

CO2 MANAGEMENT – MOVING TRANSPORT FORWARD

Emma Gilmour
SIAS Limited
Philip McKay
Aberdeenshire Council

1. INTRODUCTION

The Scottish Government has set one of the most ambitious national targets in the world for the reduction in emissions in climate change gases, an 80% reduction by 2050. Aberdeenshire Council has even greater ambitions than the Scottish Government for its own operations and aims to become a carbon neutral organisation in the short to medium term, for example, by the year 2020 and work with partners to become a carbon neutral region by 2030.

The management mechanism for delivering on any of these targets is the same as that for any other public investment: Gather evidence; Set objectives; Generate options; Deliver; Monitor (as per Scottish Transport Appraisal Guidance).

Transport is one sector of Aberdeenshire Council's carbon emissions balance sheet that is to be addressed. Carbon management monitoring is a key feature in Aberdeenshire Council's Local Transport Strategy Implementation Plan, from which it will set targets for the future reduction of carbon emissions related to transportation. Managing its own organisation's operation is an integral part of this process.

To move transport forward in the realms of carbon management Aberdeenshire Council recognised that it needed a tool to help it deliver its ambitions. SIAS Limited as one of its framework consultants was commissioned to develop a carbon management monitoring tool. The purpose of the carbon management tool is to: Provide baseline evidence, Appraise Options, and Monitor results from the direct transport based carbon emissions generated by Aberdeenshire Council operations.

The first part of this paper goes through the stages involved in developing the tool, the challenges encountered and how successful we were at over-coming these. The second part of this paper discusses how the tool will be used to monitor progress towards the Council's objectives and the role it can play in the appraisal of options for delivering these objectives.

The first stage for SIAS was to undertake a literature review focusing on the best practice established in the Transport Scotland Travel Plan, 2007-2009. SIAS also undertook a web based search of existing Carbon Calculators some of which were generic, some focused on business and some on travel. This search revealed that a purpose built tool would be required to cover the wide range of purposes, scale and adaptability desired by Aberdeenshire Council, utilising existing data sources where possible.

Prior to undertaking the development of the tool it was essential for SIAS to obtain samples of available data; this was orchestrated by a detailed request mechanism for Aberdeenshire Council to follow. The data requests for the financial year 2007/08 were under the main framework of:

- Business travel data
- Fleet travel data, and
- Commuter travel data

It took some considerable effort for Aberdeenshire Council to be able to collate the necessary data from existing sources. The difficult process of finding, and collating data in formats acceptable to services that were conscious of personal data protection provided a revealing and useful exercise in determining where processes could be improved. It took cross collaboration between a range of council Services, including Transportation, Finance and Personnel, to produce the necessary data sets. These were then checked for accuracy and adaptability for the carbon management monitoring tool.

Business travel data originated from two sources, booked travel data and mileage claim records. This data was disaggregated by council Service to allow for inter and cross- service monitoring. Fleet data came from travel card acquisitions. Commuting data was derived from recent web based Staff Travel surveys and work/home postcode data combined with contracted hours.

Issues presented themselves with each set of data and methods to provide interim estimates of carbon emissions were used where possible. Deficiencies in data, or in methods for achieving results from the data, were recorded and recommendations for improvement featured as a major outcome of the study. Through simple and subtle changes to existing claim forms and recording mechanisms the process of monitoring and managing carbon emissions could be improved 'moving transport forward' from its existing position.

Interim results from the monitoring tool revealed that like many public sector organisations Aberdeenshire Council is heavily reliant on 'Grey Fleet' for business transport and that this made up a significant proportion of carbon emissions for business travel. Grey Fleet being the term generally applied to the use of private vehicles for business purposes whose expenses are claimed back through mileage allowances.

When considering the carbon emissions from the Grey Fleet generic carbon conversion factors were applied to the data set. It became evident that this limits the sensitivity of the model. Aberdeenshire Council is particularly keen to create tool with sufficient sensitivity to allow the impacts of policy decisions to be tested. Only by improvements to the collection of existing data and potential improvements in access to emission data will subtle differences in vehicle types and energy efficiency, particularly in the dominant Grey Fleet, be perceivable and targetable.

