Better transport through technology

ITS United Kingdom Carbon Working Group
Workshop 1 July 2010 at Newcastle University

Transport and the Environment – a Coalition Enhanced by Technology

Report

The Carbon Working Group (CWG) was set up in 2009 and is led by Keith McCabe of Atkins, assisted by Ian Routledge of Ian Routledge Consultancy and Tessa Darley of innovITS.

On 1 July 2010, it held its first major event: a workshop attended by over 50 people. The focus was how to build on the CWGôs recently published *ITS (UK) Strategy to support carbon reduction and to address climate change issues.*

1. Programme

Keith opened proceedings by welcoming all the participants and thanking Newcastle University for hosting the event and providing such excellent facilities, including an audio recording of the workshop, and video / audio links with London, England and Washington, DC.

The workshop then broke into two strands: Supporting Policy, chaired by Grant Klein of Detica, and Opportunities and Challenges, chaired by Douglas Hyslop of Scottish Enterprise. Several speakers contributed to each strand:

Supporting Policy:

Electric vehicles ï David Beeton, One North East

Eco driving ï Dr Tim Felstead Southampton University,

Smarter choices ï Helene Vergereau, Atkins

Travel demand management ï Keith Mortimer, Chairman of the ITS (UK) Road User Charging Interest Group

Enforcing traffic regulations ï Timo Thornton, Speedcheck Services

Integrated land use and transport planning ï Margaret Bell, 4M Project, Newcastle University

Opportunities and challenges:

Transportation of goods ï Mike Page, AECOMM

Energy consumption of road side equipment ï Gary Stockbridge, Highways Agency

Network management ï Environmental impact of managed motorways ï Graeme Scott, IBI Group

Economic, Social Inclusion and health goals ï Mark Wilson, One North East,

Climate change adaptation ï Steven Fraser, Atkins

Carbon tools ï Farhad Pooran ITS America Sustainability Forum

At the end of the programme, Marcia Pincus, US DoT Research and Innovative Technology Administration AERIS, contributed a presentation on ITS and environment AERIS project, via an audio link.

2. Summary

Transport accounts for 23% of CO_2 emissions in the UK. Of this 23%, 92% comes from road transport, making Intelligent Transport Systems (ITS) interventions likely to be effective in reducing emissions.

The workshop described and discussed in detail several ITS applications which had already contributed to proven CO_2 reductions, or had a significant potential to do so:-

Already used:-

- Internet based maps to guide freight drivers accurately
- Managed motorways: benefits of reduced emissions due to smoother traffic flow, of the removal of the need for additional road building (a carbon intensive activity), and of better design of road side equipment reducing energy consumption.
- Systems to support cycling and walking
- Adaptive signal control to reduce braking, acceleration and idling
- Information services to support travel planning - for towns, workplaces, other activity centres, and individuals
- Road user charging
- Point to point speed enforcement, which smooths traffic flows

Ready or close to ready for implementation:-

- Infrastructure to support the use of low carbon vehicles, such as mapping and navigation for charging points
- Systems to support eco-driving

Using ITS for climate change adaption is also important. Recent severe weather events have proven the need for resilient transport networks, and effective and fast evacuation procedures, both of which can be assisted by ITS.

Many technologies with the potential to aid carbon reduction in transport will be more effective and deliver better value for money if proper attention is paid to standardisation. It is essential for the UK to play an active part in the international standardisation process for items such as EV charging point technology and traffic management systems technology. This will benefit customers through lower prices, suppliers through larger markets, and users by the convenience of having systems work nationally and cross-border.

ITS has a supporting, not a starring, role to play in reducing the carbon footprint of UK transport. Any serious positive impact will have to be delivered by changes in land use planning, fuel technology, modal shift from private cars to public transport, cycling or walking, and more efficient use of freight vehicles. ITS can contribute significantly to all of these, and in many cases, already does so.

