Reducing the Demand for Travel: Mobile and Flexible Working Programmes

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The Scottish Government
Riaghaltas na h-Alba

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

1. INTRODUCTION

Background

1.1. This report is the final report for the Reducing the Demand for Travel: Mobile and Flexible Working project being undertaken by MVA Consultancy and Natural Capital for Transport Scotland.

Aims and Objectives

1.2. The aim of the project was to review the effectiveness of policies and measures set out in Scottish Government's emissions reduction plans, in particular to determine whether mobile and flexible working arrangements by larger organisations create significant carbon reduction compared with a 'business as usual' approach and to understand the factors which influence the 'carbon-effectiveness' of such measures.

1.3. This report presents case studies from each of the organisations involved, and details their experiences of mobile and flexible working.

Definitions and Scope

1.4. The term 'Mobile and flexible working' can be used to cover a wide range of different activities, including:

- work from home (either occasionally or full-time);
- work at/from multiple locations, rather than at a single 'normal place of work';
- working from locations which are closer to home than the 'normal place of work';
- varying the start and/or end of the time spent at the workplace;
- working part-time (i.e. fewer hours per day than 'normal' and/or fewer days per week;
- mobile working (i.e. working while travelling); and
- use of technology such as tele/video conferencing etc. to reduce business mileage.

1.5. In this study, we are particularly interested in work patterns which alter the amount of 'work-related travel', including both 'commuting' (i.e. travel between home and the normal place of work) and 'business trips' (for example to attend meetings or visit customers etc.).

1.6. This study excludes consideration of:

- logistics-related travel (for example collecting supplies, delivering goods to customers etc.); and

- work patterns which are not voluntary, including shift work and 'short-time working', where the employer reduces the employee's number of hours temporarily because of a short-term shortage of work.

1.7. There are likely to be a number of reasons why an employer might offer their employees the opportunity to work flexibly. These include:

- allowing the employees to fit their work round other commitments (child-care, care for other dependents, hobbies, volunteering, participation in sports etc.);

- reducing the amount time 'wasted' while travelling, including both the employee's time (e.g. commuting) and the employer's loss of productive 'in-work' time;

- reducing the amount of office space required;

- minimising the disruption caused by relocation of an office, department or individual;

- reducing the direct cost of work-related travel (car mileage, public transport fares, overnight accommodation etc.);

- reducing pressure on scarce resources at the 'normal place of work' (car parking, desk space, etc.); and/or

- reducing the 'carbon footprint' of the work-related travel.

1.8. This study focusses on the last of these objectives, with particular focus on the impact on greenhouse gas emissions of the work-related travel itself and a secondary focus on other impacts flexible working might have on other activities which create significant amounts of greenhouse gas emissions.

1.9. Having identified a reduction in transport-related emissions by estimating the total change in car use and converting this to a change in greenhouse gas emissions, there are a number of different measures which might be used to convert this total into an emission reduction per employee, as follows:

- 'per employee' – i.e. the total reduction in greenhouse gas emissions divided by the total number of employees, regardless of whether or not they make use of the flexible working opportunity;

- 'per flexible worker' – i.e. the total reduction in emissions from car-commuting divided by the number who work flexibly, regardless of whether or not they normally commute by car; and

- ‘per flexible-working car commuter’ – i.e. the total reduction in car commuting emissions divided by the number of flexible-working car drivers.

1.10. These estimates will differ significantly, so care is needed to ensure which calculation is being used.

Methodology

Identifying Organisations

1.11. In order to identify participants for the research, organisations with more than 30 employees who had implemented mobile and/or flexible working were invited to take part.

1.12. The research specification suggested a need to include organisations located in a range of city locations and ‘out-of-town’ locations and with a reasonable geographic spread across Scotland. There was also a desire for the study to include a range of organisation sizes and a combination of public and private sector organisations, to maximise the applicability of the research conclusions.

1.13. In order to identify organisations to take part in the research, the following methods of recruitment were undertaken:

- Transport Scotland/Scottish Government letter sent to a variety of organisations stating that the research was being undertaken by MVA/NC and asking them to consider participating in the study;
- 2020 Transport Subgroup were contacted to ask for their assistance in recruiting organisations and an email was sent out to all of the sub-group members regarding the opportunity to participate;
- a notice was put on the 'Choose Another Way' website inviting organisations to participate;
- follow-up emails to 2020 Transport Subgroup members inviting organisations to participate in the research;
- direct approach to organisations participating in the Transport Challenge; and
- direct approach to existing contacts within a number of organisations.

Profile of Organisations

1.14. Contact was made and discussions were held with a total of 25 organisations however, despite repeated attempts to encourage participation, only four organisations and one professional body ended up participating in the research. These were:

- Aberdeenshire Council;
- Fife Council;
- RBS Group;
- BT; and
- Members of the Law Society of Scotland.

1.15. The above list of organisations provides a reasonable geographical spread across Scotland; comprises a mixture of town/city centre versus 'outer urban' locations; is a mixture of both public and private sector; and varying organisation size.

1.16. Given the lower than expected number of participating organisations, this report provides case studies of each which highlight the mobile and flexible working activities which they operate, and provides insight into the problems they have faced and the benefits that they have gained. Where data was available, a summary of the quantitative impact of mobile and flexible working is provided.

1.17. An early lesson learnt from this research was the time, effort and difficulty involved in recruiting organisations to participate. Repeated attempts were made by email and telephone to encourage organisations to participate, however most of these discussions proved fruitless in the end. Most organisations do not have a dedicated 'Flexible Working Manager' and as such finding the right person to talk to proved difficult. Many of the initial discussions were positive, however, interest generally waned as the request was passed through different managers to find someone with sufficient interest and authority.

2. LITERATURE REVIEW

Introduction

2.1. This chapter sets out a summary of the research that has been conducted into the benefits of flexible working / working from home and considers some key questions in respect to the current research and literature available.

2.2. With fewer vehicles commuting, and people travelling at a wider variety of times, rather than always in the peaks, it is often assumed that there is a reduction in carbon emissions from transport. This assumption has been an area of continuing interest for transport research. There is little indication of any major pilots or demonstration projects having been carried out on flexible working. This means that the bulk of the evidence for its worth is from either largely theoretical academic research, or from organisations with a considerable stake in its development, particularly from the Information and Communications Technology (ICT) and telecommunications sectors. Both bodies of work have significant drawbacks: the first in its detachment from real world examples; the second in the clear interest the companies supporting it have in its success.

Growth in Flexible Working over Time

2.3. The proportion of employed adults who work from home in the UK appears to have increased over the last ten years.

2.4. An Office for National Statistics (ONS) report[1] which summarises the Method of Travel to Work in England and Wales from the 2011 Census suggests that the proportion of people in England and Wales recording their place of work as 'working mainly at or from home' increased from 9.2% in 2001 to 10.7% in 2011.[2] This ONS article also reports results from the UK-wide Labour Force Survey which suggests that the proportion reporting working at or from home in their main job rose from 10.8% in 2001 to 13.0% in 2011.

2.5. As noted in this ONS article, a much-lower (5.4%) proportion of respondents in England and Wales reported 'Working from Home' as their method of travel to work in the 2011 Census. This discrepancy appears to be primarily caused by those who work from home but travel as part of their work (for example to visit customers) recording the mode of this travel in their response to the 'method of travel to work' question. Care is therefore needed when using these two different Census-based estimates of the level of home-working.

2.6. NB This 'double-response' was not included in the 2001 Census, which simply assigned the mode 'Work from home' to all those who recorded their place of work as 'working mainly at or from home'.

[1] http://www.ons.gov.uk/ons/dcp171766_299766.pdf

[2] http://www.ons.gov.uk/ons/dcp171766_299766.pdf

2.7. In Scotland, the Scottish Household Survey (SHS)[3] has recorded a similar increase in the proportion of employed adults working from home, up from 8.7% in 2001 to around 10.6% in 2011[4].

2.8. The UK National Travel Survey (NTS)[5] suggests that the proportion of home-working in the UK has increased, from 3% in 2002 of employed adults to around 5% in 2012.

2.9. It is not clear why these proportions are so much lower than the corresponding Census and SHS-based estimates, though it may be caused by the difference in wording of the relevant question which, in the NTS, asks the respondent to specify their usual workplace, choosing between 'Same Place Every Day', 'Different Places' and 'Home/Same Building as Home'. In particular, it is likely that many of those who work from home (e.g. visiting different customers) will chose the second option and it is not clear which of these three options would be selected by farmers, who may be put off by the reference to working in a building in the third option.

2.10. This all goes to show that even something as apparently straightforward as estimating the level of home-working is not straight forward.

2.11. In 2011 the Confederation for British Industry (CBI) conducted an analysis of employment trends in the UK. Their report 'Navigating Choppy Waters – CBI/Harvey Nash employment trends survey 2011'[6] lists a number of key findings, including:

- flexible working is now a standard feature of the modern workplace: nearly all employers (96%) offer at least one form of flexible working and nearly three quarters (70%) offer three or more;

- there has been particularly rapid expansion in recent years in the use of teleworking and the provision of career breaks/sabbaticals. In 2006 just 13% of firms offered teleworking for employees in at least certain roles some of the time, but in 2011 59% do so – NB this CBI report does not quantify how many home-workers there currently are in the UK, or what proportion of UK employees may be able to work flexibly;

- the increased use of flexible working looks set to continue in the next few years, with many employers currently considering introducing additional arrangements;

- employers understand the value of flexible working to their business, particularly the positive impact granting requests has on

[3] Table S3 of http://www.transportscotland.gov.uk/files/STS_2012.pdf
[4] http://www.scotland.gov.uk/Topics/Statistics/16002/DataTrendsWorkHome
[5] Table NTS0804 https://www.gov.uk/government/statistical-data-sets/nts08-availability-and-distance-from-key-local-services
[6] http://www.cbi.org.uk/media/955608/2011.06-navigating_choppy_waters_-_employment_trends_survey.pdf

employee relations and recruitment/retention (seen as positive by 74% and 61% respectively);

- but they are wary about the UK government's plan to extend the 'right to request' to all employees, with many anticipating a negative impact on productivity, customer service and labour costs (32%, 35% and 38% respectively). This puts a premium on ensuring that any changes work for business needs too; and

- nearly three quarters (72%) of employers are concerned that losing the working time opt-out would have an impact on their business. Nearly half (46%) believe that the impact would be significant or severe.

2.12. The report found that flexible working policies, if used appropriately, help organisations manage costs and boost employee morale. They found that employers want to expand flexible working as it benefits both them and their employees. Although it should be recognised that it may not always be suitable for every type of job. In 2011, 58% of employers also found that flexible working aids recruitment and retention (up from 52% in 2010); 26% reported a positive impact on productivity; and 35% report reduced absenteeism, however only marginal impacts were reported in regards to customer service (6% of employers) and labour costs (5% of employers).

Mobile and Flexible Working – Key Questions

Who uses mobile and flexible working?

2.13. There are many kinds of flexible workers (as defined in Chapter 1) and distinctions must be made between them when comparing data. In regards to those who work from home, one of the most important distinctions is between employees who always work from home, and those who only spend part of their working week at home. These two groups of flexible workers are quite different in demographic profile, but the key observations are as follows, all refer specifically to Scotland unless otherwise stated:

- using data from the Labour Force Survey[7] it is clear that, of those who work from home full time, a disproportionate number are from managerial and professional occupations (63% of flexible workers, compared with just 39% of all workers);

- unsurprisingly, given the types of role fulfilled by flexible workers (professional and managerial), flexible working is much more common in higher and middle income groups. Low income flexible workers do exist, but are less common, so that it is difficult to use large national surveys such as the Labour Force Survey or Scottish

[7] http://www.ons.gov.uk/ons/guide-method/surveys/list-of-surveys/survey.html?survey=Labour+Force+Survey

Household Survey to robustly infer much about their travel behaviour;

- flexible workers across the UK tend to be aged above 30 but below 60, suggesting that it is associated with the mid-career stage, (rather than entry-level) which fits with the type of roles they are likely to be filling (National Travel Survey, 2002-5)[8];

- international evidence suggests that flexible workers tend to live further away from their place of work than other workers (Mokhtarian, Collantes and Gertz, 2004)[9]. In Scotland flexible workers are most common in remote rural areas, where they represent 22% of the employed population, and in accessible rural areas where they represent 17% of the population. This compares with 8% workers in large urban areas and 9% of workers in other urban areas. (All statistics from the Scottish Household Survey, 2010); and

- in Scotland, flexible workers who work at home all the time have lower annual commuting distances than partial flexible workers, and those who never work flexibly. Partial flexible workers travel further than the other two groups, and this may reflect living at a farther distance from their workplace, and other differing residential patterns – for example living in accessible rural areas. Accessible rural areas have the highest access to broadband (Scottish Household Survey, 2010); and the highest average incomes (Annual Survey of Hours and Earnings, 2009)[10]. All of which means there is the infrastructure and human capital to underpin high levels of flexible working.

Does flexible working reduce travel?

2.14. There has been considerable debate as to whether flexible working actually reduces travel or not. For frequent flexible workers (3+ days per week), the evidence at GB level is that their average commuting mileage is significantly lower than those who never flexibly work (1,468 miles per year compared with 2,608 miles per year (National Travel Survey – aggregated results from 2009-12). However, partial flexible workers (less than once per month, but more than twice per month) have a higher average commuting mileage (3,891 miles) than both of the other groups. This may reflect the fact flexible workers tend to live further from their offices, and potentially other services than other workers. In addition there is no indication of causality – i.e. that people's commutes have reduced since becoming flexible workers. It may be that full time employees with a long commute have switched to flexible working, however it may equally be that people who were not commuters

[8] https://www.gov.uk/government/organisations/department-for-transport/series/national-travel-survey-statistics
[9] http://www.envplan.com/abstract.cgi?id=a36218
[10] http://www.ons.gov.uk/ons/rel/ashe/annual-survey-of-hours-and-earnings/2009-results/index.html

were attracted to employment in which they could work flexibly, which would mean that there was no net reduction of travel.

2.15. In terms of overall annual distance travelled for all purposes the picture is even more complex. From the NTS figures, people who never use flexible working methods and commute full time have on average significantly lower annual mileage travelled for all purposes (8,065 miles) than those who frequently work under flexible arrangements (12,089 miles) and those who sometimes do (14,027 miles). There have been a series of explanations, not necessarily mutually exclusive to explain this finding.

2.16. The residential location of flexible workers may also influence their annual travel. For example, those who live in the rural hinterland of the large urban areas generally need to travel further to access local services such as doctors' surgeries, shops, cash machines etc. (Travel and Transport in Scotland, 2011)[11] and will have a longer commute, which encourages them to work from home more often than average.

2.17. Their decision to work flexibly and their higher-than-average total travel are therefore both symptoms of the home location, rather than one being caused by the other. This raises two questions:

- How much does the ability to work flexibly influence their choice of home and work location? And
- How does their flexible working affect their total travel after the accessibility of their home location has been taken into account?

2.18. In addition, removing commuting trips may cause additional 'trip-chaining'; trips which were previously combined with these trips to/from work (for example dropping children at school or 'popping into the shops on the way home') to appear as additional stand alone trips in travel diary records when the commuting part of the trip is removed (Institution of Engineering and Technology (IET), 2010)[12].

Does flexible working reduce emissions?

2.19. The Scottish Government has undertaken studies to determine the baseline for carbon emissions, and potential for abatement from the public sector[13]. This report identified that the Scottish public sector has a significant role to play in reducing carbon emissions, however the effect from transport was largely excluded from the analysis.

2.20. Early research from the USA showed that early adopters of flexible working are unrepresentative of the population as a whole, with it being more popular initially with very long distance commuters, (Mokhtarian, Handy and

[11] http://www.transportscotland.gov.uk/news/Transport-and-Travel-in-Scotland-2011
[12] http://www.theiet.org/factfiles/transport/unintended-page.cfm
[13] http://www.scotland.gov.uk/Publications/2012/12/3885

Saloman, 1995)[14]. Unfortunately this may mean that as it becomes more common across the whole population it may have less effect on emissions, as it begins to be taken up by those who do not have significant commutes to begin with. In Scotland it is already the case that over half of flexible workers live in large or other urban areas (SHS, 2010), and urban commuters tend to have shorter commutes than those from other areas (NTS 2005).