2. CARBON MANAGEMENT TOOL DEVELOPMENT

Objectives of the Study

With around 14,000 employees across a generally rural geographical area of 6300 sq. km, and with 180 local offices spread across this region Aberdeenshire Council requires a significant amount of transport. In 2006, 10 million business miles were generated by Aberdeenshire Council's Grey Fleet. Aberdeenshire Council has decided it must set an example and take a leading role in addressing its own issues relating to climate change, particularly associated to CO₂ emissions from transportation.

The main aims for Aberdeenshire Council as an organisation are: -

- Working towards becoming carbon neutral by 2020¹ and; -
- In the short-term aim towards a target of a 10% reduction in transport emissions by 2012 (from a 2005 level).²

The objectives of the carbon monitoring study are to fulfil the Local Transport Strategy commitment to establish a regime that will allow the carbon impacts of transportation choices to be monitored and different scenarios to be considered.

The purpose of the Carbon Management Monitor is to:

- Establish a robust mechanism to evaluate carbon dioxide (CO₂) emissions produced annually through Aberdeenshire Council's transportation needs.
- Calculate how much carbon dioxide (CO₂) is produced annually from
 - Council owned vehicles
 - Council's Grey Fleet
 - Public Transport modes (including bus, rail, air)
- Create a baseline figure for future monitoring
- Provide a tool to inform decision making to test alternate scenarios and policies for Aberdeenshire Councils travel needs.

Research & Data Review

As a starting point for the study a review of the Transport Scotland Travel Plan 2007-2009³ was undertaken. This has been developed as a 'gold' standard for other organisations in Scotland to emulate. It is carbon focused and establishes the carbon footprint of its own estate. Although setting a precedent and useful benchmark, the methodology was not found to precisely meet the scale, data systems and monitoring accuracy that Aberdeenshire Council were looking to utilise and adopt. A bespoke tool was needed to gather information from a variety of sources, monitor subtle change in vehicular efficiency and be able to test differing scenarios.

Web based carbon monitoring tools were found to rely heavily on the Department for Environment, Food and Rural Affairs (DEFRA) Greenhouse Gas (GHG) Conversion Factors⁴ that have ranges of Carbon emissions for small, medium or large cars or 'all cars' by fuel type and the tools relied upon data being re-input into new systems.

It was noted as part of this study that existing emissions from transport were quoted as direct carbon dioxide, although referred to as carbon. At this stage indirect emissions are not included, for example those associated with the manufacture of a product or the production and distribution of fuels and the factors do not therefore cover such situations. Work being carried out looking to better understand such emissions may allow expansion to include indirect emissions in the future. Similarly work is also being carried out by DEFRA to include non-CO₂ greenhouse gases. It is likely that this could lead to transport carbon dioxide equivalent factors being developed as have already been developed for other sectors, such as the energy sector.

Business Travel – Planes, Trains, Hire Cars and Grey Fleet

Business travel by Aberdeenshire Council employees generates significant carbon emissions. The assessment of business travel was under taken in two ways based on the existing systems and data available. Firstly, there was the travel booking system that provided information on business travel by hire car, train or aeroplane. Secondly, there was the mileage claim system that recorded private car use claims for business travel, often referred to as Grey Fleet mileage. The two systems were analysed and disaggregated by Council Service.

Planes, Trains, Hire Cars

To establish the extent of this, business travel information was requested from Aberdeenshire Council. The data supplied from the booking system provided information on a range of factors including:

- The council service using the transport
- Date and reason for the journey
- Origin and destination
- Cost of transport, accommodation and additional charges
- Mode of transport

The data was then processed and filtered by the travel mode (aeroplane, rail or hire car). There was a further sub filter required on flights to take into consideration whether they were domestic, short haul or long haul. During this process it became evident where there were deficiencies in the accuracy of journey recording and sufficient detail in some cases to ultimately provide a summary of travel distances. The distances by mode were required in order to calculate carbon emissions for business travel. Costs were also collected by mode although this was not the focus of investigations.