3. Notes of proceedings – Supporting Policy

The session was chaired by Grant Klein of Detica. Grant welcomed everybody to the session and noted that the organisersô intention was not for the participants just to listen to the presentations, but also to engage in dialogue and contribute to the outcome of the workshop.

The Electric Vehicle (EV) Journey – Dr David Beeton, One North East

David introduced himself as a technology strategist, and provided a brief history of EVs. He noted that the most recent major change had been the development of lithium battery technology. These batteries now have an energy density which allows them to compete with internal combustion engines in terms of power and range. These new batteries will be in mass production from the end of this year. The EV sector is important to the Northeast, where most British cars are now made. Nissan are market leaders in EVs, and the Northeast is home to the Nissan LEAF.

£423 million has been invested in producing EV batteries. Local production will start in 2013 in Sunderland. It should be noted that this not only involves Nissan, but also provides work for other local manufacturers and vehicle and engine converters.

David stressed the importance of infrastructure. Alliances with cities and regions are essential. The City of Newcastle is participating in the UK Governmentôs Plugged-in Places project, together with London and Milton Keynes, to pioneer the provision of charging points for EVs. When the Newcastle work is completed, the city will have 710 smart charging points. Rapid charging points are also being installed, to lengthen trip range and provide a safety net. One North East is incentivising investment in EVs and infrastructure, but it is not setting out to substitute for private enterprise. So far, they have 66 partners, including both large and small organisations. The ultimate aim is to offer an intelligent grid of smart metering and autonomous energy management.

There are also vehicle demonstration projects, with the first one mainly using EV Smartcars. Research is focusing on how people drive the cars (including reference to eco-driving), the performance of the car, and where they are being charged. This is an £11 million TSB funded project and also involves vehicles manufactured locally, including one electric scooter.

One North East wants to encourage local investment and the creation of jobs. The area was recognised by the previous Government as the UKôs leading region for EV technology and development. It continues to be important to create assets to support this status. The region wishes to remain the UKôs premier test bed for EVs.

The strength of the UK in this area is recognised by Japanese vehicle manufacturers who have earmarked the UK as among their first wave of European sales target for EVs.

During discussion, the question was asked whether the effect of Government spending cuts has already been felt by the Northeastôs EV sector. This is not the case, and in fact the new Government has already explicitly expressed support for EVs, so that One North East is cautiously optimistic about the future.

It is not known with any certainty how many EVs the planned infrastructure will support. There is a strong expectation that most charging will take place at peopleôs homes or at work, but it is not possible to predict accurately how charging patterns will turn out once there is a significant EV fleet.

There is also interest in using the public charging points for other applications, such as multimedia downloads. EV charging can also be used to incentivise a smart grid and clean and smart generation of electricity.

Standards are very important in this area and One North East is working with the IET on standards for charging points. The UK should be more engaged in international standardisation on this topic, to make sure that it will be possible to charge an electric vehicle anywhere in the EU without needing adaptors or any other complications. Consensus is also emerging on topics such as standardised payment systems enabling one account to cover the whole country. But those pioneering EVs now

will have to plan for some obsolescence since standards are currently running behind the implementation.

One North East is confident that there is no need for concern over international stocks of lithium, which it believes are adequate for any foreseeable future needs.

Eco-driving - Dr Tim Felstead of Southampton University

Tim described the benefits of eco-driving, and how to apply its principles. His work in this area has mainly been through the FOOTLITE project.

Fuel consumption and emissions are worsened amongst other things by poor gear selection, low vehicle occupancy, sharp acceleration, lack of anticipation, and a large number of stops. Driving in a high gear, at a steady speed, with smooth deceleration when required, and with full anticipation of what the traffic ahead is doing, generate benefits in terms of fuel consumption and emissions. Driving with the throttle fully open reduces fuel consumption, but is worse in terms of air quality. Similarly, a more passive driving style is beneficial in terms of all emissions except NOx, so the argument is by no means simple. There are also noise benefits to calmer driving.