2.21. For journeys shorter than 8km (5 miles), the rebound effect may be greater than the emissions saved (Kitou and Horvath, 2006)[15]. Since the current average commuting distance in Scotland is around 8.4 miles (Source: Tables 11.4 and 11.5 of Scottish Transport Statistics No 30 2011 Edition)[16], then there should be plenty of these longer (i.e. greater than 5 mile) commuting trips to be targeted by flexible working initiatives.

2.22. A systematic review of American research on flexible working and emissions (Walls and Safirova, 2004)[17] showed that flexible workers on average did reduce their emissions on days which they were working flexibly as they tended to travel an average distance of between 27% and 51% fewer miles than on a commuting day. This led to direct reductions in the emissions of the main transport-related air quality pollutants (NO_x, CO and particulates).

2.23. In the UK, a fairly comprehensive assessment of flexible working from the perspective of carbon emissions reduction has been undertaken (Banister et al, 2007)[18]. This assessment noted that flexible working can save energy at the original workplace, however it would also be accompanied by an increase in energy usage at home. They argue that, based on crude assumptions, increases in home energy from heating, lighting and computing offset around 80% of the carbon reductions arising from the reduced amount of commuting.

2.24. In Scotland, the carbon reduction agenda is prominent and political commitments have been made towards it. The Climate Change (Scotland) Act sets out a target to reduce Greenhouse Gas Emissions by 42% by 2020, and by 80% by 2050 (compared to 1990 levels). It is therefore essential that measures are put in place to reduce emissions, and that the effectiveness of those measures is monitoring and reviewed carefully. The 2012 Scottish Government research 'The Impact of Workplace Initiatives on Low Carbon Behaviour'[19] undertook a series of ten case studies on a variety of organisations, both public and private sector. They identified the most successful initiatives, in terms of cost savings, as being workplace travel planning and basic energy saving measures. Additionally, in order to maximise the chances of successful delivery, they found that having

[14] http://escholarship.org/uc/item/44n3k2jp
[15] http://gudangdata.tarumanagara.ac.id/filed/ft/ts/Telework-TransportChoice-AirPolution-ASCE.pdf
[16] http://www.transportscotland.gov.uk/strategy-and-research/publications-and-consultations/j205779-00.htm
[17] http://rff.org/RFF/Documents/RFF-DP-04-44.pdf
[18] http://www.tsu.ox.ac.uk/pubs/1024-banister-etal.pdf
[19] http://www.scotland.gov.uk/Publications/2012/03/2237

workplace champions in place were key, along with the support, commitment and leadership of senior management.

2.25. The Scottish Government (2012) research however found it difficult to assess the level of impact, to scale up results and to make comparisons between organisations. However they did find reason to be optimistic about the possibilities for reducing carbon, particularly by those organisations adopting a 'company-wide' approach, rather than a 'piecemeal' introduction of localised measures.

2.26. The *2020 Climate Group: Leading by Example Initiative on Transport* [20] study focussed on the efforts of 61 of the 97 member organisations in Scotland's 2020 Climate Group to reduce their transport emissions. The basis for this being that the Scottish Government has a target to reduce greenhouse gas emissions by 42% compared to 1990 levels by 2020 – this includes a 30% reduction in transport emissions from 2006 levels by 2020. Emissions reductions have been seen in all sectors except transport.

2.27. A key finding of the 2020 Climate Group study was the importance of measuring environmental footprint data. They found that 27% of the organisations do not collate data on transport. This represents a serious problem in regards to monitoring progress towards reduction targets as a reliable baseline cannot be established. This issue is also reflected through this research into the impact of mobile and flexible working, as many of the businesses that were approached do not monitor or collate data on transport, emissions, or energy usage to enough of extent to assess the impact that the measures are having.

2.28. In addition to lack of data, the 2020 Climate Group study also identified several other barriers to efforts to minimise the impact of transport. These included:

- behaviour change/staff support (56% of organisations listed this a barrier);
- lack of leadership (49%);
- lack of internal funding/time (34%);
- lack of appropriate technologies (33%); and
- location/lack of infrastructure (15%).

<u>Does flexible working help to reduce congestion?</u>

2.29. The possibility that flexible working could have a positive effect upon levels of congestion makes it an appealing policy intervention, although evidence of the impact which flexible working may have on congestion is extremely

[20] Foley, C, McElhatton J and Reeve R (2012) *2020 Climate Group: Leading by Example Initiative on Transport*, Edinburgh Centre for Carbon Innovation.

limited, (Mokhtarian, Handy and Saloman, 1995)[21]. However, in longitudinal research from the UK, Haddad, Lyons and Chatterjee (2008)[22] found that avoiding wasted time in traffic was a common motivation for homeworking, whether for a full day or part of a day. There is also some evidence that, as congestion levels increase, more commuters switch to part-day home working to avoid the peak-hour congestion[23] (Lyons and Felstead, undated).

2.30. In Scotland, Halden (2006)[24], as a part of a wider investigation into ICT and travel demand, argued that very significant congestion reductions were possible through flexible working. However these hypothesised reductions relied on other travel demand management approaches being implemented simultaneously.

2.31. Ben-Elia and Ettema (2011)[25], in studies from the Netherlands, demonstrated that rush hour avoidance behaviour can be increased through the use of financial rewards for commuters. They show that sufficient rewards can make people either vary the time or mode of their travel-to-work, or consider alternatives to travel such as flexible working.

What are the rebound effects?

2.32. Across the literature for flexible working there is a continuous and understandable concern over 'the rebound effect'. This effect is found where energy-efficient systems generate more demand for energy through increased usage elsewhere.

2.33. This is relevant to flexible working in a variety of ways, but perhaps the most direct is through an income effect, where energy improvements (or commute time and money savings) for the employee leave more income (or time) for further consumption (i.e. travel) in other areas. Likewise the fact that someone is not driving to work may mean that another household member makes use of a car that would not previously have been available to them. In addition to the travel 'rebound' effects, there will also be additional energy rebound effects arising from the increased use of home central heating and other increased electricity use at home from kettles, lighting etc.

2.34. The bulk of the literature supports the idea that there probably is a significant rebound effect, but under most circumstances emissions-related impacts of this 'rebound' are generally smaller than the impacts of the primary change in behaviour.

2.35. A notable outlier is Glaister (2008)[26] who recognises that his own position is outside the research mainstream by titling his work 'an alternative view'. He argues that greater mobility is associated with quality of life and so it is unlikely that homeworking will succeed in reducing travel overall. He also

[21] http://escholarship.org/uc/item/44n3k2jp
[22] http://eprints.uwe.ac.uk/9219/
[23] http://eprints.uwe.ac.uk/9215/1/9215.pdf
[24] http://www.scotland.gov.uk/Resource/Doc/123907/0029821.pdf
[25] http://eprints.uwe.ac.uk/14803/3/BenElia_Ettema_TRA_revised2_3.pdf
[26] http://www.flexibility.co.uk/downloads/Canhomeworkingsavetheplanet.pdf

argues time saved in routine travel (e.g. commuting) will be spent on travel to for other purposes.

2.36. Similarly, research conducted by WSP Environmental[27] found that while transport related carbon emissions are saved by reduced commuting, the extra heating and power used at home (especially in winter) can outweigh the benefits. In an office environment, heating and electricity are shared amongst all staff, however at home the employee is required to use more energy to heat their property. The research also estimates that if an employee works at home all year they will generate 2.38 tons of carbon dioxide, whereas a typical office worker will produce only 1.68 tons of carbon per year.

What are the benefits/challenges?

2.37. In a pair of papers, Shafizadeh et al., (2000[28] 2007[29]) ran a series of Monte Carlo (computer) simulations in order to identify main costs and benefits of flexible working. Monte Carlo simulations are not intended to uncover a single definitive solution, but rather to identify the circumstances through which the greatest benefits for each group can be maximised. The simulation was run with data to look for benefits of telecommuting for employers, employees, and the wider public sector, though they found little benefit for the public sector either as employer or transport service provider.

2.38. A range of circumstances make flexible working more beneficial for the employers. These include:

- when the employee is more productive at home;
- when the flexibility helps to retain staff (i.e. reduce staff turnover);
- when employee time is highly valued;
- when flexible working is frequent;
- when costs can be saved either in parking or desk space at an office; and
- when the employee makes use of their own equipment at home. (Shafizadeh et al., 2007).

2.39. For the employee, the most favourable circumstances are found:

- when they value the time that they would have spent commuting highly;

[27] http://www.telegraph.co.uk/earth/earthnews/3295393/Go-green-work-at-the-office-not-at-home.html
[28] http://escholarship.org/uc/item/49c1n7hg#page-1
[29] http://www.csus.edu/indiv/s/shafizadehk/pubs/jis2007.pdf

- when the commuting distance is above average;
- when the commuting vehicle is inefficient; and
- when flexible working is most frequent (Shafizadeh et al., 2007).

2.40. Whilst the case for flexible working as a means to reduce travel may be supported by a range of academic research evidence, the evidence on productivity is of a different nature. It should be noted that several of the productivity studies have been sponsored by organisations with a vested interest in promoting remote working and other initiatives requiring investment in telecommunications technology.

2.41. For example, BT reported some strong productivity and business improvements as a result of implementing widespread working. The benefits they list include:

- staff 30% more productive;
- 20% reduction in staff absenteeism;
- 50% improvement in staff satisfaction; and
- £500m reduction in BTs property portfolio (Waters, 2008)[30].

2.42. Another source of evidence for productivity gains comes from the responses to the UK Department for Transport's call for evidence on alternatives to transport.[31] Eight of the organisations which submitted responses to the UK DfT's call for evidence suggested that a motivating factor was increased productivity, efficiency or effectiveness. However, it is worth noting that 9 of the 22 evidence pieces submitted to the DfT`s call for evidence were by ICT companies, with the remainder dominated by public bodies or UK Government departments, and only one piece by an academic.

2.43. Ruth and Chaudhry (2008)[32], expressed scepticism towards some of the largest claims in productivity improvements, suggesting that the real estate savings identified by corporations were fairly concrete, but the productivity improvements less clear.

2.44. More recently, in 2012, Workplace Unlimited published a paper 'Flexible Working Benefits – collated evidence and case studies'[33]. The research noted that flexible working benefits are by no means limited to space and its associated costs. By looking at case studies over 30 organisations, they

[30] http://www.flexibility.co.uk/downloads/Canhomeworkingsavetheplanet.pdf
[31] https://www.gov.uk/government/consultations/alternatives-to-travel-a-call-for-evidence-guidance-document-and-questionnaire
[32] Ruth, S., and Chaudry, I., 2008. Telework, a Productivity Paradox. *Public Policy*, (November/December issue) pp. 87-90.
[33] http://www.workplaceunlimited.com/2012%20WPU-OP-01%20Flexible%20Working%20Benefits.pdf

found that, in addition to the well documented benefits which illustrate clear, objective space efficiencies and associated property savings, there are also a substantial number of less-tangible benefits which are difficult to measure. For example, they found that organisations such as BP, Department for Trade and Industry, EC Harris, GSK, PwC, Rolls Royce and the Treasury Solicitors all reported enhanced knowledge sharing, communication, team interaction and collaboration as a result of flexible working. This led to better joined-up services, more cross-selling of services, and increased profitability. GSK and EC Harris report that flexible working has contributed towards a 12% increase in profit. Other benefits identified include decreased travel time between the office and client sites, and reduced absenteeism. The organisations also reported increased levels of staff satisfaction as well as greater feelings of trust and autonomy.

2.45. The research concluded that, "whilst implementing flexible working is easily justified by the property savings alone, the additional benefits are considered a more significant driver for flexible working – they are just more difficult to demonstrate."

2.46. Flexible working differs from other working situations in a range of ways, but two stand out in the literature as of greatest importance. Firstly the placement of workers at home may influence the worker's family life. Secondly a substantial flexible working workforce has the potential for significant gains in terms of business resilience. Each of these impacts is discussed in turn below.

Impact of Flexible Working on Family Life

2.47. Research on the relationship between homeworking and family life has found both positive and negative impacts. For example, Penfold et al (2009)[34], in a study of the attitudes and behaviours of flexible workers, noted that family reasons and work-life balance were commonly stated as motivations for flexible working. Similar motivations were found by Haddad, Lyons and Chatterjee (2009)[35], though they note that conflict between roles as parents and workers can make homeworking challenging. Gajendran and Harrison (2007)[36] in a quantitative psychological study found that flexible working most commonly tended to marginally lessen work-family conflict, though not in all cases.

Impact of Flexible Working on Business Resilience

2.48. Business resilience, or business continuity, may represent one of the most important areas of potential benefits of flexible working for transport. For example, during periods of severe weather transport systems can be

[34] http://www.researchonline.org.uk/sds/search/download.do;jsessionid=AFBD2CBB09A84B16E2950948905048E7?ref=B11240

[35] http://eprints.uwe.ac.uk/9219/

[36] Gajendran R., and Harrison, D., 2007. The Good, the Bad and the Unknown about Telecommuting: Meta-Analysis of Psychological Mediators and Individual consequences. Journal of Applied Psychology. (92):6 pp. 1524-1541.

disrupted. Under these circumstances the capacity for organisations to continue functioning with staff dialling-in remotely can significantly mitigate the effects of any disruption. Some examples of evidence of flexible working enabling resilience include:

- Gill (2006)[37] highlighted the potential for teleworking to improve resilience in the face of pandemic H1N1 influenza. This work pointed to the role of flexible working and its use in response to SARS. It was shown that working from home has both a resilience benefit to organisations, and the potential to slow transmission by removing the contact of commuting and office work;

- two organisational respondents to the DfT's consultation on alternatives to travel highlighted business continuity in the face of severe weather;

- Halden (2006) points to work on the Atlanta Olympics where flexible working was successfully promoted as an alternative to travel during the period of the games and associated travel disruption; and

- a key focus of the London 2012 Travel Demand Management (TDM) campaign was to achieve flexibility in the behaviour of commuters, particularly those using 'hotspot' locations. The TDM programme promoted 'the 4Rs', of reduce travel, retime travel, reroute and remode. During the Games, survey data was gathered daily with regard to changes that respondents had made the previous day to their commuter journey. This revealed that, on average weekdays during the Games, 35% of commuters had made some change to their usual journey. Subsequent research by TfL indicated that over 75% of Londoners made some change to their usual travel during the Games period. The behaviour change that was achieved proved to be highly targeted, with changes focussed on hotspot locations. Overall the effect at those locations was to reduce peak demand and to spread peaks. Consequently available capacity was used more efficiently, record numbers of passengers were carried but operational thresholds were not breached.

Conclusions

2.49. It is apparent through the range of different studies that have taken place into the impact of mobile and flexible working, that the results are variable and sometimes conflicting.

2.50. It is also worth noting that some of the research to date has been undertaken by companies with a vested interest in promoting flexible and

[37] Gill, T., 2006. Countering the economic effects of bird flu through teleworking. *Journal of Business Continuity & Emergency Planning.* (1): 1 pp. 27-36.

mobile working and it is therefore important that this new research remains impartial and represents a variety of organisation types.

2.51. Finally, the research found appears to focus solely on the use of flexible working, and does not give an assessment of the effect of mobile working initiatives. Our project has sought to redress this balance by considering both flexible and mobile working as potential approaches for reducing travel.

3. CASE STUDY: ABERDEENSHIRE COUNCIL

Introduction

3.1. Aberdeenshire Council is a local authority employing 14,546 staff (as of January 2013). The area is predominately rural and the population is spread across the whole area, with only five towns having a population greater than 10,000. Council employees are representative of the area as a whole and many will have significant commutes where public transport is not always a viable or attractive option.

Case Study Methodology

3.2. This case study was undertaken through discussions and correspondence with Aberdeenshire Council's 'Worksmart Team Leader'. Additional data was provided by the Council in the form of a completed 'Travel and Emissions Data Sheet' (see appendix A for example data sheet).

Mobile and Flexible Working Activities

3.3. Aberdeenshire Council implemented mobile and flexible working as a way for the organisation to make required savings in the current financial climate. In addition to being more cost-effective, they have set out four aims:

- increased productivity;
- improved asset management;
- improved customer service; and
- improved employer profile.

3.4. They offer four different profiles (flexible, mobile, home and fixed) and eight different working patterns under their Worksmart programme.

3.5. The Council has an office rationalisation programme called WorkSPACE, which started to roll out late 2011 with a five year timetable. The programme aims to reduce the office portfolio from 98 offices to 53. The Council is also in the process of preparing a travel plan which will take cognisance of the mobile and flexible working initiatives, and will feed into the Local Transport Strategy.