The legacy of the booked travel assessment has been that it was possible to provide recommendations for improved methods of recording data within the existing booking system. Enhancement to the existing system included elements, such as, indicating clearly if travel was one way or return, and including airport codes in the route description. Better data sets will improve both the accuracy and ease with which carbon monitoring of transport emissions can move forward.

Grey Fleet

Grey Fleet refers to business miles driven by employees in their own vehicles, and claimed back at a fixed mileage rate, as described by, among others, the Office of Government Commerce in their paper on *Grey Fleet initiatives, an Environment Agency Case Study* (2007)⁵. In that study it is stated that a significant proportion of the mileage travelled in the public sector is driven in the Grey Fleet. These vehicles are often older than lease or hire vehicles, meaning that they may have higher emissions levels than newer equivalents and fewer safety features. For organisations seeking to achieve travel efficiencies, comply with duty of care legislation and reduce emission levels, the Grey Fleet is an important area to target.

Aberdeenshire Council has just this type of arrangement whereby its employees use their private cars for business travel and claim back mileage at a set rate. Summary details of mileage claims were provided to SIAS in an anonymised format to determine annual 2007/2008 carbon emissions from this form of transport use.

Aberdeenshire Council had hoped for an accurate reflection of carbon emissions for each vehicle that has been used to make a claim.

The DVLA has released CO₂ emissions figures for all vehicles registered after March 2001. The information is provided on the vehicle registration document (V5). Older vehicles have been categorised into the various bands according to the size of their engines.

In general, vehicles with larger engines tend to generate higher emissions, however other factors such as make, model, age of vehicle, level of maintenance and type of fuel used also influence how much CO₂ is emitted. The DVLA has advised that no direct correlation can be made between engine size and CO₂ emissions. It is not possible to say, for example, that a vehicle within the DVLA's Band C is directly comparable in terms of emissions to vehicles with a specific engine size.

A request was made to DVLA for a carbon emission matching service to undertake an automatic allocation of carbon emissions to each identified vehicle. Unfortunately, DVLA did not respond favourable to this request neither in a non-fee nor fee paying capacity. There is the facility to manually check the DVLA database using the Vehicle Enquiry Service⁶.

This is an option for future work, but would be time consuming with around 7,500 vehicle registrations to investigate. SIAS undertook an interim measure

to reach some indication of a baseline of carbon emissions from business mileage. The interim measure used a generic DEFRA carbon emission figure for all car travel. This could not be broken down by size of vehicle or fuel type due to inaccuracy in the existing data set. Recommendations were made to alter the mileage claim form to include fuel type on each claim.

A secondary assessment was undertaken to give a theoretical 'A' rated energy efficient carbon factor for each car. 'A' rated fuel economy cars are classified at below 100gCO₂/km. In real world driving conditions DEFRA acknowledges that carbon emissions can increase on those stated by 15% which would give carbon emissions of up to 115gCO₂/km for 'A' class vehicles.

The assessment showed the extent that a change in vehicle type across the Grey Fleet or as a transfer to hire cars would achieve in carbon savings. In theory it was found that up to a 50% saving in carbon emissions could be made without any other major changes in travel behaviour. This is mainly because the existing 2007 average car has a carbon factor of 207.5gCO₂/km which is around an 'F' energy efficiency rating. The ratings are according to the colour-coded environment label for all new cars that began appearing in UK car showrooms from July 2005.

The new label - that has been introduced years ahead of likely EU legislation - is the result of a voluntary agreement by car makers following discussions with environment groups and other road transport stakeholders under the auspices of the Low Carbon Vehicle Partnership (LowCVP)⁷.