There is a big difference between aggressive and passive driving styles in terms of fuel consumption and emissions. At a basic level, eco-driving comes down to encouraging a passive driving style. TRL research suggests that there are worthwhile benefits available from eco-driving. Sweden, the Netherlands and Switzerland all have Government initiatives on eco-driving, and the EC is covering eco-driving through the TREATISE and ECODRIVEN projects.

Driver training can be expected to lead to initial fuel savings but these get eroded over time as drivers return to their ñormalò driving styles. This presents an opportunity for ITS through the provision of monitoring tools. These can be calibrated to individual vehicles. Training in eco-driving is now part of the driving test training, but it is impossible to fail the test on this particular aspect.

Vehicle to Vehicle (V2V) and Vehicle to Infrastructure to Vehicle (V2I2V) will affect this area in the future and need to be taken into account. If eco-driving becomes the normal driving style , will driver behaviour have changed to the point where there will be a need to change traffic management settings?

During discussion it was noted that the Institute of Advanced Motorists advocates a brisk acceleration process, in order to get to an efficient speed sooner. Again there is no blanket approach. Vehicles are differently optimised. It is also very hard to undo long established behaviour. For instance, generations of drivers have been taught to use the engine to brake, dating back to when vehicle technology meant that it was unsafe to rely solely on the mechanical brakes. It was suggested that speed awareness courses should include some eco-driving content. In connection with speed management, it was suggested that 30-40 mph is the sweet spot for most engines, and that ISA (Intelligent Speed Adaptation) can contribute to eco-driving. Both the large scale Swedish studies early in the 2000s, and the smaller, later English trials reported benefits in the form of reduced emissions. The current Transport for London project is also expected to find that ISA leads to reduced emissions.

Smarter choices – Helen Vergereau, Atkins

Helene gave an overview of the many projects she has worked on in the area of travel planning and smart travel. She noted that if initiatives such as eco-driving make driving cheaper, it will not be unreasonable to expect people to drive more, as it will have become more affordable. This is also true for congestion - clean vehicles take up the same road space as polluting ones. It follows that initiatives to encourage cleaner motoring must be accompanied by work to lock in the benefits and avoid an increase in miles driven.

Smarter choices broadly cover modes of travel such as walking, cycling, and the different public transport modes, and also making fewer or shorter journeys, and being smarter about using private motorised transport.

Land use planning, workplace transport planning, school travel planning, and residential community travel planning are all important sub-disciplines within travel planning.

The most effective way to smart travel is to start by selecting a sustainable site for the workplace, housing, or other facility, and then building travel planning into every stage of the development process.

Travel planning works. In the UK, this has been evidenced by the DfTôs sustainable travel towns: Darlington, Peterborough, and Worcester. Helene recommended reading the project reports (available at www.dft.gov.uk/pgr/sustainable/demonstrationtowns/), but highlighted the general decrease in car trips of 11-13%, and the increase in bus use, walking, and cycling. There were also other benefits such as improved public health, improvements in air quality, safety benefits and a reduction in congestion. According to the DfTôs calculations, £1 spent on smarter choices delivers £10 of benefits.

The motivation behind travel choices is complex, and includes influences by social, cultural, ethical, legal, political, and resource factors.

Habit is a very important barrier to change, but an individual break point such as a home move or a change of work place is a good time to look at smart choices.

ITS can play an important part in enabling informed smart choices, through journey planners and other information provision. But physical factors such as environmental design for pedestrian and cycling access ï avoiding putting fencing and barriers across the logical non-road routes between, for instance, a housing estate and a school, are also important. The ideal conditions for smart travel will be delivered by a multi-discipline package of solutions, put together by practitioners from different professions working as a team.

During discussion, the participants expanded on Heleneôs questions about what effect EVs will have on travel planning, since they are clean in terms of local emissions, and have the potential to be a cheap form of transport. It was assumed that their cheapness will only be up to a point, as the Treasury will probably need to tax travel in another way if fuel tax income decreases as EVs become more widespread..

