can often be facilitated by connecting with relevant experts. As the CATCH user community grows and develops, the ease of finding such people will increase and the path to finding them will not necessarily be user driven, but could be suggested by the knowledge platform itself. The platform could learn what problem the user is interested in and display common paths that have developed from similar queries in the past.

One way of connecting professionals via the knowledge platform will be discussion forums facilitated by technical experts. Users will be able to use these forums to post questions to the wider transport community. Questions and responses will be categorized and tagged to allow for better filtering of information and to enable users to quickly find relevant information. Users will also be able to "publish" information that is composed of various web pages or new material quickly and easily. Within the context of how the information is presented to nudge people to more sustainable transport choices, it is hoped that the CATCH platform will provide a useful tool in the move to a low carbon sustainable transport system.

4 CONCLUSION

This paper has demonstrated that the land transport sector must be incorporated in climate change mitigation strategies owing to the high contribution of the sector to GHG emissions. The modal split of the transport sector dictates that any approach to manage GHG emissions from the sector should focus on reducing demand for road transport and that it should reflect the high concentration of GHG emissions from cities.

There are a range of barriers that exist to reducing GHG emissions from the land transport sector. These include institutional, cultural, and financial barriers, and their nature makes them particularly challenging to overcome. As with approaches to

[4] The potential exists for those experts to be rewarded through the tool by social recognition. This social recognition might be reward enough on its own, but would be useful to show as a career metric as well.

climate change mitigation from the transport sector there is no 'silver bullet' that can be used to remove these barriers but steps can be taken to reduce their impact on the development of sustainable urban transport strategies.

The 'knowledge platform' being developed under the EC FP7 CATCH project is being designed in collaboration with end-users to overcome some of the barriers faced to developing low carbon interventions. It aims to do so by increasing awareness of the impact of travel behaviours, indicating how they could be made more sustainable, and facilitating a shift towards lower carbon travel behaviours. In doing so it aims to encourage citizens to change their behaviours and transport professionals to build their capacity in this area. This paper has shown that it has a wide range of different features and applications that will likely be used by different users in different ways. These will continue to be developed and refined until the knowledge platform is made 'live' in December 2011. When it is completed it will be available from http://www.carbonaware.eu.

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