The consumer-friendly label has been designed to help car buyers assess the climate change impacts of different cars. It will also emphasise that - increasingly - better environmental performance means lower road tax and lower running costs. An example of the Fuel Economy labelling convention (current in 2008) is shown in the diagram below⁸.



The assessment identified that passing on information to Council Services about the energy efficiency of transport types would be useful and may reap carbon reduction rewards when combined with a review of transport policies. This may be through fuel economy labelling as well as promoting behaviour change messages, such as, reducing the need to travel, promoting walking, cycling, public transport and using energy efficient hire cars where appropriate.

The legacy of the Grey Fleet assessment has been that it was possible to identify where data sets could be improved to make carbon monitoring more accurate and streamlined, plus identifying where carbon savings can be made. The non-direct social cost of carbon, for example, from changing a relatively new vehicle for a more fuel efficient one has not been investigated in this study but is something that should be borne in mind. This issue may make hire cars a more attractive option for business use than any remunerative incentives for the Grey Fleet to become more fuel efficient.

Fleet Travel – Works Vehicles

The aim of reviewing Fleet Travel was to set a baseline for the carbon emissions from organisation related fleet travel derived from vehicles owned or operated by Aberdeenshire Council.

Aberdeenshire Council has a range of fleet vehicles (including vans, snow ploughs, etc.) and all these vehicles require fuel to operate them. Fuel is bought from suppliers using fuel cards. The suppliers include Esso, Shell and BP.

The direct monitoring of fuel consumption, of Diesel (Sometimes sold as DERV - A term used in the UK to describe diesel oil used as a fuel for road vehicles) and Petrol (sometimes sold as motor spirit) is a convenient and accurate way to determine carbon consumption. The methodology has a direct correlation to determining carbon use which is more reliable than other methods, such as conversion of mileage and engine size to carbon emissions that use average assumptions of speed. At the moment no bio fuels are recorded as being bought via the Council fuel cards.

The Council has provided some fuel card data to give a base line figure for fuel usage but there was a need to make access to data for monitoring purposes much more streamlined. It was also identified that there was no direct mechanism for establishing mileage as a monitoring indicator; however the current upgrading of the fleet management system within Aberdeenshire Council should provide more detailed information in future. The main legacy of this study has been to highlight the need for accessible data for carbon monitoring but it also recommended a green fleet review and eco-driving training.

Commuter Travel

SIAS was commissioned to ascertain the level of commuter travelling to work by Aberdeenshire Council employees as part of a general monitoring programme to determine carbon emissions from travel generated by the Council. To establish the extent of this a calculation was undertaken to firstly establish the total distance travelled by Aberdeenshire Council commuters and then the modes used were applied to estimate the possible carbon footprint of commuter travel.

A postcode analysis was used to determine the distance travelled to work by all employees followed by an analysis of the Staff Travel Survey results that

was used to apply a mode share to bands of distance from home to work. The Staff Travel Survey had already been undertaken in a web based medium and it had data for just over 1700 staff, This was used as the model to apply to the 11,000 staff records available for Aberdeenshire Council employees.

There were a number of key assumptions made that have influenced the calculation of commuter carbon emissions were:

- Hours in a working day
- Indirect travel factor
- Mode share is as per Staff Travel Survey by distance range
- The number of weeks worked each year is on average 43weeks (3000 education staff on 39 working weeks per year, all others on 44.2 weeks per year)
- A 'car passenger' or 'driver with passenger' share the carbon emissions of a single private car
- DEFRA kgCO₂ average use figures for cars e.g. unknown fuel

The average travel distance to work was 14km, which was above the Scottish Average but below the Aberdeenshire average from the 2001 census⁹. The average commuting distance travelled by all modes was found to be in the order of 6,000km per year for each employee. The total distance being travelled to work was around 68 million kilometres, this is the equivalent of a person making 88 round trips to the moon.

The legacy of the assessment has been to identify and suggest that an improved system may be possible where annual 'hands up' survey on mode of travel linked to staff details could be undertaken. This does however raise issues of data protection that require further investigation and may pose a logistical difficulty due to the sheer number of employees, not all who have instant access to web facilities.