It was also thought that it was time to seriously consider the question of vehicle ownership. Car clubs and other forms of innovative ownership could perhaps play a role in limiting the actual number of vehicles on the road, whether low carbon or not and help lower income household access low carbon vehicles (which have a high purchase price at present). Some thought that there should be more policy support for this.

The participants were able to come up with a number of real life examples where well intentioned policy initiatives in areas other than transport, work against carbon reduction by creating more journeys. Examples are: the rationalisation of hospitals to improve clinical excellence and cut running costs, and the building of out of town industrial and retail parks to create employment and support commercial activity. This realises other policy goals but also creates more emissions from transport. It was thought that better incentives for joined up thinking by the various authorities involved, would be beneficial. Parking charges can also be used to drive down new car trips generated by these sites, as can providing discounted public transport tickets for the services calling at them.

The issue of how long new learned travel behaviour lasts was also discussed. Research shows that longer established habits will reassert themselves over time. Changes in travel behaviour do need continuous effort, and should be revisited about every five years.

It was noted that the tools provided must be good. If people don't like online journey planners or bus time tables, they will not use them, or try them once and then return to their established habits. An honourable mention was made of the Transport for London on line journey planner which has become the recognised way of finding one's way around the London public transport system, for visitors as well as residents. It was noted that this was due to its high quality, being both simple and fast to use, so that users have no reason not to return to it. It has also benefited from good marketing. There may be other journey planners in the UK which are just as good, but simply not widely known.

Travel Demand Management – Keith Mortimer

Keith provided an insight into the potential of using road user charging to contribute to the ITS (UK) strategy on climate change.

He noted that there has never been a tolling scheme implemented with carbon reduction cited as the primary reason, anywhere in the world. However, CO2 reduction was frequently cited as a benefit of a proposed tolling scheme, and so this merited further attention.

RUC yields revenue which can be used for anything at all, but the usual beneficiaries are infrastructure and public transport. To benefit the environment, a scheme has to modify driver behaviour.

In order to achieve public acceptability, alternatives for travel have to be provided before RUC is implemented. The challenge then is how to lock in the changed behaviour.

Claims have been made for CO_2 and other emission reductions through RUC, and there is some evidence for this, from both London and Stockholm. The EC ITS Action Plan makes reference to RUC as one way to "green" transport.

It is common to compare fuel tax and RUC as methods for raising revenue from motorists. Both have benefits and disbenefits. RUC is demonstrably the fairer approach if Time Distance Place (TDP) charging is used, but this can raise legislative and privacy implications.

Emissions do kill, and this is slowly becoming a publicly discussed issue in the UK. The cost of congestion is widely discussed in policy circles but only used in public debate in terms of justifying road building.

A wider use of LCVs will reduce the emissions from transport at the point of use, but it will do nothing to reduce congestion or safety problems. Uncontrolled use of electric vehicles in cities could arguably make matters worse, by causing more congestion for the majority of fossil-fuelled drivers, unless some form of demand management were applied.

75% of the climate change impact of road transport comes from the trunk road network. Keith highlighted concern over the expected increase in HGV emissions, predicted to rise more quickly than that from cars. Albeit that there has been an increase of 64 billion in car passenger miles over the last ten years, lorry emissions are expected to rise from 21% to 29% of the total. Increasing impact must be managed to achieve stated carbon targets.

52% of drivers break the national speed limit; adherence would save 8% in carbon emissions. ISA also has a contribution to make, and more balanced speed distribution would provide sustainable gains. Lower speed limits have benefits too. Again, it is essential to lock in any beneficial changes once they have been achieved.

Any future introductions of RUC can be expected to be driven by congestion, not emissions.

During discussion, it was agreed that to realise the environmental benefits of RUC, particularly of the TDP type, there was first a massive public relations offensive to be undertaken. Benefits have to be

clearly detailed, and communicated in a highly individualised way. For this topic, there is no such thing as the ñgeneral publicò to be communicated with in a one-size-fits-all way. ITS can assist driver benefits to minimise charges and reward behaviour change.