The Delivery of Mobile and Flexible Working

3.6. The main factors which those consulted felt had assisted with the delivery of the scheme were the establishment of a Project Steering Board, led by a Director and including cross-service senior management representation, and the identification of a dedicated project team to drive the initiative forward.

3.7. The main ‘barrier to delivery’ identified was the need to change the culture within the organisation. Those consulted acknowledged that this is an on-going process and that progress is being made.

3.8. The Aberdeenshire Council initiatives are well resourced with a dedicated delivery team which is made up of a team leader, two co-ordinators and four ICT staff. They are also in the process of expanding the team to include two project assistants as well as potentially an increase in IT resources as well. There are also ‘Worksmart Champions’ identified within the various services to promote the scheme and its initiatives.

3.9. At the start of the programme, road shows, posters and material included within staff payslips were all used to raise awareness of the initiatives. A website was developed as a ‘go to’ point for staff to obtain information about the scheme. The initiatives are also regularly promoted through Aberdeenshire Council’s internal Intranet and via a fortnightly briefing note to staff.

Take-up of Mobile and Flexible Working

3.10. Mobile and flexible working is open to most employees depending upon their job role. There are however a number of specific job roles that will remain fixed, for example reception can only do their job at fixed times and in a fixed location. To take part in mobile and flexible working, the employee and their line manager discuss the profile/pattern they want to adopt and a decision is made as to whether this is practical or not, depending upon the nature of their role.

3.11. Around 1,800 (12%) employees of Aberdeenshire Council have adopted revised working patterns since 2010. Those consulted predicted that approximately 3,500 Aberdeenshire Council staff will work in a flexible/mobile manner by 2016 – if total staff numbers remain the same, this would account for 24% of staff. A cross section of services are involved in the programme, with particularly high take-up within the Social Work department.

Financial Impacts of mobile and flexible working

3.12. Since the implementation of mobile and flexible working, Aberdeenshire Council has observed a reduction in both business and commuting mileage. Table 1 below provides some further details on the financial savings from business mileage (figures based on Worksmart participants).

Business Mileage Savings

3.13. The business mileage savings are based on Worksmart participants’ travel claims submitted to Payroll. The travel payments for each quarter are compared against the previous year.

Table 1. Business Mileage Savings

Financial Year	savings (£)
2010/11	£46,231
2011/12	£64,188
2012/13 (6 months to 30 Sept)	£16,121
Total to 30 September 2012	**£126,540**

3.14. Business mileage is expected to reduce further in coming years, with the implantation of the travel plan which will introduce pool cars. These measures will also have an impact on commuting mileage, as staff who are required to travel for work will be able to use a wider range of modes for commuting as they no longer have to have their own car on site.

3.15. There is also a perception amongst managers that staff/team productivity levels have increased, but there are currently no tools in place to quantify this.

3.16. In addition, the Council has reported a reduction in energy consumption for 2010/11 to 2011/12, largely due to office rationalisation. This trend is expected to continue as the roll out of WorkSPACE continues.

3.17. Aberdeenshire Council are tracking the property savings being made through reduced running costs; the reduction in the number of leased buildings; and capital receipts that will be achieved once they are in a position to market some of the buildings that they will no longer require. It is anticipated that these measurements will confirm a net saving to the organisation once flexible working and WorkSPACE have been fully implemented.

Benefits/Drawbacks of Mobile and Flexible Working

3.18. The main benefits for employees were identified by the Council as having the opportunity to have a better work-life balance and greater job satisfaction. For management, the benefits were identified as having more productive staff. For the organisation as a whole, the main benefit was considered to be the improvement to overall service delivery.

3.19. Additional benefits including increased sustainability, improved asset management and an improved employer profile were also identified.

3.20. In regards to drawbacks, there is potential for a loss of team dynamics. However this was identified early and managers have a responsibility to ensure that the team have adequate opportunities to meet ‘face-to-face’ on a regular basis. It was felt that the culture within the organisation has recently moved away from ‘presenteesim’ to a more ‘output-based’ approach to

managing staff. As a result, those consulted felt that, there is an ongoing need to ensure that flexible working does not have an actual or perceived negative impact on individual performance or productivity.

Good Practice and Lessons Learned

3.21. Aberdeenshire Council stated that, in terms of good practice, they found the following to be beneficial:

- a dedicated project team to drive forward the project;
- creating a dedicated website;
- starting on a voluntary basis; and
- use employees who have had a positive experience to promote flexible working amongst their peers.

3.22. The main lessons learned that were identified was the need to have all technology solutions in place at the start (e.g. electronic document management system, mobile devices and telephony e.g. single number that will follow you wherever you go). This creates a much easier transition for staff to adopt a different way of working without too much trouble.

The Future of Mobile and Flexible Working

3.23. Aberdeenshire Council are committed to the future of flexible working and their Worksmart programmes will remain and be offered to staff. Through WorkSPACE the council will capture most staff in the main offices but a focus for the future will be to capture the staff in outlying offices.

Quantification of Carbon Impacts

3.24. The key data provided by Aberdeenshire were as follows:

- a committee paper from September 2012 on actions by the Council and their effectiveness as part of their Climate Change Action Plan;
- the Council's Climate Change Action Plan 2011-2015;
- surveys from the Council's 'Worksmart' initiative for 2010 and 2011; and
- a completed survey-specific Travel and Emissions Monitoring Data Sheet.

3.25. These documents suggested the following conclusions:

- business travel reduced by 4.3% (419,425 miles) between 2010/11 and 2011/12 (reported in committee report) however this figure is not specifically related to flexible working initiatives;

- approximately 10% of Council staff work flexibly (i.e. from home or locations closer to home than the normal place of work) – 1,420 staff out of a total of 14,546 (as of January 2013) although the total number of staff participating in all forms of mobile/flexible working was recorded as 1,738;

- carbon emissions fell between 2010/11 and 2011/12 for energy from buildings, fleet transport and business mileage. Reductions in business mileage are attributed to a number of factors but these include the Worksmart initiative. Reductions in emissions from buildings cannot be attributed to flexible working however from 2012/13 the Council's office rationalisation programme is being facilitated by the ongoing adoption of flexible working; and

- Worksmart participants have been surveyed (achieving a 28% response rate) and it has been estimated from these results that mobile and flexible working has resulted in a 30% reduction in commuting mileage for these flexible workers. It was also calculated that these savings achieved an emissions reduction of 49.1 tonnes CO_2 in 2010/11 compared with the previous year – this is equivalent to around of 80kg CO_2 per flexible worker involved in Worksmart per year.

3.26. Aberdeenshire Council appear to have been successful in recruiting a significant number of staff into programmes such as Worksmart which is focused on flexible and mobile working. The data provided by the Council on travel, fuel use and emissions monitoring both generally across all Council services and specifically in response to the survey monitoring data sheet request indicate that carbon emissions have fallen in the last 2-3 years for which data was available, and that at least some of this reduction can be attributed to flexible working.

Commuting Mileage Savings

3.27. Table 2 shows the results that were collated from approximately 28% of the Worksmart participants who provided details of the reduction in their commuting mileage as a result of their working from home or alternative work locations.

Table 2. Commuting Mileage Savings by Aberdeenshire's Worksmart Scheme

Financial Year	savings (miles)	SAVINGS ($kgCO_2$)
2009/10 (quarter ended 31 March)	11,700	2,122
2010/11	195,319	49,140
2011/12 (nine months ended 31 Dec)	204,730	51,116
Total to 31 December 2011	**411,749**	**102,378**
Financial Year	**savings (miles)**	**SAVINGS ($kgCO_2$)**

3.28. This 50 tonne per annum reduction in CO_2 is less than 0.01% of Aberdeenshire's total transport-related greenhouse gas (which the Department of Energy and Climate Change (July 2013) estimates of CO_2 emissions by Local Authority[38] suggest were around 610 kilo-tonnes in 2011). It also represents around 0.3% of the total 17-kilotonne reduction Aberdeenshire achieved in its transport-related emissions in 2011 (down from around 627 kilo-tonnes in 2010 to around 610 kilo-tonnes in 2011).

3.29. Whilst reductions in energy use and associated carbon emissions from property rationalisation prior to 2012 cannot be attributed to flexible working it does appear that the Worksmart initiative is integrated with and important to the success of planned workspace rationalisation programmes which will presumably contribute to ongoing financial and environmental efficiencies.

3.30. The data show that flexible working initiatives at the Council have reduced the commuting mileages and emissions of those taking part in Worksmart. No data are available on whether the overall travel of Worksmart participants have also reduced i.e. what contribution commuting mileage was to their overall annual travel and/or whether there have been any travel rebound effects.

38 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211904/110713_Local_CO2_NS_Annex_A2_.pdf

4. CASE STUDY: BT

Introduction

4.1. BT has the most established flexible working programme of the organisations which participated in this research. Some departments at BT started to adopt flexible working in the 1980s, and a formal company policy was adopted in 1996. BT has operations around the world, however the data and information provided in this case study is largely focussed on their UK experience.

Case Study Methodology

4.2. Interviews were conducted with four key BT staff in order to develop this case study. These interviewers were held with BT's:

- Flexible Working Manager;
- Head of Property Strategy;
- Senior Corporate Real Estate Manager; and
- Telereal Trillium – who assist BT with property advice, estate management and facilities management.

4.3. In addition to the detailed interviews, further data was provided through case studies, brochures, research reports and corporate strategies.

Mobile and Flexible Working Activities

4.4. BT has used flexible working as a means to reduce costs, improve productivity and efficiency, and minimise the carbon impact of the company. They also use it as a tool to improve recruitment and retention, reduce levels of absenteeism, and to support staff returning from maternity leave.

4.5. The first major flexible working scheme at BT was *Workstyle 2000*. This was implemented in mid-90s to help BT to become an organisation that was able to anticipate and react quickly to change; and to help them become an organisation that would be competitive through its improved working practices.

4.6. Flexible working is currently being rolled out across the world, but in the UK and in many other locations it is already standard practice. BT operate five set work styles:

- fully home-based;
- occasional home-based;
- mobile working;

- flexible within the estate; and
- fixed desk.

4.7. Flexible working at BT revolves around providing staff with a choice – encouraging staff to choose the most flexible work style which is suitable for them and their role.

4.8. In addition to delivering flexible working solutions internally, BT, as a major technology and communications company, also actively promote it to other businesses and public sector organisations, conduct cost-benefit analyses and help them set it up.

The Delivery of Mobile and Flexible Working

4.9. BT managers highlight a number of key factors required for successful delivery of flexible working. These include:

- having a clear benefits case in place;
- senior management support;
- the need to tackle the organisation as a whole rather than targeting a few individuals;
- clear, simple processes and procedures for managers to follow in order to make the right decisions for their teams;
- having the right equipment – home workers need to be properly equipped to do their job properly;
- operate objective/performance based management, rather than attendance based management; and
- need for facilities to be in place – e.g. desk booking service; room booking service; wireless enabled offices etc.

Take-up of Mobile and Flexible Working

4.10. Flexible working at BT is simply regarded as “business as usual”. In 2006, nearly 7 out of 10 employees worked flexibly, and nearly 10% are fully-home-based. At present, there are around 9,500 full-time homeworkers; and 5,000 part-time homeworkers.

4.11. Staff are able to apply for any work style at any time, and they are encouraged to do so through case studies and demonstrations. BT also systematically target specific buildings/groups/areas and put people through a formal process to find out what might work best for them.

4.12. As BT define flexible working as providing staff with a choice, it means that some roles may appear to be flexible but are not defined as such. For

example, many engineers are not regarded as ‘flexible’ as, although they go straight to their first job from home and return home straight from their last job of the day, they have no choice in the pattern and therefore are not flexible workers; however they are still eligible to request altered hours and other HR-related flexible working. BT has very few groups where flexible working is not applicable. To BT, the only people who are not working flexibly in one way or another, are the few people who absolutely have to be based in a fixed location, for example those who require a modified work station.

4.13. There are some departments where BT has been careful about the types of flexible working options available. One such area is call centre workers – these staff members do work flexibly in that they don’t have a fixed desk, but they are generally not able to work from home. The need to avoid home-based staff becoming ‘isolated’ has also been identified.

Impacts of Mobile and Flexible Working

4.14. 20 years ago, BT was structured geographically, so that project teams and customer services were generally all located together in the relevant region. Now however, BT teams are structured more by ‘functionality’ than by location. This change could have led to an increased need to travel. However those consulted noted that BT try to ensure that their staff travel as little as possible, and that the relevant technology is a) available and b) used, to reduce unnecessary travel.

4.15. Those consulted reported significant impacts in terms of improved productivity of BT staff. BT’s internal studies have shown that when comparing a flexible worker to their office-based counterpart, there is an average of 20% increased productivity doing like-for-like work. However results like this will not be derived from all types of flexible working such as staff who simply desk-share.

4.16. In the research interview, BT’s Flexible Working Manager stated that:

> “If you look between home and occasional home and office-based people, BT measure an average 20% productivity gain. And that ranges from about 15% for jobs which are very sales based and therefore very out and about, to around 30% for things which are more traditionally office based.”
>
> David Dunbar, BT Flexible Working Manager

4.17. In regards to office rationalisation, BT has been undertaking a series of Building Optimisation Programmes. The current programme is aiming to deliver energy cost savings of £1million per annum. The long term plan to 2020 is to reduce office energy costs by £7.3M p.a. These savings are to be achieved through the vacation of leasehold properties and consolidating the remaining estate. Flexible or ‘agile’ working practices are one of the key enablers to deliver the programme and its associated savings.

4.18. The Building Optimisation programme has also contributed to wider strategic objectives such as reducing the carbon footprint of the company. Since 1996, BT has reduced their carbon footprint by 60% and is aiming to achieve an 80% reduction in UK carbon emissions by 2016 and 80% reduction in carbon intensity by 2020, as part of their 'Better Future' strategy.

Benefits/Drawbacks of Mobile and Flexible Working

4.19. BT has offered flexible working in one form or another for at least 20 years. As such, over time they have identified a number of organisational, management and employee benefits that have derived from the implementation of flexible working practices.

Organisation Benefits

4.20. For the organisation, the identified benefits revolve in cost and productivity. These savings largely come from the rationalisation of the company's property portfolio and also by being an employer of choice. This has resulted in improved staff retention and increased levels of productivity.

4.21. The organisation also benefits from staff who are more motivated and more responsive. Staff who take less sick leave, and who are focussed on their objectives and results.

4.22. They also find that, as a company, they are more resilient to issues such as flooding or adverse weather which prevents staff from getting to work. By having flexible working systems in place, the impact of these events is minimised as staff are able to work elsewhere with ease.

4.23. A significant benefit that BT studies have shown, is that that homeworking female staff were more much more likely to come back to work after maternity leave compared to office based staff; and they also found that homeworkers tend to return to work quicker than office-based staff.

Management Benefits

4.24. Two key management benefits have been identified by BT. With the move towards flexible working, BT has moved to an objective led management approach. They have found that this is a much more effective management tool for both the manager and the employee, as staff performance is measured against set objectives and targets, rather than simply monitoring presence.

4.25. Managers have also reported a stronger team culture. BT managers hold regular calls to get the team together and discuss any problems or issues, how things are going and get everybody to share their solutions to those problems. These can be scheduled frequently because they are short, sharp team phone calls. BT managers reported that they find these discussions immensely valuable, however they rarely happen with that level of frequency within a traditional office environment where one-on-one conversations, rather than team conversations tend to be the norm.

Employee Benefits

4.26. For employees, there are also a number of identified benefits. BT studies have shown that their flexible working staff feel that they have a much better work-life balance, and that they feel more empowered and trusted as an employee. This empowerment comes from the objective-led management system as they are able to clearly demonstrate how they are performing, and they know that they do not need to be present at a fixed desk in order for their manager to know that they are doing their job well.

4.27. In terms of the improved work-life balance, flexible workers report that they save both time and money from their commute. Additionally staff are able to consider and make life changes, such as moving to a new town or city, without worrying about their new commute or having to find a new job if there is no local office as they are able to work more flexibly, from home for example.

Organisation Drawbacks

4.28. BT reported that they see flexible working as positive, however they do acknowledge that it is not always easy. Implementation is a long process which requires a lot of effort and commitment by the organisation and relevant staff to develop and maintain the 'flexible-working' culture. It needs to be rolled out properly and the benefits clearly sold to all staff, organisations need to appreciate that rolling out the new system will take time and it is therefore important that momentum is maintained throughout. Organisations also need to recognise that flexible working practices will not be applicable to all teams and all staff, so there is a risk that some people may perceive it to be unfair, and this will need to be carefully addressed.