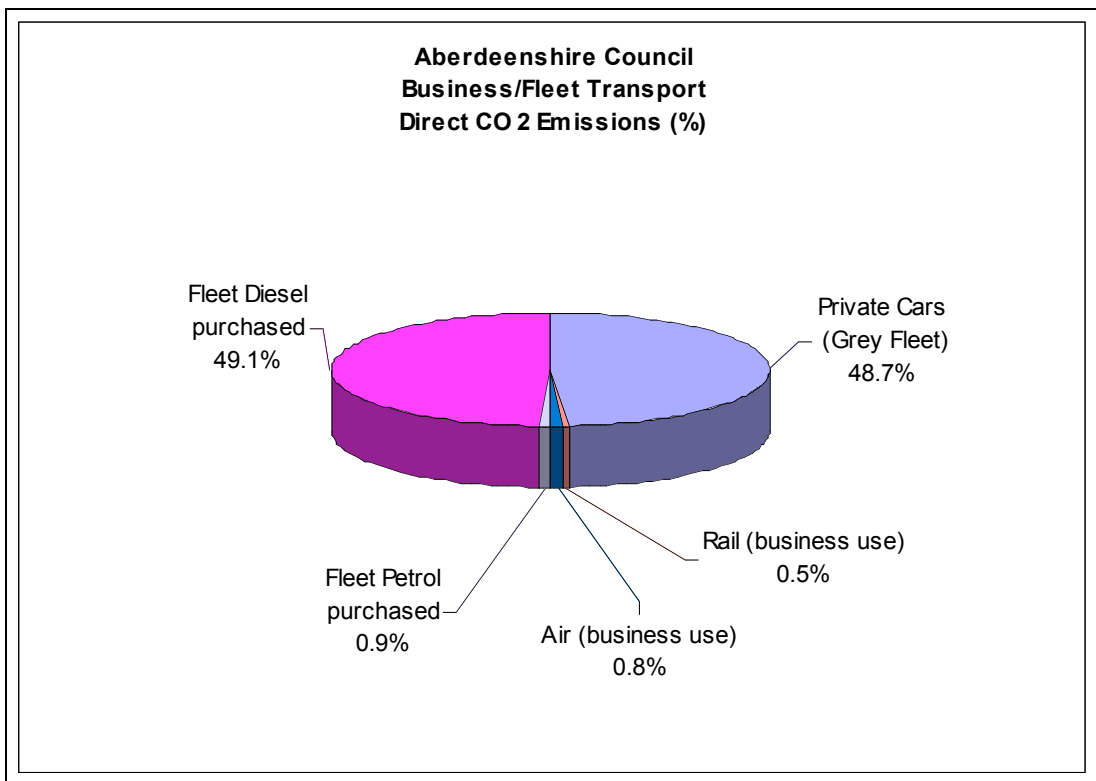
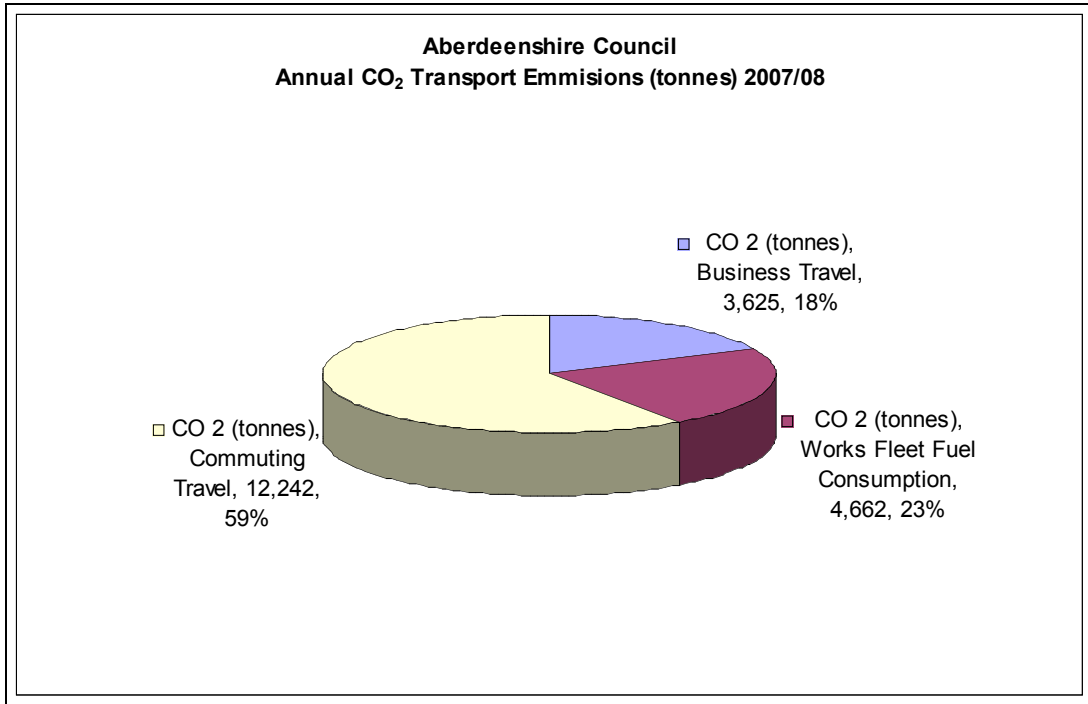
Database Summary