The policy focus needs to shift from moving vehicles to moving people. Road user charging offers significant carbon benefits as part of a managed ñTDPCSBòpackage (Time-Distance-Place-Class-Speed-Behaviour) employing established and emergent ITS technologies. Demand management can be tied into a number of policies to sustain achieved gains. A package of measures including speed control and distance charging by class/mass, time and place offers potential CO_2 savings of 30% to 40%, tuned for local policies and priorities.

For the future, ITS (UK) should strengthen contact and influence from the centre and gain greater involvement to build awareness of policy, promote ITS ability to deliver solutions, and assist members with briefings and government consultations. In developing wider press relationships we should promote ITS practice and dispel popular disinformation about climate change (and RUC!)

Follow up within the RUC IG will include a meeting centred on LRUC best practice (7th October) and a joint meeting with the SEIG (9th December).

Enforcing traffic regulations - Timo Thornton, Speedcheck Services

We know the safety benefits of average speed enforcement, having ten years of data available from permanent SPECS installations. There is an average 77% drop in KSI when SPECS enforcement is employed. We also know that average speed enforcement gives smoother traffic flows, leading to reduced congestion and reliable journey times. However one aspect that hasnôt been explored before is the reduction in emissions.

The technology is a good example of how to change peopleôs behaviour to reduce fuel use ï saving money and benefiting the environment. The route to changed behaviour is through education, information on the dash, pricing, speed limits and enforcement.

Average speed enforcement reduces the variability of speed between vehicles. A narrower speed profile means smoother traffic flow. . For example, enforcing a 50mph speed limit with SPECS camers at roadworks on the M4 actually reduced peak period congestion when compared with the 70mph limit operating on the road with no roadworks, prompting some drivers to complain when the cameras were removed at the end of the works.

By comparing traffic speed profiles, it can be illustrated that enforcing a 70mph limit achieves an 11% reduction in CO_2 emissions from passenger cars, rising to 26% if a 50mph is enforced. The actual reduction in CO_2 is likelu to be greater than illustrated, as HGV speeds could not be disaggregated from the speed data and the data assumes constant speeds, not taking into account the reduction in CO2 caused by the smoothing of traffic flow.

NO_X, CO and particulate emissions also reduce with average speed enforcement, as does noise.

During discussion, it was noted that this is an established ITS technology that does create benefit. There is clearly an issue in that we have all the data but we do not seem to be able to get it and its implications widely known.

The reasoning of travellers is often complex and can seem opaque, such as the example of the drivers who pay to use the M6Toll and then visit the services, giving away all the time gain they bought with their toll, and adding food costs into the bargain.

It was noted that Managed Motorways policy makes no mention of environmental benefits. This was felt to be a mistake, in that the reductions in emissions and noise should be declared as an important part of the justification for the policy.

It was felt that too often, environmental benefits of ITS implementations seem to be accidental byproducts rather than planned outcomes. Policy makers have no strong reason to make transport policy on environmental grounds, and maybe this should be changed, particularly in the current funding situation.

Integrated land use and transport planning – Margaret Bell, Newcastle University

Margaret encouraged the ITS community to think outside its habitual area of technology, and consider the wider context of everything it does.

Data is key ï for instance to demonstrate that emissions and congestion are not merely being relocated ï it can be tempting to hide the relocation from the outcomes reported, and declare the project a success ï but that they are genuinely reduced.

The 4M project covers measurement, modelling, mapping, and management.

Land use is always shaped by the past. For 50 years it has been shaped by the needs of cars, and there has been a lack of investment in other infrastructure.

There will be increased pressure on land in the UK by population increases, and worldwide by the need to produce a lot more food. But we also have our CO_2 target to meet. We do not have to stick within current land use and travel norms. The design and designation of building for living and working can be done differently, as long as we model accurately so we know that it will be workable. Policy can then be made to tackle the greatest polluters.