Management and Employee Drawbacks

4.29. Some managers may have a perception that people not working physically within the team may not buy into the ethos and cohesiveness of the team. There is a risk for some staff that work may become all-pervasive and interferes with home life. A degree of change is required to introduce, maintain and support flexible working, which can be 'unsettling' for some people. Also home-based workers can feel isolated if not managed properly.

4.30. BT staff however felt that the majority, if not all, of the drawbacks above can at least be mitigated, if not prevented, by implementing schemes thoughtfully and carefully, having appropriate systems in place from the outset and working closely with staff to ensure that the arrangements work for them and their team.

Good Practice and Lessons Learned

4.31. The BT staff interviewed were able to identify a number of key points in terms of good practice and lessons that they have been learnt over the years. These are summarised below:

- getting leadership and systems in place first - don't go out to your people until 'all the i's are dotted and t's are crossed';
- building and maintaining momentum – this is not a one-off activity;
- don't exclude specific groups too early in the process - there may be groups who need to be excluded, but these should only be confirmed after the initial consultation process so all staff are aware of the process and requirements;
- don't go for quick-win departments where they are already working flexibly. Get it working in the most difficult department first and then no one can say it's something they can't do;
- need to understand what the business wants to achieve;
- need to highlight that there is a real benefit to the business by having a more agile workforce – not just cost, energy, carbon benefits;
- need to have the right tools and technology in place from the start;
- need to keep space in offices for when people do need to come in;
- communications - get middle managers on board early, communicate with them and make sure they understand what is going to happen, when it'll happen, how It will work and the benefits that will be achieved;
- clear HR policies need to be in place – for example, do employees have the right of appeal if their manager rejects their request for flexible working?; and
- should have a simple problem-reporting systems – e.g. if someone uses a touchdown desk and the network cable for example isn't working, it's very easy for them just to move to another desk and the fault goes unreported. Can end up with a creeping failure rate with IT and soon the whole system will fall down. A simple solution could be to have an indicator on each desk that will alert other staff and facilities of the problem (e.g. a red paper flag).

The Future of Mobile and Flexible Working

4.32. Flexible working at BT is long established. The flexibility is engrained in the culture of the company and it is simply regarded as the normal way of working. BT will continue to roll out these working practices to their offices around the world, and will continue to work with local authorities and other organisations to promote the benefits of flexible working, develop business cases and help with the delivery of the technology required.

Quantification of Carbon Impacts

4.33. The key data provided by BT included:

- a case study of the BT Workstyle project (2006);
- a report on The Economic, Environmental and Social Impacts of Homeworking at BT from SustainIT and the University of Bradford (2008)[39];
- Smart 2020 BT Agile Worker Energy and Carbon Case Study (2008);
- a case study on BT Flexible Working (2012); and
- an Application in Action: Flexible Working at BT report (2012).

4.34. These documents supported the following conclusions:

- as a result of the BT Options 2000 programme, its property portfolio was reduced by 40% and by 2005 the company was saving £550 million a year in property costs when compared to pre-programme expenditures (2012);
- the Flexible Working at BT information sheet (2012) reported annual travel cost savings of £29 million. The company avoided 11 million kilometres and 2,800t CO_2 from company car, rail and air travel through use of conferencing technology and flexible working arrangements in 2010;
- BT research suggests each of their homeworkers reduces their annual corporate emissions (i.e. travel and buildings) by 1.4t CO_2. This represented a total saving of 27.5 million litres of unleaded petrol (63,390t CO_2) in 2009;
- average travel to work distance for homeworkers was 34 miles (lower than a similar survey in 2006 suggesting broader 'adoption' of home working with time, as early adopters tend to be those with greatest travel to work distance). This figure is for all modes of transport. The average for car users was 31 miles and 73 miles for train users;
- based on 11,104 registered homeworkers (in 2008) and their average number of days working from home this was equivalent to 7,583t CO_2 per annum avoided from commuting by registered homeworkers (there was a similar number of estimated non-registered home workers);

39 James, P. (2008) Homeworking at BT – The Economic, Environmental and Social Impacts, SustainIT and University of Bradford

- a survey specifically asked home workers about additional journeys made on days working from home. The annual emissions from additional journeys (travel rebound) were calculated at 603t CO_2 pa or less than 10% of commute emissions savings overall;

- on a net basis (i.e. including rebound effects but excluding employer energy use) in 2008 homeworking was estimated to save BT around 6,980t CO_2 per annum (from registered homeworkers) or an average of 0.68t CO_2 per homeworker per year; and

- a more recent flyer on flexible working states that 65,000 of 94,000 (69%) BT employees work flexibly in some way[40].

4.35. BT's flexible working programme, currently in its 7th (or 13th if the BT Options 2000 Teleworking initiative is included) year, is one of the longest running and largest (69% of its employees worked flexibly to some degree in 2012). It can therefore act as a good indicator of potential savings from flexible working for businesses in a similar sector/size.

4.36. The 1.4t CO_2/year figure is acknowledged in the Smart 2020 BT Agile Worker Energy and Carbon Case Study (2008) to be high because early adopters tend to have the largest travel to work distances. This would be expected to fall on average as more people home work. However, the Smart 2020 study also includes energy savings from the office (4000kWh/year/employee) which helps explain the difference between the figures quoted of 0.7t CO_2/year and 1.4t CO_2/year in the 2008 findings.

4.37. The annual emissions savings per home-working employee is dependent upon the average commute distance (greater savings where trips are longer) and this is likely to fall over time as the early adopters of home-working schemes are likely to be those living furthest from the office. That said, BT has been implementing flexible working for many years, so the results may be levelling out with regards to the 'type' of employee selecting this work mode.

4.38. The University of Bradford Research[41] shows that estimated rebound effects account for less than 10% of the total commute savings. Homeworking by registered flexible workers is estimated to be saving 0.68t CO_2 a year per 'home worker' on the scheme through commuting alone. This figure can also be considered conservative as there are a number of unregistered home workers. The same study presents data which indicates that on average every home worker avoids 7.8kg CO_2 per day in travel emissions.

4.39. 'In-building' flexible working (desk sharing and re-allocation etc.) has created savings in property costs (at Brentwood) of £345,000 for energy and facilities management costs and freed-up a building wing with an annual rental income of £1m. Similar property consolidation gains were reported at

[40] BT (2012) Application in Action: Flexible Working at BT
[41] James, P. (2008) Homeworking at BT – The Economic, Environmental and Social Impacts, SustainIT and University of Bradford

other sites. The 40% decrease in its property portfolio since implementation of the Options 2000 Initiative further reinforces the potential savings to upkeep and emissions from property rationalisation.

5. CASE STUDY: FIFE COUNCIL

Introduction

5.1. Fife Council employs approximately 20,000 employees across a range of services. The Council is Scotland's third largest local authority by population and is approximately 1,300 square kilometres in area. Council offices, depots and other sites are situated across the whole area.

Case Study Methodology

5.2. To develop the case study, a series of interviews were held with Fife Council staff including:

- Business Change Manager;
- Criminal Justice and Social Work Service Manager;
- Human Resources Manager;
- Building Services Service Manager; and
- Climate Change & Zero Waste Service Manager.

5.3. Fife Council employees were also invited to undertake a short online questionnaire to help determine changes in travel behaviour as a result of flexible working, as well as the impact on other energy usage. The response however was disappointing, with only 24 members of staff completing the survey. A copy of the survey is included in Appendix B and a summary of the results are provided in section 5.10.

Mobile and Flexible Working Activities

5.4. Fife Council has implemented flexible working to some departments mainly as a tool to improve productivity. In the current economic climate, Fife Council need to make substantial savings and flexible working was identified as a way to increase productivity and cost-efficiencies. Any resultant reductions in business mileage, commuting mileage etc. were seen as secondary benefits.

5.5. Fife Council operate two models of flexible working. First of all they offer the statutory requirement for all staff to be able to request a flexible working arrangement, such as part-time hours, job share, compressed hours etc. Previously this was only a statutory right for staff with caring responsibilities, however all staff are now able to request a flexible working arrangement. Service managers are responsible for determining whether requests are approved or not, and for ensuring that the needs of the service are still met.

5.6. In addition to the statutory flexible working opportunities, Fife Council implemented a 'Mobile and Flexible Working Scheme' which is designed to improve productivity and make the Council a more efficient organisation.

5.7. Specific job roles have been targeted in the first instance, rather than rolling out mobile and flexible working to all staff. The Council has developed three categories, as follows:

- mobile workers – staff out in the field who now use technology to receive daily work planners etc. They no longer have to report into an office before going to their first job, they can leave straight from home;

- home workers – a small group of staff (finance staff only at present) who work 100% of the time at home. They no longer have an office base at all; and

- flexible workers – staff who have a 'base office' but work from home or from other offices on occasion. These staff hot desk at offices (including their base) rather than having an individual space.

5.8. Mobile workers at the moment are within Building Services. Building Services staff are mainly trades-people and they have been issued with handheld devices to reduce unnecessary travel from home to an office/depot to be issued with their work plan for the day. The technology is also being used for reporting and is significantly reducing time spent on back-office paper work and provides an almost instant monitoring tool. Mobile working is also being rolled out to Social Work staff to allow them to plan days more effectively and reduce travelling to and from offices at the start and end of each day.

5.9. Alongside the mobile and flexible working implementation, Fife Council has also instigated an Office Rationalisation Programme which will reduce their number of buildings from around 90 to approximately 25. This transition is still ongoing and not all old sites have closed yet, however once the transition is complete, the Council expects to generate significant savings in energy costs, not to mention staff mileage (both business and commuting).

The Delivery of Mobile and Flexible Working

5.10. Fife Council has a dedicated team in place to set-up, deliver, manage and promote their mobile and flexible working initiative. This was identified by all interviewees as the primary factor which has led to the successful delivery of the scheme. Additionally, the delivery team also has the backing of Elected Members which has been a huge help.

5.11. There were two distinct barriers to the scheme delivery that were identified by the interviewees. These were not having IT as part of the delivery team from the outset. This led to delays, technical challenges and IT issues upon implementation. The second barrier identified related to leadership and ownership issues. There are a number of staff and managers who do not react well to change and therefore try to make problems. This however has been a management issue and has now largely been overcome.

5.12. Overall, the Fife Council mobile and flexible working scheme appears to functioning well and delivering the savings that were set out in the original business case. All interviewees felt that it would only go from strength to strength and that there would be a definite commitment to its ongoing implementation. It was agreed that the implementation of mobile and flexible working at Fife Council has helped the Council in their efforts towards achieving their wider corporate objectives which include becoming a more effective, more efficient, greener Council.

Take up of Mobile and Flexible Working

5.13. As the council have approached this by targeting specific roles, the take-up is 100% in the areas concerned. A council wide take-up figure cannot be determined as mobile and flexible working is not something for staff to opt-in or out of, it is entirely dependent on whether their job role has been identified as being suitable or not. However, in terms of actual numbers rather than percentages, the Council originally targeted 2,000 staff roles across the business, and with the implementation of the Office Rationalisation Programme, approximately 4,000 office based staff will be classed as flexible workers.

Impact of mobile and flexible working

5.14. The impact of mobile and flexible working at Fife Council has been significant. Several teams have reported substantial reductions in mileage, for both commuting and business trips. Additionally, productivity has increased across departments, but particularly in Building Services where they have witnessed a 20% increase in productivity since switching to mobile working. This has arisen from the use of handheld technology which reduces the amount of time staff spend travelling to and from depots and on paperwork, and increases the amount of time they have to undertake jobs.

Cost analysis

5.15. A Business Case was produced to justify the implementation of the scheme. This predicted a spend of £12 million, with a return of £28 million over five years. The Business Case is currently being refreshed to reflect actual spend and ongoing savings.

5.16. All interviewees regarded the implementation of mobile and flexible working to be a cost-effective. They all agreed that the financial benefits were clear to see with productivity increasing and the fuel/mileage/energy costs coming down.

Benefits/Drawbacks of Mobile and Flexible Working

5.17. The principal benefit for the organisation was identified as the creation of a more efficient and effective council, with costs being reduced and productivity being increased. The scheme has resulted in staff being able to spend increasing amounts of time on customer-focussed productive tasks. For example, the implementation of flexible working practices within Building

Services has resulted in approximately a 20% increase in productivity per trade employee as they are able to go straight to and from their first and last jobs of the day without having to travel and report to a depot first.

5.18. For managers, benefits were identified as having a more productive workforce; being able to deploy staff more effectively; being able to monitor and evaluate performance easier through the logging of jobs on the hand-held devices; and a reduction in the amount of time spent on back-office tasks.

5.19. For employees, the main benefits were identified as being improved work-life balance; reduced travel costs; a happier workforce; and a less stressed workforce.

5.20. That said, despite the obvious benefits listed above, a number of drawbacks have also been identified. There has been a concern that being able to access work from home will result in some staff members never switching off, however this is a management issue and should not detract from the benefits of the scheme. Other drawbacks were identified as lack of desk space in some locations; isolation of homeworkers; and not feeling part of the team as they are rarely in an office with other staff.

5.21. However, the interviewees agreed that most of the drawbacks that were identified are not issues with the scheme itself, but they are management issues that should be remedied with a small degree of rethinking.

Good Practice and Lessons Learned

5.22. Fife Council have a dedicated Communications person on board. This ensured that staff were kept well aware of the implementation, what it would mean for them, and helped to minimise disruption and work towards a smooth transition to the new working practices. Other examples of good practice were the altered working practices and management processes within Building Services. They are now able to plan work more methodically by category rather than geography; and they are able to ensure that all jobs are carried out on time rather than the previous system whereby sometimes all small jobs would be done and large jobs missed or vice versa.

5.23. A number of lessons learnt were identified in the interviews. The most critical being the need to have full support from IT departments from the outset to help with the smooth transition, and to ensure that services are working properly prior to the switch over. It was also felt that information should be circulated to staff not effected by the scheme to ensure that they understand the changes that are happening elsewhere, and so that they are more aware and prepared should their own role be identified as appropriate for mobile and flexible working at a later stage. The final lesson identified was that there is an opportunity to be more robust in understanding benefits, as well as placing more focus on monitoring and evaluation, and on the carbon impact of the scheme.

The Future of Mobile and Flexible Working

5.24. Overall, the Fife Council mobile and flexible working scheme is functioning well and delivering the savings that were set out in the original business case. All interviewees felt that it would only go from strength to strength and that there would be a definite commitment to its ongoing implementation.

Quantification of Carbon Impacts

5.25. A total of 24 employees of Fife Council completed the on-line questionnaire designed by MVA and Natural Capital for this study – see Appendix B for details of the content of this questionnaire. Three of these 24 claimed never to use flexible working, leaving the remaining 21 as bona fide 'flexible workers'.

5.26. Key quantitative results from the database compiled using survey responses of relevance to carbon emissions may be summarised as follows:

- 12 out of 21 respondents (57%) indicated that work related travel has changed as a result of flexible working and in all cases this was a reduction which ranged across responses from 10% to 60%;

- only 2 out of 19 respondents (11%) who undertook flexible working made other trips during working hours (that they may not have been able to at the main place of work) however none of the respondents made new trips out with working hours that they would not have made as part of the commute to/from the main place of work;

- 12 out of 21 respondents (57%) identified a change in vehicle fuel use, with 11 of those 12 reporting a reduction. Fuel consumption reductions were generally estimated at between 10% and 50% of previous levels for the commute;

- 9 respondents out of 16 responding (56%) considered that extra heating and lighting was used at their alternative work location although none stated they considered this to be more than an additional 10%. The seven respondents who did not consider extra energy was used were all generally working in an alternative Council office which 'was already open' rather than at home; and

- 15 out of 17 responses (88%) identified that those undertaking flexible working drove fewer miles per year overall as a result of their new working/travel patterns. Five estimated a large reduction in annual travel and 10 estimated a small reduction.

5.27. Although the sample size is too small to provide a fully representative picture of the emissions effects of flexible working, some analysis of the Fife Council survey responses was undertaken to quantify the potential effects of flexible working on the travel and emissions for each of the respondents' journeys. This required some approximations of commute distances and the reductions in commuting associated with the introduction of flexible working since most of the respondents partly worked from home and partly from an

office closer to home than the main place of work. Estimated car travel distances were converted to carbon dioxide equivalent emissions using an emission rate[42] which was derived from outputs from the Transport Model for Scotland. A summary of the calculations is presented in the table below.