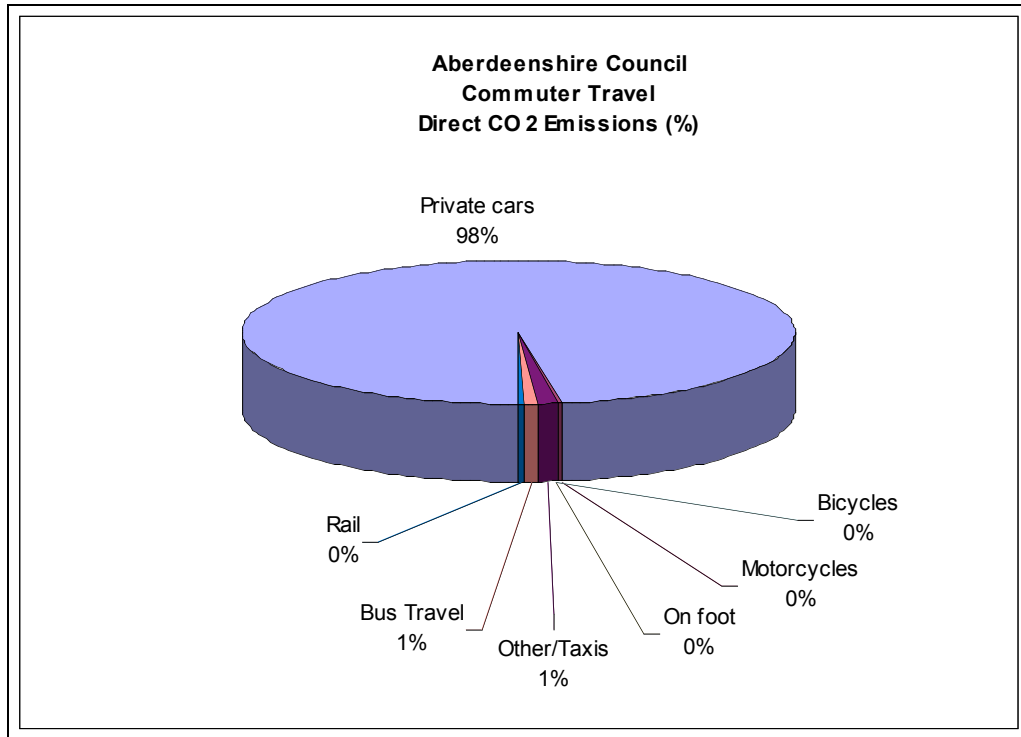
SIAS had requested existing information and data sources from within the organisation of Aberdeenshire Council and used recognised DEFRA emissions factors to develop a baseline for carbon emissions. Results will include a margin of error commensurate with the data available and the factors utilised.