There is a need for household surveys, looking at travel to school, travel to work and so on. We can then use monitoring technology to discover how these patterns translate into emissions. Nest models to cover the larger area such as the whole city. Doing this accurately will result in informed strategy, whether tactical, strategic, short term, or long term.

The fiscal deficit reduction is an opportunity, not a death sentence. Whatever we do, should start with a commitment to reduce the need to travel. The ITS community needs to take on the challenge of thinking longer term.

During discussion, the boundaries of acceptability were extensively debated. Is our target really attainable? It was thought that making significant changes to the locations of and links between housing, workplaces, schools, amenities etc will be a challenge but with facts to back up policy change ï it can be done.

4. Notes of proceedings – Opportunities and Challenges

The session was chaired by Douglas Hyslop of Scottish Enterprise.

Six excellent presentations focussed on work that was recently completed or on-going and provided proven results as well as highlighting that schemes were delivering not just carbon reduction benefits but also delivering other benefits for the funding organisation.

Transportation of Goods – Mike Page, AECOM

Mike opened his presentation by reminding the audience 23% of CO_2 emissions came from transport, 92% of which was from road transport and 42% from goods vehicles. He then described the Freight

Best Practice Programme which was currently estimated to be saving the industry £43M/year in savings in the UK.

Mike then described the work being undertaken by the Tyne and Wear Partnership and gave examples of simple but effective measures that reduced carbon emissions and reduced freight operatorsø costs, including:

- Google based maps for drivers showing where companies were located; and
- An information point for drivers at the Washington services.

Environmental Impact of Managed Motorways – Graeme Scott, IBI Group

Graeme opened his presentation telling the audience that the M42 managed motorway had:

- Reduced fuel consumption by 4%; and
- Reduced emissions by 10%.

Graeme then went on to explain that compared to motorway widening, the proposed £6 billion rollout of managed motorways would:

- During construction use 850,000 tonnes less of CO2;
- Reduce fuel usage during operation because of ñsmootherò traffic flow (but Graeme highlighted the risk of improved operation resulting in additional induced trips); and
- Reduced roadside equipment operating costs through better design.

Emergy Usage of Roadside Equipment – Gary Stockbridge, Highways Agency

Gary opened his presentation by explaining to the audience that the HA had around 150,000 powered roadside assets that resulted in annual energy bill of £22M, 70% of which was street lighting costs. The HA was thus moving to reduce costs by £7M/year within five years and funding the work by annual savings achieved in the same period.

Gary explained that whilst street lighting was the obvious target to create savings through more intelligent operation and providing lighting only when required, the intention was to achieve savings from all ITS roadside equipment. It was also hoped some of the measures the HA was pioneering would be taken up in urban areas.

Economic, Social Inclusion and Health Goals - Mark Wilson, One North East

Mark opened his presentation by stressing the potential economic, social inclusion and health benefits of measures to reduce carbon emissions.

After speculating on the new coalition governments approach to this area, Mark gave examples of transport schemes designed to reduce emissions that gave benefits in other areas:

- The London Cycle scheme: designed with specific transport/emissions reduction objectives but there were obvious health benefits; and
- North East Smart ticketing project: designed with transport/emissions reduction objectives but would improve social inclusion.

Climate Change Adaption – Steven Fraser, Atkins

Steven used the example of a recent study undertaken by Atkins in the North West of England to examine the potential scale of impacts of climate change related extreme weather events on the resilience of critical transport infrastructure .

Steven outlined the following:

- Common definitions for *climate change adaptation* and *network resilience*

- Why is climate change adaptation necessary?
- Historic weather trends
- Climate change projections
- Impacts of climate change on network resilience
- Adaptation action at a national, regional and local levels
- Challenges for organisations responsible for adapting to climate change

Carbon Tools – Farhad Poorhan, ITS America Sustainability Forum

Farhad opened his presentation noting that in the US some 5 billion miles per day were travelled hence the need to address key transport issues. Farhad then explained Congress was now moving to requiring the States to come up with strategies to tackle transport related emissions but it was being suggested by opponents that up that up to 80% of any benefits achieved would be offset by induced trips and ITS America was now actively seeking to demonstrate this was incorrect.