Table 3. Summary Emissions Data (Fife Council Survey)

	Annual Vehicle kilometre	Annual CO_{2e} (kg)
Average respondent commuting (before flexible working)	7,000	1,160
Average respondent commuting (after flexible working implemented)	5,950	990
All sample commuting (before flexible working)	147,000	24,400
All sample commuting (after flexible working implemented)	125,000	20,750
Change (all sample)	22,000 (15%)	3,650 (15%)

5.28. The data show that for the sample of Council staff responding, the introduction of the flexible and mobile working arrangements has been estimated to yield a 15% reduction in carbon emissions for the journey to/from work compared with the situation prior to adoption of flexible working practices. The data suggest that the reduction in transport-related emissions per 'flexible worker' within Fife Council is around 174kg per annum (= 3650/21).

5.29. The responses from the survey also indicate a relatively low potential for travel rebound effects from those working flexibly. It is possible of course that these responses are an under-representation of the true figure since respondents may have been unwilling (even anonymously) to indicate they undertook personal journeys during working time. It also does not take account of the potential for additional travel to be undertaken by other household members who have access to a car which was previously unavailable when the member of staff commuted daily to the main place of work.

5.30. The survey data also yield some information about the extent of changes in domestic energy use, as estimated by those undertaking flexible working at home. The returns are essentially qualitative but suggest that a modest (c10%) increase in home energy costs can be attributed to the changes in working practices. It is not clear how many extra days working from home per week lies behind this qualitative estimate

[42] 165g CO_2 per veh km , derived using outputs from the Transport Model for Scotland – see Chapter 8 for details

5.31. No data have been made available from Fife Council on the potential energy and emissions savings associated with building management and property rationalisation for the organisation’s estates.

6. CASE STUDY: RBS GROUP

Introduction

6.1. Edinburgh is home to many of RBS Group's main offices, with the headquarters situated at Gogarburn and a number of other large sites located in the city centre and The Gyle. In addition to these offices, RBS Group has a network premises worldwide, including around 2,200 branches in the UK alone.

Case Study Methodology

6.2. In order to develop the case study, a series of interviews were held with senior managers working at RBS Group, largely based at the company headquarters in Edinburgh. The interviews were held with:

- Environmental Sustainability Manager;
- Energy Manager; and
- Choice Programme Managers (the Choice Programme is the RBS Group's method of implementing flexible working globally across the Group and is coordinated across IT, HR and property).

6.3. Additional data was provided via a completed Travel and Emissions Data Sheet, as well as a results summary of a home working pilot which researched the impact of home-working on energy usage relative to office based working.

Mobile and Flexible Working Activities

6.4. One of the main reasons why RBS Group chose to implement a flexible working programme was to generate substantial economic savings through a reduction in offices and other buildings. In addition to this, RBS strives to be an employer of choice and seeks to maximise staff retention. It was felt that systems to allow mobile and flexible working are becoming industry standard and therefore RBS requires them so as not to fall behind the rest of the marketplace and to ensure that they offer the working conditions expected by people working in the financial sector.

6.5. RBS Group offers a range of flexible working options, these include:

- compressed hours;
- working from home; and
- working from offices closer to home, rather than your base office.

6.6. RBS Group uses both technology and flexible working to reduce business travel and to encourage staff to work at locations closer to their homes. The RBS Group headquarters at Gogarburn, Edinburgh has around 4000 desks. There are also other substantial offices throughout west Edinburgh. Combined, these west Edinburgh sites employ approximately 7,000 staff. To minimise travel, a drop-in hub has been set-up in Glasgow which has approximately 70 desks and 250 employees registered to use them, and various offices across Edinburgh city centre have between 15-30 hot desks each. These hubs and hot desks along with other flexible working arrangements, such as home working, allow people to choose whether they always need to travel to the larger offices or not. To help facilitate these arrangements RBS also have a travel plan in place, which includes measures such as operating a minibus between each of the Edinburgh sites every 20 minutes to reduce taxi use and a larger bus which operates between Gogarburn, The Gyle offices and the The Gyle Shopping Centre.

The Delivery of Mobile and Flexible Working

6.7. RBS managers identified several factors that they felt were significant in regards to the delivery of their flexible working initiatives. First of all a *'Virtual Client Service'* was established. This technology allows staff to use any computer (tablet, laptop or desktop), either within an RBS office, at home, or elsewhere to remotely access all their work systems.

6.8. Advances in IT systems such as this allow staff to work when and where they want, and at times most suitable to them. Inability to access servers, software and internal systems is often cited as a barrier to mobile and flexible working, however increasingly more remote access services, including bespoke services, are becoming available.

6.9. Staff , however, are not issued with 'home-equipment' and are therefore required to have home broadband access as well as their own computer, laptop or tablet, in order to access these systems at home.

6.10. It is imperative that technology is in place from the inception of the flexible working programme and is reliable. The mobile and flexible working initiatives will not succeed if staff cannot trust the technology to provide them with the required access and at the same speed they would have if working traditionally. For RBS this was identified as an issue at the start, however more recently the systems are proving to be more and more reliable and as fast as working in the office.

6.11. Another key aspect in terms of delivery was the need to ensure that office space is utilised in the best way for the people and the services that are delivered there. For example, if lots of meetings are held, then lots of meeting rooms are required; if people are expected to hotdesk then it is imperative that lots of desks are provided and that staff can easily identify which are available.

6.12. The managers interviewed also stated that although many RBS staff may not be able to work remotely due to their specific job, there is nothing to stop

any member of staff requesting an adjustment to their working hours for example, and it is therefore important that all staff are aware of all the types of flexible working that are available.

Take-up of Mobile and Flexible Working

6.13. Flexible working is an integral part of working at RBS and all jobs advertised promote that it is an option. For existing employees, they can apply for a flexible working pattern at any time in their work lifecycle, regardless of age, location, job role etc. In regards to uptake, in 2012 new flexible working arrangements were delivered to 6,000 staff across UK (approx. 90,000 staff in UK).

6.14. From anecdotal evidence, it was believed that many office-based staff, on average, work from home at least one day a week and teams encourage their staff to work from an alternative location one or two days a week to reduce travel and to improve work-life balance.

Impact of Mobile and Flexible Working

6.15. The implementation of flexible working at RBS has had a considerable impact. RBS has a substantial property portfolio and is constantly considering ways to rationalise this and use sites more efficiently. In Edinburgh for example, they have used flexible working to successfully relocate staff to other offices. This has released at least one building already, and a further two or three are earmarked to go soon.

6.16. Flexible working is not always the driving factor behind the office rationalisation programmes; the main driver being the downsizing of the bank. However, flexible working has helped to make the transition process much simpler for staff.

6.17. Where flexible working has been used to help facilitate office closures, significant energy reductions have been seen. However, the energy use in buildings is not correlated to the number of people within the buildings and reductions are therefore only seen when a building is able to completely close.

Cost Analysis

6.18. The direct cost-benefit of delivering flexible working and workplace flexibility to 6,000 RBS staff in 2012 was £4.5M in reduced property portfolio costs – annually. RBS are committed to the continued roll-out of the Choices Programme across all aspects of the business in order to continue efforts to reduce costs, increase profit back to shareholder strength, and to attract and retain the best staff.

Benefits/Drawbacks of Mobile and Flexible Working

<u>Benefits</u>

6.19. RBS have witnessed a significant number of benefits since they began to offer flexible working patterns and initiatives.

6.20. The Choice Programme team conduct an annual survey of all staff to gain their feedback on a number of issues, including flexible working. Across all blocks of questions asked, flexible workers have more favourable views on all categories by between 1-5%. A selection of these results are shown below:

- flexible workers scored over 5% more favourably on views of efficiency and effectiveness;
- 90% of full-time flexible workers believe they have enough freedom in their job to do what is necessary to provide good service to our customers, compared to 70% department average;
- full-time flexible workers have the highest proportion of engaged employees, and the lowest number of disengaged employees;
- 59% of full-time flexible workers said they are not considering leaving their division, 8% higher than department average;
- 5% fewer flexible workers indicated they were stressed; and
- 87% of full-time flexible workers say they are treated with respect regardless of their job, compared to 83% on a department average.

6.21. Other benefits highlighted by the interviewees included:

- improved employee retention;
- improved staff morale;
- cost savings through property reduction and increased productivity;
- objective led management, rather than presence management;
- staff feel more trusted;
- reduced travelling time/cost;
- improved work-life balance; and
- reduced commutes.

<u>Drawbacks</u>

6.22. No negative comments were made from an organisational perspective, however some drawbacks at management and staff levels were identified. These include:

- increased paperwork/process (e.g. lone working forms, health and safety etc.);
- staff need to have the required infrastructure at home (e.g. broadband, laptop etc.);
- increased utility costs at home;
- can be lonely for the staff member; and
- some managers prefer a traditional approach of being able to see their team at work in front of them.

6.23. It was felt that some managers have a perception (based on assumptions) that flexible working is negative, however the experience at RBS has shown that when they are engaged by the Choices team, usually the negative perception is turned into a robust positive when they are given the facts.

Good Practice and Lessons Learned

6.24. The RBS managers felt that it was good practice to ensure that the technology is available, fast and right for the job. Many staff do not have work laptops for example, so technology is required that they can use easily with the equipment they have at home. In addition to the more traditional remote access systems, RBS have developed an app which allows staff to access systems from their tablet computer. This has proven to be very useful and is much easier to navigate on a tablet rather than accessing systems through the website.

6.25. A significant lesson that has been learned through this process is the significance of listening to staff and the need to engage and work across departments such as HR, technology and property. Without doing this, flexible working will not succeed. Without this, small changes will happen, but there will not be a robust change programme across the organisation.

The Future of Mobile and Flexible Working

6.26. The implementation of flexible working has been successful at RBS and is continuing to go from strength to strength, with plans in place to roll out the programme as far as possible.

Quantification of Carbon Impacts

6.27. The key data collected from this organisation were:

- a homeworking pilot project PowerPoint slide;
- a single response from the staff survey undertaken for the study; and

- a partially completed survey-specific Travel and Emissions Monitoring Data Sheet.

6.28. Key quantitative results from these sources include:

- RBS surveyed 71 staff in Property Services in Edinburgh and London who undertook home working;
- emissions reductions of 36.2t CO_2 per annum were estimated for RBS buildings as a result of the home working pilot (equivalent to 510kg CO_2 per person per year);
- for staff in London offices in the pilot, emissions savings from home working were estimated at 4.6kg CO_2 per day plus 6.5kg CO_2 specifically for commuting travel emissions[43];
- for staff in Edinburgh offices in the pilot, emissions savings from home working were estimated at 11.2kg CO_2 per day plus 13.1kg CO_2 specifically for commute travel emissions[44];
- the average daily transport emissions reduction per home worker calculated across the survey is 9.3kg CO_2;
- reductions in transport emissions are estimated to be on average over 3 times higher than the increase in domestic heating/energy emissions, though the factor is influenced by the office location and the level of car use within the commuting travel pattern;
- 1,236,149,171kWh annual energy consumption in buildings is equivalent to 483,074t CO_2 per annum. RBS has seen a 7.5% energy consumption decrease across the group, the reason for which was not specified in the feedback;
- the Travel and Emissions Monitoring Data Sheet reported that RBS's total business travel emissions are currently estimated to be around 56.2 kilo-tonnes of CO_2 per annum;
- the data sheet also estimates RBS's total carbon emissions to be around 606 kilo-tonnes of CO_2 per year;
- the single RBS respondent who completed the MVA survey reported a 60% decrease in their work-related travel and a net change of 50% decrease in travel by car outside of work; and
- he/she went on to suggest that their home energy bills have risen by about 10% as a result of working from home three out of five

[43] The information provided suggests that savings are 4.6kg for 'domestic, office and commuting' however the figure of 6.5kg (from commuting) is a further contribution

[44] The information provided suggests that savings are 11.2kg for 'domestic, office and commuting' however the figure of 13.1kg (from commuting) is a further contribution

days per week, suggesting that each day of home-working created a 3.3% increase in domestic energy use.

6.29. From the available secondary information it can be determined that flexible working practices can be beneficial both to the environment and organisations that adopt them. RBS shared an extract of the results of a nine month pilot flexible working study with 71 office-based participants in London and Edinburgh. Between them they were estimated to save 36.2t CO_2 per year (0.51t CO_2 per person per year) although this figure appears to exclude the reduction in transport emissions from the reduced commuting.

6.30. Further daily emissions savings from avoiding commuting into work were estimated to be 6.5kg CO_2 in London and 13.1kg CO_2 in Edinburgh per home-working participant. When other variables were factored in, including domestic and office energy use and commuting, daily emissions savings were estimated at 4.6kg CO_2 in London and 11.2kg CO_2 in Edinburgh. A more detailed breakdown of the data, or access to the raw survey, would be needed to determine the influence of rebound effects on these figures and to explain why the figures quoted for travel emissions saving appear to be larger than the figures quoted for energy use and travel combined.

6.31. The summary highlights that, on average, transport emissions are over three times higher than those arising from the domestic work environment. Office locations and the accessibility of public transport appear to have a significant impact on the magnitude of the change in transport-related emissions.

6.32. The survey response, although limited, yielded some interesting data. Not commuting in to work, given the large diesel car used, saved 20kg CO_2 per day (49 miles per day). The participant reported a 60% decrease in work-related car travel and a halving of car use outside of work. His/her home energy bills were around 10% higher, as a result of working 3 out of 5 days per week at home.

6.33. Data provided by RBS indicates that energy consumption in buildings across the group has fallen by around 7.5% although this is not necessarily related to the introduction of the flexible working arrangements. The data also suggests that annual business travel CO_2 emissions have fallen due to competitive incentives such as cost-reducing challenges being introduced across the business. It can be inferred that in the right working environment and with the right team mind-set, similar results might be reached in addition to, or outwith, the adoption of flexible working practices.

7. CASE STUDY: LAW SOCIETY OF SCOTLAND MEMBERS

Background

7.1. The Law Society of Scotland undertook a major survey of its members in June 2013. This survey was designed to provide the Law Society with an up-to-date profile of the legal profession in Scotland.

7.2. The research sought to collect information on current working patterns across the profession and explore views and experiences of a range of equality-related issues.

7.3. Over 14,000 paper questionnaires were distributed to all Law Society of Scotland members, along with an electronic web-link to provide an on-line completion option.

7.4. The survey gathered the following information from each respondent:

- Section A - Their professional background, current role and nature of their employment (12 questions);
- Section B - Details of their current working patterns, including hours of work (contracted and actual), any flexible working arrangements, use of any career breaks, use of technology to work remotely and details of different work locations etc. (25 questions, many with several parts);
- Section C - Their experiences of any form of discrimination; and
- Section D - Demographic information which was used to monitor the level diversity within the Scottish legal profession.