Collation of all the findings of corporate business and fleet travel was brought together. In terms of business travel around 49% of carbon emissions are derived from Grey Fleet business trips. Council owned, Fleet vehicles are in the majority fuelled by diesel. There is more CO₂ emitted from Fleet vehicles than from the 10 million car miles undertaken on business travel. In total for the year 2007/08 around 8,000 tonnes of CO₂ was emitted from business and fleet travel operated by the Aberdeenshire Council organisation.

The magnitude of CO₂ being emitted from commuting travel based on the assumptions was around 12,000 tonnes CO₂ in 2007/08. This is larger than the combined emissions from business and fleet travel in that same year.

The total combined carbon emission from business, fleet and commuter travel for Aberdeenshire Council is in the order of 20,000 tonnes CO₂ per annum. The breakdown of carbon emissions are shown in the following graphs.





3. ROLE OF THE CARBON MANAGEMENT TOOL

The transport emissions carbon monitoring tool now exists for developing targets and testing the effectiveness of different policy actions. However, work is not fully complete on the sensitivity of the tool and an action plan has been developed to take the carbon management of transport forward.

A Transport Emissions Action Plan has been developed that highlights twelve short term measures to improve the monitoring system and tackle transport emissions. The action plan suggests tackling carbon emission head-on by reviewing reduction measures across business, fleet and commuter travel. It is acknowledged that this will require joint working and participation between the finance, personnel and transport services. Quick wins were identified to focus attention of the areas most likely to have immediate impact, such as, using technology to reduce the amount of travel, encouraging shifts to low carbon modes of travel and utilisation of energy efficient hired vehicles combined with transport policy reviews. Ultimately, any residual carbon emissions from transport may require to be offset in order to make transport entirely carbon neutral.

The resources of Aberdeenshire Council are not unlimited and the tool allows the Council to determine where these resources are most likely to achieve the greatest impacts. Carbon emissions information for business travel had been disaggregated by Council Service to give an indication of where attention could be focused. Further work could be undertaken to disaggregate commuter and fleet travel to enable a full league table of emissions by Council Service. Performance targets could be developed by service and the tool used to assess if these achieve the desired cumulative effect across the council.

There is also potential to use the carbon management tool to assess the impacts of alternative fuels, such as, bio-fuel, Liquefied Petroleum Gas, hybrid and electric powered vehicles.

Quantitative appraisal of predicted and actual impacts will be invaluable as the Council moves forward with a series of policy initiatives. Some initiatives by the Council will have been tried elsewhere and the impact of these can be quantified. Conversely, the Council may try some new initiatives. The tool can be used to make predictions to quantify how effective these will be (based on pilot or Stated Preference studies) pre-implementation and how effective they were post-implementation (Revealed Preference).

A final Report was submitted to Aberdeenshire Council for consideration in March 2009.

Notes:

1. <http://www.aberdeenshire.gov.uk/about/plans/sac13.pdf>
2. <http://www.aberdeenshire.gov.uk/green/SIPfinaldocument.pdf>
3. <http://www.transportscotland.gov.uk/files/documents/reports/j9425.pdf>
4. <http://www.defra.gov.uk/ENVIRONMENT/business/envrp/pdf/conversion-factors.pdf>
5. http://www.ogc.gov.uk/documents/Environment_Agency_Case_Study.pdf
6. <http://www.taxdisc.direct.gov.uk/EvIPortalApp/>
7. <http://www.lowcvp.org.uk/>
8. <http://campaigns.direct.gov.uk/actonco2/home/on-the-move/car-emission-comparison-tools.html>
9. <http://www.scrol.gov.uk/scrol/analyser/>