Farhad also noted:

- ITS had an important role to play in carbon reduction;
- Integration was pivotal; and
- The TRACE project had demonstrated adaptive traffic signal control could reduce vehicle emissions by 17%.

Appendix 1 – Participants in CWG workshop on 1 July 2010

Keith McCabe	Atkins	Chair
Grant Klein	Detica	Co-Chair
Geoffrey Williams	3Ci Global	Speaker
Owen Wilson	Darlington council	Speaker
Gary Stockbridge	Highways Agency	Speaker
Graeme Scott	IBI Group	speaker
Margaret Bell	Newcastle University	Speaker
David Beeton	One North East	Speaker
Mark Wilson	One North East	speaker
Douglas Hyslop	Scottish Enterprise	Co-Chair
Timo Thornton	Speed Check Services	Speaker
Farhad Pooran	Telvent	Speaker
Keith Mortimer	Wyeval	speaker
Mike Page	AECOM	Speaker
John Conquest	4 Way Consulting	
Paul Rose	Amey	
John Watson	Atkins	
Steven Fraser	Atkins	
Louise Evans	Atkins	
Neil Brailsford	Capita	
Stefano Mainero	EPN Consulting	
David Hytch	GMPTE	
Ian Routledge	Ian Routledge Consultancy	Rapporteur
Jacqueline Barr	IBI Group	
Graham Scott	IBI Group	
Richard Gibson	IDT Ltd	
Tessa Darley	Innovits	
Jennie Martin	ITS (UK)	Rapporteur
Rachael Louis	ITS (UK)	
Neal Skleton	ITS (UK)	
Roger Hacker	JMP Consultants Ltd	
Tony Mallichan	Logica	
Theo Quick	Logica	
Kim Hampton	Mott Macdonad	
John Turner	Mott Macdonad	
Simon Jobe	Newcastle City Council Civic Centre	
Nick Hodges	Newcastle University	
Lucy Latham	Newcastle University	
Anil Namdeo	Newcastle University	
Glyn Rhys-Tyler	Newcastle University	
Kathryn Vowles	Parsons Brinckerhoff	
Tom Robinson	Ricardo	
Robert McCann	Royal Mail	
George Ogboru	Scott Wilson	
Stuart Wilson	Scott Wilson	
Joanne Dodds	Scott Wilson	
Gemma Murphy	Small Piece trust	
Professor Mike MacDonald	Southampton University	
Tim Falstead	Southampton University	
Paul Lewins	Sunderland City Council.	
Richard Kemp-Harper	Technology Strategy Board	
Trevor Platt	T-Systems Ltd	
Glynn Hutton	Variable Message Signs Limited	
Keith Mortimer	Wyeval	

Appendix 2 – Priority allocated to workshop topics by participants

ITS (UK) Carbon Working Group Workshop 1st July 2010		
Item	**Speaker**	Priority 10 highest 1 lowest
Smarter Choices	**Helene Vergereau**	**7.6**
Economic growth	**Mark Wilson**	**7.5**
Travel Demand Management	**Keith Mortimer**	**7.2**
Adaptation	**Steven Fraser**	**7.2**
Electric vehicle infrastructure	**David Beeton**	**7.1**
Energy consumption of equipment	**Gary Stockbridge**	**7.1**
Integrated Land Use & Transport planning	**Margaret Bell**	**7.0**
Transportation of goods	**Mike Page**	**7.0**
Social inclusion and health	**Mark Wilson**	**6.9**
Eco Driving	**Mike McDonald & Tim Falstead**	**6.8**
Tools and information	**Farhad Pooran**	**6.5**
Enforcing traffic regulations	**Timo Thornton**	**6.4**
Network Management	**Graeme Scott**	**6.4**
Electric Vehicles	**David Beeton**	**6.3**