7.5. The 25 questions in Section B of this questionnaire are most relevant here. In particular, the survey asked:

- *Has the amount of time you spend commuting and/or travelling for work purposes changed as a result of being able to work more flexibly (e.g. working from home/other locations, use of flexi-time, amended hours, etc.) and if so, by how much (±minutes per week); and*
- *Main mode of transport for commuting and in-work trips.*

7.6. The instructions to the respondents included the following definitions:

- *'**amended working hours**' was defined as 'a contractual change to their hours of work i.e. where your contractual hours are reduced from the standard full time contracted hours of your employer (often referred to as 'part time') and/or where the days you are contracted*

to work are varied (such as condensing 35 or 40 hours a week into four days or working only during 'term time"); and

- *'**flexible working**' was defined as 'measures which allow employees to adjust the start and end times of their working day e.g. to avoid peak hours congestion, to allow for children to be dropped off/picked up from school or to fit with other activities. It also includes the ability to work from home or from offices or locations other than your 'normal place of work'.*

7.7. A total of 3,449 surveys were completed, representing a response rate of around 25%.

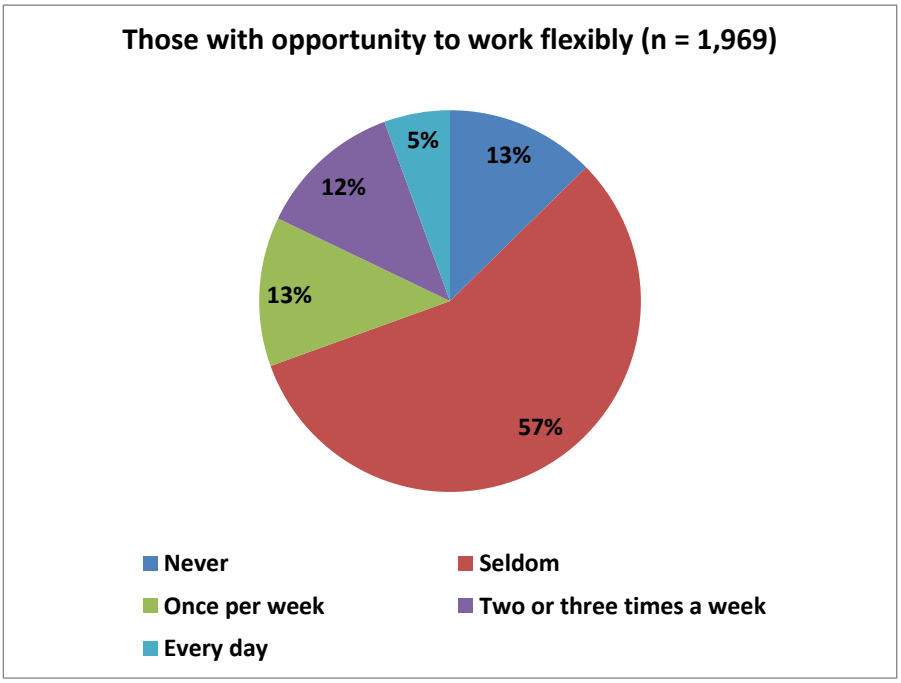
Results and Conclusions from the 2013 Law Society of Scotland Survey

7.8. Over half (57% n= 1,975) of the 3,449 Law Society members who completed the survey reported an ability to work flexibly, either from home (6%) or via mobile or remote working (4%) or both (49%).

7.9. 1,969 of these respondents answered the follow-up question 'How frequently do you work from home or remotely during your contracted working hours?'

7.10. The resulting distribution is illustrated in Figure 1.

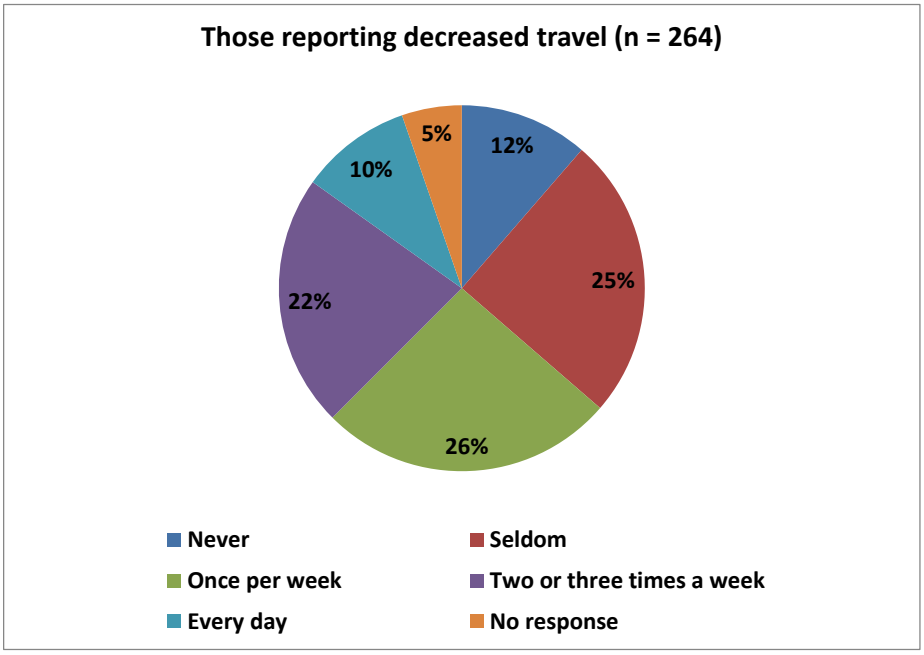
Figure 1. Frequency of flexible working



7.11. Taking a weighted average of these frequencies suggests that the average frequency of working flexibly among those reporting an opportunity to so is around 0.75 days per week, with the precise value depending on the numerical frequency allocated to the large 'seldom' category.

7.12. Figure 2 shows the corresponding frequencies for the sub-set of respondents who report having reduced their travel as a result of their flexible working.

Figure 2. Frequency of flexible working among those reporting reduced travel



7.13. The weighted average frequency of working flexibly among those reporting a decrease in their travel lies between 1.4 times per week and 1.6 times per week, depending on whether the rather-anomalous responses of the 12% (n=30) who report having reduced their travel despite never working flexibly are included or excluded.

7.14. Taking an average of these two estimates suggest that those who reduce their travel do so by working flexibly on average around 1.5 times per week.

7.15. A total of 3,044 Law Society member respondents answered the question 'Has the amount of time you spend commuting and/or travelling for work purposes changed as a result of being able to work more flexibly?'

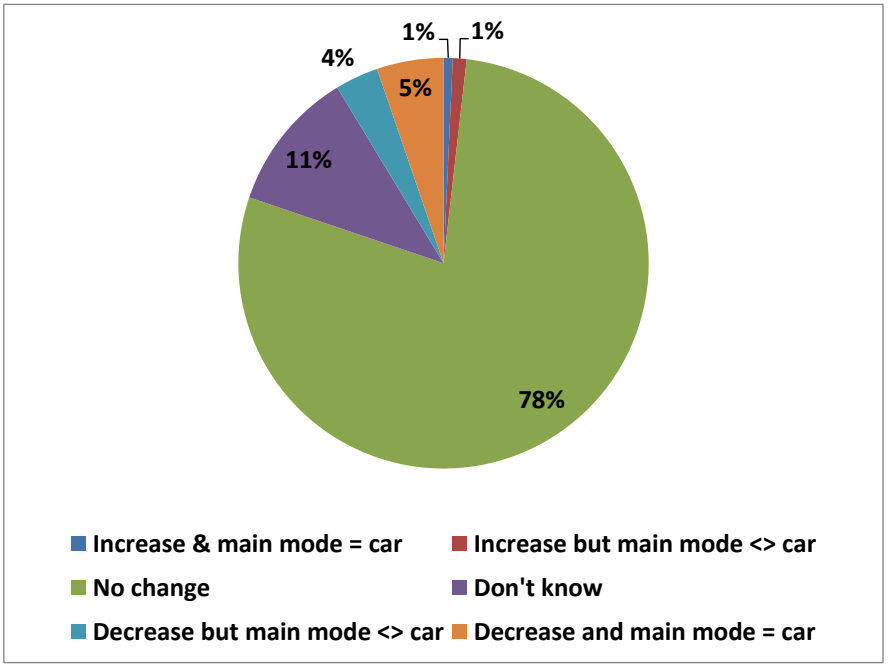
7.16. Around 78% (n=2,386) reported no change in time spent travelling and a further 11% (n=339) reported not knowing the answer to this question. The remaining 10% (n=319) reported a change in the time spend travelling each week as a result of their flexible working.

7.17. The Law Society survey did not ask the respondents to allocate the changes in their travel times to different modes. However, if we assume that any non-car trips by those whose main mode was car will cancel out the car trips made by those whose main mode wasn't car, it is reasonable to assume that the time saved by the 'Main mode = Car' respondents will lead to a corresponding reduction in overall car vehicle mileage.

7.18. Of the 10% (n=319) respondents who reported a change in the time spend travelling as a result of flexible working, slightly over half (6% of the respondents, n=182) stated that their main mode of travel was car. Within this group of car users, 160 (=5.3% of the respondents) reported that their journey time had decreased, while the remaining 22 (0.7% of respondents) reported an increase in weekly travel time as a result of their flexible working.

7.19. Figure 3 illustrates the pattern of responses relating to travel time reductions and main mode.

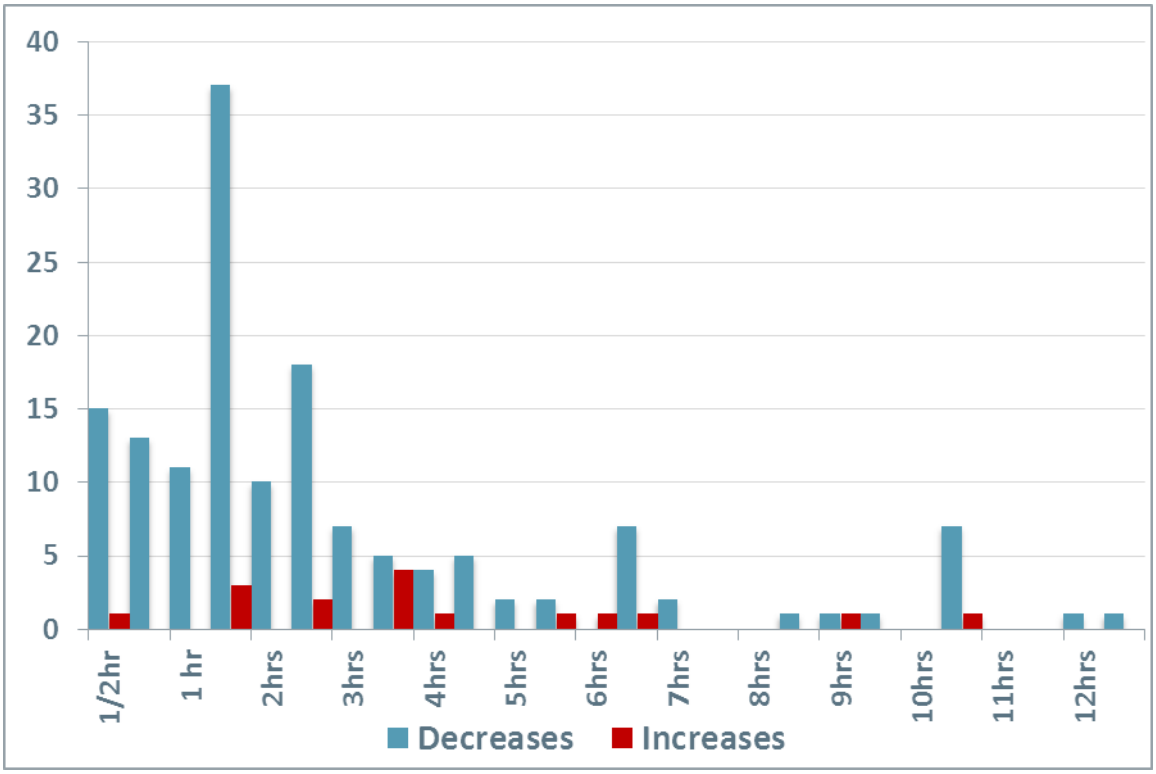
Figure 3. Respondents reporting changes in their weekly travel as a result of flexible working



7.20. The respondents who reported a change in the weekly travel time were asked to estimate the size of this change. 150 of the 160 who reported a decrease and 16 of the 22 who reported an increase provided an estimate of this change in their weekly journey time.

7.21. The resulting frequency distributions are shown in Figure 4.

Figure 4. Reported changes in weekly journey time by 'Main Mode = Car' Respondents



7.22. The corresponding weighted averages for the two distributions are a 146 minute average reduction per week for the 150 respondents who reported decreased weekly travel and a 218-minute average increase for the 16 who reported an increase in their weekly travel. These average values were allocated to the 16 (= 10 + 6) respondents who failed to provide an estimate of their journey time reduction/increase.

7.23. The result is a total estimate of around 310 hours per week reduction in car journey time as a result of the flexible working of the Law Society respondents, made up of a 390 hours per week reduction from those reporting a decrease, offset by an 80-hours per week additional car use by those reporting increased travel times. Treating this increase as a 'travel rebound' effect would suggest a travel rebound effect of around 20% (=80/390) of the main travel reduction.

7.24. Dividing this total reduction among all respondents results in an estimated reduction in weekly car journey time reduction of between a) 5.4 minutes and b) 6.1 minutes per employee per week, depending on whether the 405 respondents who did not answer the question regarding changes in their weekly travel time are a) included in the calculation with a zero change in their car use or b) simply ignored in this calculation.[45]

[45] We suspect assumption a) is more-likely to be the case

7.25. We might therefore conclude that if an organisation similar in nature to the Scottish legal profession but currently offering no flexible working were to introduce a flexible working scheme similar to that currently-available to Law Society members (i.e. available to over half the work-force and resulting in applicable employees working flexibly somewhere between once a fortnight and once a week), then the resulting reduction in car use might be expected to lie **5 and 6** minutes of car use per week per employee.

8. CARBON IMPACTS OF GENERIC FLEXIBLE WORKING SCHEMES

Introduction

8.1. In this chapter we use a combination of analysis of Scotland's current travel patterns and the results from the five case studies described previously to estimate various aspects of the likely carbon impacts of mobile and flexible working initiatives.

8.2. The analysis begins by estimating the traffic-related carbon saving which would be achieved by removing commuter trips to/from organisations located in a range of different geographic locations across Scotland, taking account of current traffic conditions, mode share and work-related travel distances in these different geographic locations.

Estimation of Greenhouse Gas Emissions Rates

8.3. MVA have developed a software program, known as ENEVAL, to apply the latest DEFRA-approved traffic-related greenhouse gas emissions methodology to traffic volume, speed and fleet composition data output by traffic models, on a link-by-link basis. Further details of an earlier version of ENEVAL can be found on Transport Scotland's LATIS web-site.[46]

8.4. We applied ENEVAL to outputs from the current version of Transport Model for Scotland's representation of 2012 traffic conditions across Scotland's strategic road network to estimate the average CO_2(e) emission rate (g/car-km) for car trips in the AM peak (08:00-09:00) and inter-peak (10:00-16:00) weekday periods averaged over the strategic road network in each Local Authority. The results are provided in Appendix C.

8.5. The variation in these emission rates reflect the different mix of speeds (from free-flowing motorway to congested urban conditions) encountered across the Scottish road network. In particular, areas with large proportions of either very fast free-flowing motorway traffic or slow, congested urban links will tend to have higher emission rates (g/km) of CO_2 than areas where the traffic travels within a more fuel-efficient range of speeds.

8.6. In Table 4 we compare the results for Scotland's four main cities and the 'Rest of Scotland' (i.e. all other Local Authorities combined).

46 http://www.transportscotland.gov.uk/files/documents/analysis/LATIS/ENEVAL81_UserManual_17112008.pdf

Table 4. AM/IP Emission Rates

Location	CO_2 Emissions (g/km)
Edinburgh	166.92
Glasgow	161.20
Dundee	156.72
Aberdeen	161.71
Rest of Scotland	166.89
Scotland	**164.6**

8.7. These results suggest that emissions rates vary slightly between the four cities, ranging from around 157g/km for cars travelling to Dundee (≈4% lower than the all-Scotland average), up to around 167g/km for Edinburgh car traffic, around 2% higher than the Scottish average emission rate.

8.8. However, since many of the Travel to Work car trips to/from the four urban locations will also include sections driven on roads in the neighbouring local authorities, the difference in the emissions rates for trips to jobs located in these four cities is likely to less than the range suggested in Table 4. This convergence of emission rates is likely to be even more relevant when considering longer-distance 'in-work' trips, where the average emission rate is likely to approach to Scottish-wide average in most locations.

8.9. We therefore suggest that the All-Scotland average emission rate **(165 g/km)** is used to approximate the greenhouse emissions of Scottish car trips, apart from those known to lie entirely within a single Local Authority, in which case the LA-specific emissions rates listed in Appendix C can be used.

8.10. The values in Table 4 and Appendix C also reveal that average emissions rates do not appear to vary significantly between authority-wide AM Peak and Inter-Peak driving conditions, with less than a 1% difference between the emission rates for the two time periods in all but two of the 32 Local Authorities. Note that this does not mean that there are no time-period differences in emissions rates at a more-local level, for example through congestion hot-spots, merely that the net impacts of the reduced congestion are not significant at the full Local Authority level. Note that fuel consumption (and hence greenhouse gas emissions) follow a U-shaped curve, so that the benefits of faster inter-peak travel on links which were congested in the AM peak will be partially-offset by the faster travel on any links where the inter-peak speed exceeds that at which fuel consumption is minimised.

8.11. This would imply that there will be little greenhouse gas emission benefits generated by encouraging car trips to switch from peak to off-peak, unless these measures are targeted very specifically at trips which travel through known peak-congestion 'hot spots'.

Analysis of the Carbon Impacts of Scottish Commuting Trips

8.12. To enable us to predict the impacts which increasing the amount of flexible working in different locations across Scotland might have on commuting-related emissions, we have used Scottish Household Survey Travel Diary data to estimate the mode-share and average trip lengths of commuting trips to jobs located in different parts of Scotland.

8.13. Combining these values with the relevant greenhouse gas emission rate allows us to estimate the reduction in CO_2(e) emissions per commuter trip removed, based on the relevant travel patterns in different parts of Scotland.

8.14. The SHS Travel Diary data used included a total of around 16,000 Travel to Work trips made by Scottish residents between 2007 and 2010.

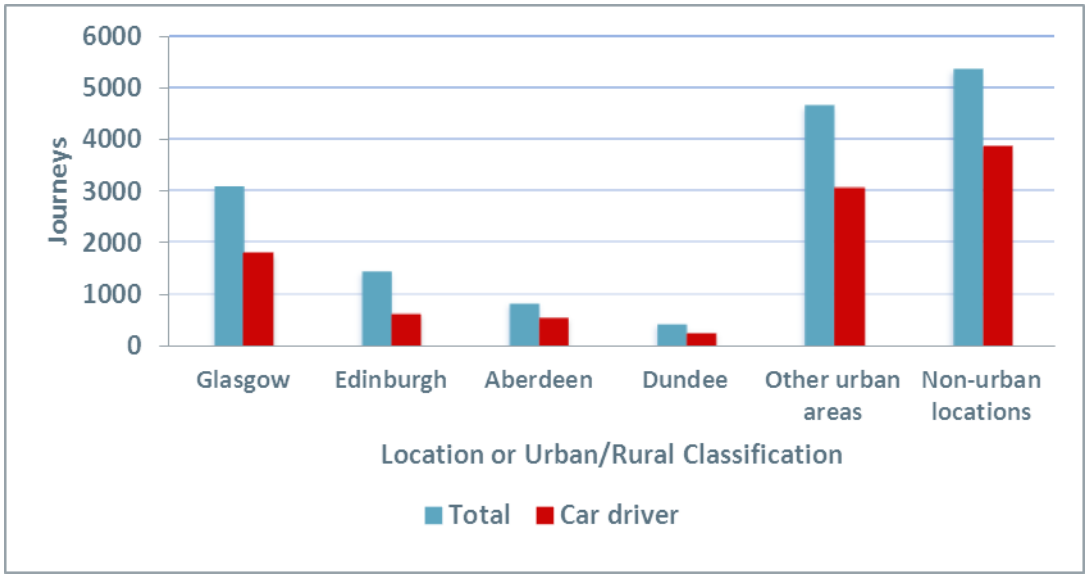
8.15. The Regional Transport Partnership (RTP) and 6-way Urban/Rural classification[47] of the datazone of the destination of these 'To-work' trips was used to partition these commuting trips into 6 categories, as follows:

- Glasgow (i.e. RTP = SPT and Urban/Rural Classification = '1: Large Urban');
- Edinburgh (i.e. RTP = SESTRAN and Urban/Rural Classification = '1: Large Urban');
- Aberdeen (RTP = NESTRANS and Urban/Rural Classification = '1: Large Urban');
- Dundee (RTP = Tactran and Urban/Rural Classification = '1: Large Urban');
- 'Other Urban' (i.e. Urban/Rural Classification = '2 : Other Urban Areas'); and
- 'Everywhere else' (i.e. Urban/Rural Classification >= 3)

8.16. Figure 5 illustrates the number of commuting trips in each of these six geographic categories in the SHS Travel Diary dataset used here and the number of these trips for which the main mode was 'Car Driver'.

[47] http://www.scotland.gov.uk/Topics/Statistics/About/Methodology/UrbanRuralClassification

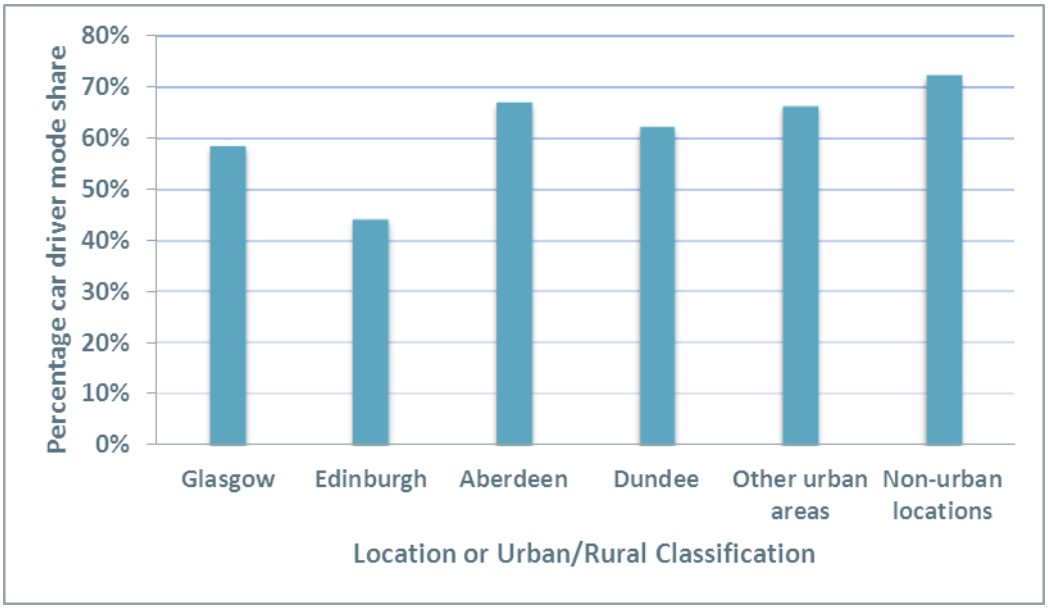
Figure 5. Commuting Trips



8.17. The ratio of the number of 'car driver' trips to the 'total' commuting trips in each of the geographic areas can then be used to convert from changes in commuting trips to changes in car vehicle trips. So, for example the SHS dataset used here includes a total of 3,103 commuter trips to destinations in Glasgow, of which 1,813 had 'Car Driver' as their mode. The resulting car driver mode share (1,813/3103 = 58.4%) can be used to predict what proportion of commuter trips removed by flexible working initiatives will result in a corresponding removal of a car vehicle trip.

8.18. These car-driver mode share factors for the six geographic areas are illustrated in Figure 6.

Figure 6. Commuter Mode Share

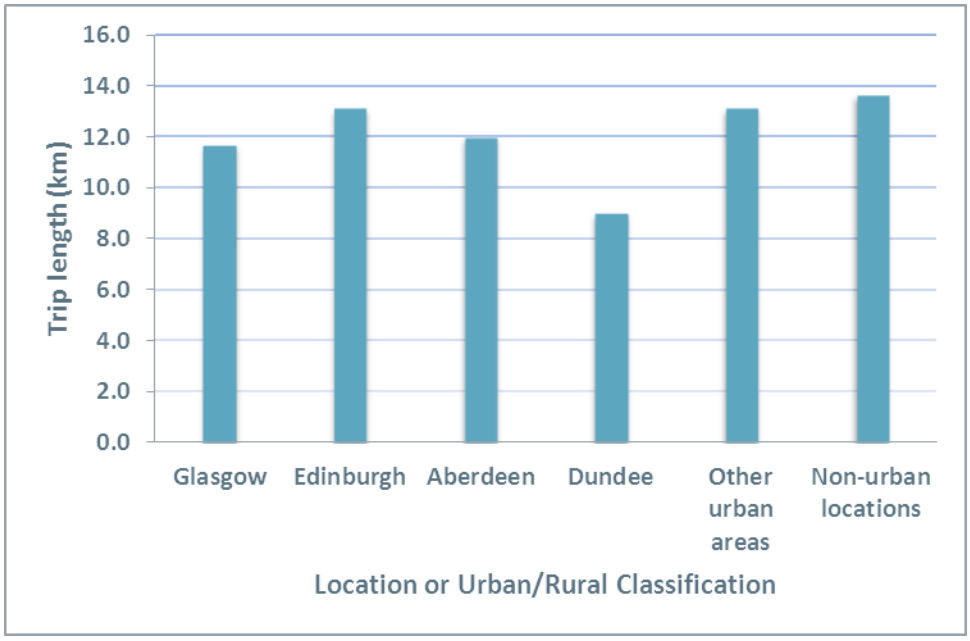


8.19. These results illustrate a significant variation in the proportion of car use, ranging from around 44% of trips to jobs located in Edinburgh, up to around 72% of trips to jobs located in non-urban areas.

8.20. The next step of the analysis is to use the SHS Travel Diary data to estimate the average trip length of the car driver commuting trips in the six locations.

8.21. Figure 7 shows the average trip length of these car driver trips in the SHS data, calculated by summing the lengths of all commuter car driver trips destinating in the relevant geographic areas in the SHS data by the number of these trips.

Figure 7. Commuter Trip Length

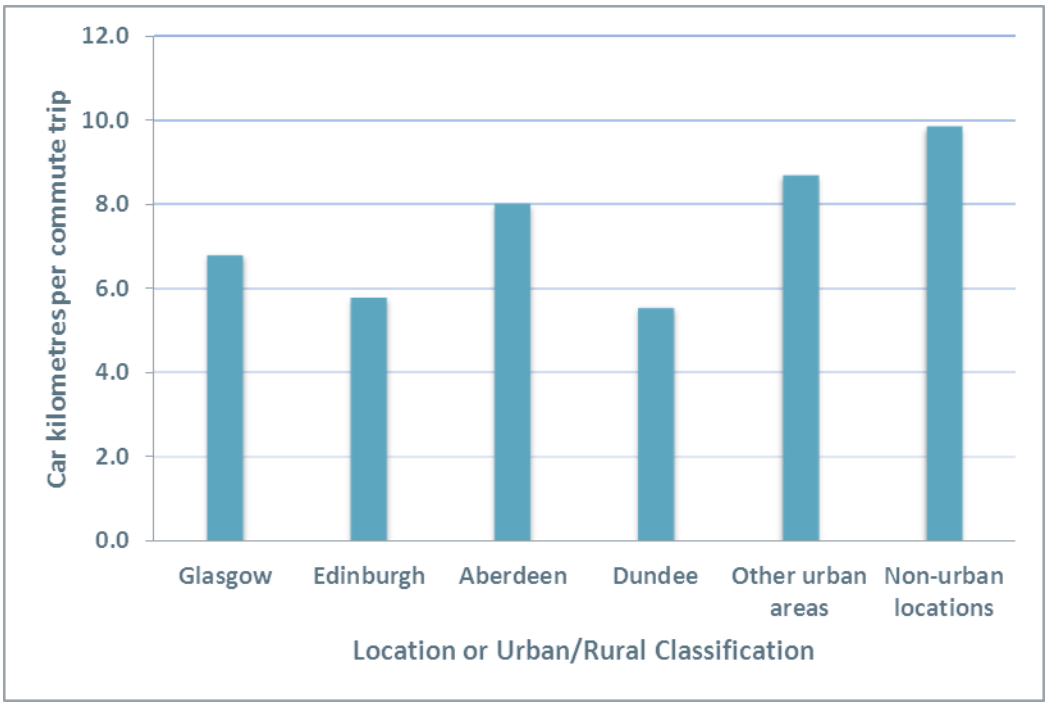


8.22. Again the results suggests a significant geographic variation in the trip pattern of these car trips, with the average length ranging from about 9km for car trips to jobs located in Dundee, up to an average of over 13km for the car trips to jobs located in non-urban locations.

8.23. Multiplying the car driver mode share by the average car driver trip length will then provide an estimate of the amount of car vehicle distance created 'per commuter' travelling to jobs in each of the six geographic locations. So, for example, 58% of commuter trips to Glasgow destinations are currently made as car driver and these have an average length of 11.7km, so that every commuter trip to Glasgow-based organisations removed by flexible working will result in an average reduction of around 6.8km (= 0.58 x 11.7) car vehicle trips from the road network.

8.24. The results for all six locations are illustrated in Figure 8 below.

Figure 8. Average Car Kilometres Per Commuter Trip



8.25. This graph suggests that travel to a typical job located in Dundee or Edinburgh generates the least amount of car vehicle kilometres (less than 6km per 1-way trip), Glasgow is next (generating less than 7km per trip), Aberdeen and other urban areas create around 8km of car vehicle kilometres per trip, while jobs located in non-urban areas result in an average of almost 10km of car use per to-work trip.

8.26. The return journeys (i.e. from work-to-home trips) will (presumably) generate a corresponding amount of car use, so the values above should be doubled when considering the benefits of reducing the amount of commuting.

8.27. Table 5 shows the results of applying the ENEVAL-based emission rates derived earlier in this chapter to these car trips per commuter factors, based on an assumption that all of the commuting trips take place in the relevant geographic area.

Table 5. Average Carbon Savings Per Commuting Trip Avoided

	Commuting Trips		
Destination	**Average Car kilometre per commuter Trip (1-way)**	**Emission Rate (g/km)**	**Kilogram of CO_2 (2-way)**
Glasgow	6.8	161	2.2
Edinburgh	5.8	167	1.9
Aberdeen	8.0	162	2.6
Dundee	5.6	157	1.7
Other Urban Areas	8.7	166	2.9
Non-Urban	9.8	166	3.3
Scotland	**8.3**	**165**	**2.7**

8.28. Thus, for example, removing a commuter trip from a Glasgow-based organisation is predicted to result in a net reduction of 6.8 car kilometres from the Glasgow network, where the emission rate is 161 g/car km), resulting in around 1.1kg of C02 saving (= 6.8 x 161/1000) in the inbound direction and a corresponding saving for the return home, resulting in an average saving of 2.2kg of CO_2(e) for each commuter trip removed from Glasgow-based organisations.

8.29. These results suggest that the greenhouse gas savings will range from about 1.7kg per day of commuting avoided in Dundee (with its average car driver mode share, shorter-than-average commuting distances and lower-than-average emissions rate), up to around 3.3kg per day for jobs located in non-urban locations (high car mode-share, longer-than-average commuting distances and average emissions rate), with an all-Scotland average of around 2.7kg of CO_2(e) per day of commuting avoided.

Analysis of the Carbon Impacts of Scottish Business Trips

8.30. In this section we repeat the analysis reported in the previous section, but now focussing on in-work trips (i.e. trips made in the course of work) rather than commuting trips.

8.31. We have again used Scottish Household Survey Travel Diary data to estimate the mode-share and average trip lengths of in-work trips to different locations in Scotland.

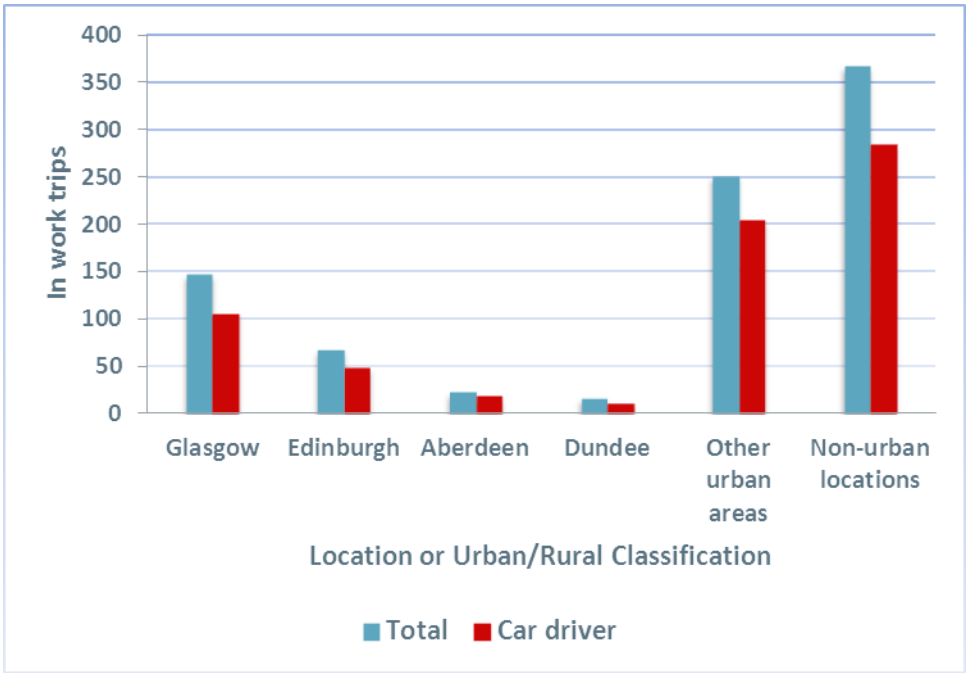
8.32. Combining these values with the relevant greenhouse gas emission rate allows us to estimate the reduction in CO_2(e) emissions per business trip removed, based on the relevant travel patterns in different parts of Scotland.

8.33. The data used included a total of 870 Travel Diary records for In-Work trips made between 2007 and 2010.

8.34. The Regional Transport Partnership (RTP) and 6-way Urban/Rural classification[48] of the datazone of the destination of these trips was again used to partition these in-work trips into the same 6 geographic categories used to analyse the commuting trips (as described in the previous section).

8.35. Figure 9 below illustrates the number of in-work trips in each of these six geographic categories in the SHS Travel Diary dataset used here and the number of these business trips for which the main mode was 'Car Driver'.

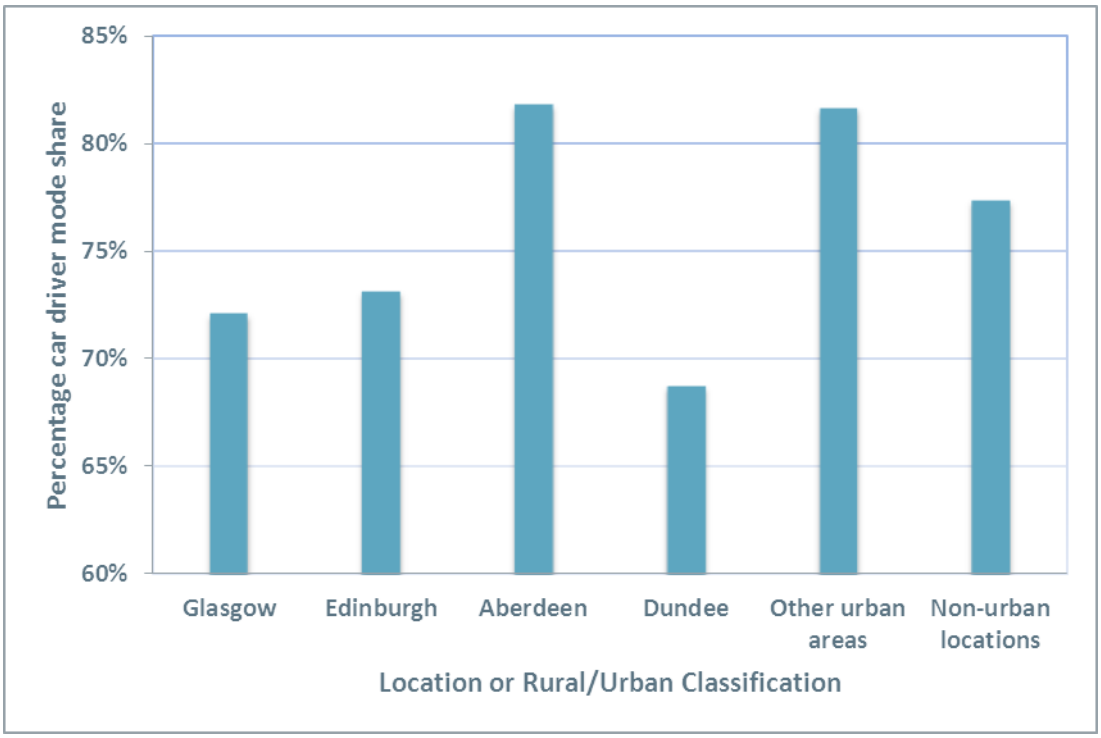
Figure 9. Number of In-Work Trips



8.36. Figure 10 shows the resulting estimate of the car driver mode share for these In-work trips to these six geographic locations.

[48] http://www.scotland.gov.uk/Topics/Statistics/About/Methodology/UrbanRuralClassification

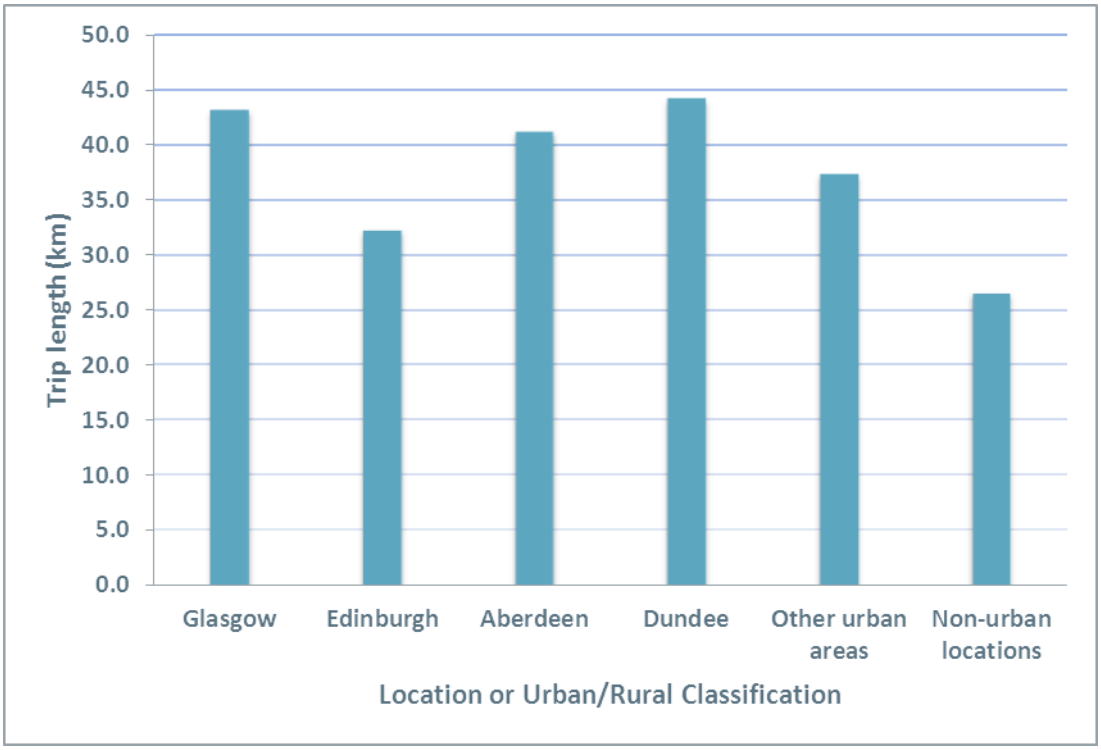
Figure 10. In-Work Car Driver Mode Share



8.37. These results again illustrate some variation in the level of car use, ranging from around 69% of in-works trips to locations in Dundee, up to over 80% of in-work trips in Aberdeen and 'Other Urban' locations. Note that the small sample sizes in Dundee and Aberdeen suggest that the values for in-work trips to these two locations should be treated with caution.

8.38. Figure 11 shows the average trip length of these car driver in-work trips.

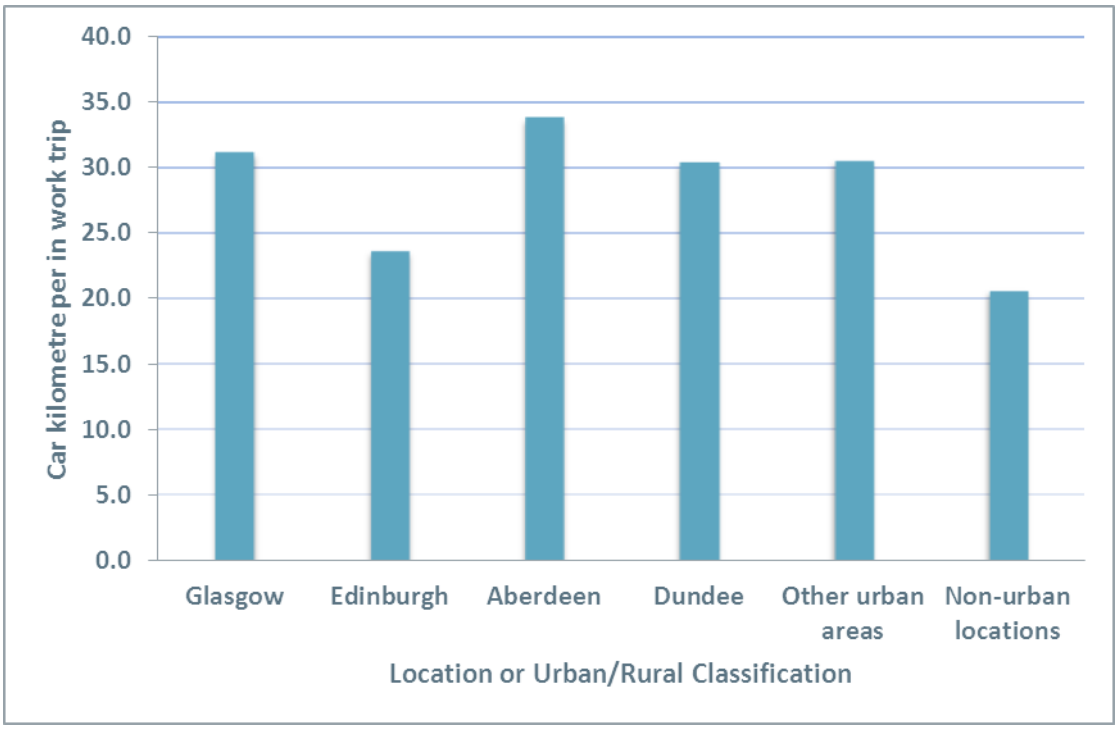
Figure 11. In-Work Trip Length



8.39. These in-work trips are much longer than the commuting trips considered in the previous section, with average car trip lengths varying from about 26km on average for trips to non-urban locations and around 32km for in-work trips to Edinburgh destinations, rising to an average of over 40km for in-work trips to all the other urban locations.

8.40. Figure 12 illustrates the results of combining these two patterns (mode share and trip length) to provide an estimate of the amount of car vehicle distance created per in-work trips to each of the six geographic locations.

Figure 12. Car km per In-Work Trip



8.41. This graph suggests that in-work travel to non-urban locations and to Edinburgh will both generate on average around 24km of car traffic, trips to Dundee and Glasgow result in around 30km of car traffic (on average), while Aberdeen and 'Other Urban locations' result in closer to 35km of car traffic per 1-way in-work trip.

8.42. Table 6 shows the results of applying the emission rates derived earlier in this chapter to these car trips, based on an assumption that 20% of In-work trips take place in the relevant local authority, with the remainder taking place on the 'Rest of Scotland' road network.

Table 6. Average Carbon Savings Per In-Work Trip Avoided

	In-Work Trips		
Destination	**Average Car kilometre per business trip (1-way)**	**Emission Rate (g/km)**	**Kilogram of CO_2 (2-way)**
Glasgow	31.2	166	10.3
Edinburgh	23.6	167	7.9
Aberdeen	33.8	166	11.2
Dundee	30.4	165	10.0
Other Urban Areas	30.5	166	10.1
Non-Urban	20.6	166	6.8
Scotland	**26.0**	**165**	**8.6**

8.43. The results suggest that the benefits of reducing the number of in-work trips by Scottish residents ranges from about 7kg of car-based emissions of

CO_2(e) saved by avoiding in-work trips to non-urban locations up to over 11kg of CO_2(e) savings from 2-way in-work trips to Aberdeen, with an all-Scottish average of 8.6kg per return in-work trip avoided.

Consideration of Rebound Factors

8.44. As discussed in the literature review, it is important when considering the impact of flexible working that two forms of rebound effect are taken into consideration.

8.45. The first is the amount of additional (car) travel generated by the home-worker and/or their car being available to undertake additional home-based trips and the second is the increase in domestic energy use arising from the increased use of home central heating and other increased electricity use at home from kettles, lighting etc.

8.46. The data from the BT Study suggested that the travel rebound effect was less that 10% of the commuter travel saving.

8.47. The data collected from flexible workers in Fife Council reported in Chapter 5 of the report suggested that 11% of home-workers reported making additional trips while working from home. As noted in Chapter 5, this value is likely to have been affected by under-reporting of non-work-travel in work time. However, these additional trips will tend to be shorter than the commuting trips avoided, since commuter trips tend to be longer than 'average' non-commuting home-based trips and those choosing to work from home are likely to have longer-than-average commutes. This will tend to cancel out the potential under-reporting of non-work-related travel. It is therefore probably reasonable to treat this 11% value as a reasonable estimate of the travel rebound effect from the Fife Council Case Study.

8.48. The larger data set from the Law Society's Diversity Survey (as reported in Chapter 6) suggested a travel rebound effect of around 20%, based on the responses of those reporting increased travel as a result of their flexible working.

8.49. Combining these three results suggests that a central value of around 14% is a reasonable estimate of the travel rebound effect.

8.50. Fife Council workers reported an increase of around 10% in their domestic energy use, but it was not clear how many days of home-working per week this represented.

8.51. Limited results from the RBS Case Study suggested that 3 days of home-work increased domestic energy use by 'around 10%', suggesting a Rule of Thumb that a day of home-working will increase domestic energy use by 3.3%.

8.52. Applying this factor to the 5.5 tonnes of CO_2 per annum which the 2011 Scottish House Condition survey[49] estimates the average Scottish home currently generates will therefore give a reasonable estimate of the 'domestic energy rebound effect.

8.53. Note that that this rebound effect is likely to decrease over time as the energy efficiency of housing stock improves, the carbon intensity of the grid electricity mix improves over time and home workers make additional energy efficiencies in their dwellings.

Worked Example Combining All of the Available Evidence

8.54. One of the deliverables of this study is an Excel spreadsheet which can be used to estimate the greenhouse gas impacts of various different flexible and mobile working schemes, using parameters calculated and reported as part of this study.

8.55. In this section we illustrate the use of this tool, using the Scottish-wide average values of ENEVAL-based emission rates and SHS-based car-commuting parameters described earlier in this chapter, with other parameters derived from the Law Society Diversity Survey and the other Case Studies described earlier in this report.

8.56. The relevant 'default' input parameters are described in turn below.

- Number of employees – arbitrarily set to 100;
- Proportion of employees who change their travel as a result of the Flexible Working scheme – 10% (based on the Law Society Members Survey);
- Number of days working from home per week – 2 (typical values from Case Studies);
- Proportion of commuting trips which are car driver – 65% (SHS Travel Diary Scottish-wide average – see Section 8.3 above);
- Average length of car commuting trips - 13km (SHS Travel Diary Scottish-wide average – see Section 8.3 above);
- Emission Rate for commuting trips – 165 g/km (ENEVAL-based Scottish-wide estimate – see Section 8.2 above);
- Number of Business Trips removed per week – 0.1 (SHS Travel Diary suggests there is only one business trips for every 20 commuter trips;
- Proportion of business trips which are car driver – 77% (SHS Travel Diary Scottish-wide average – see Section 8.4 above);

[49] Scottish House Condition Survey, Key Findings, 2011 (Scottish Government)

- Average length of car business trips - 34km (SHS Travel Diary Scottish-wide average – see Section 8.4 above);
- Emission Rate for car business trips – 165 g/km (ENEVAL-based Scottish-wide estimate – see Section 8.2 above);
- Transport-related Rebound Effect – 14% (see Section 8.5 above);
- Annual emissions from domestic dwellings – 5,500 kg/yr (see Section 8.5 above);
- % Increase in domestic energy consumption per day of home working – 3.3% (See Section 8.5 above); and
- Energy efficiency savings by the company as a result of the mobile working – 0 (conservative assumption).

8.57. These values are combined in Table 7 below.

Table 7. Worked Example of Carbon Savings using Scottish-wide Law Society Survey Values

Input Assumptions		Calculated Impacts	
No. of employees	100		
Proportion who reduce their travel	10%	No. who reduce their travel	10
Number of return commuter trips removed per week	1.5[50]		
Proportion of commuting trips which are car trips	65%	No. of return commuting trips removed per year	780
Length of commuting trip (1-way)	13km		
Emission rate (g/km) - Commuting Trips	165g/km	Annual change in commuting emissions	-2,175 kg/yr
Number of return business trips removed per week	0.1		
Proportion of business trips which are car trips	77%	No. of return business trips removed per year	52
Length of car business trips (1-way)	34km		
Emission Rate (g/km) - Business Trips	165g/km	Annual change in business car travel emissions	-449 kg/yr
		Total change in work travel-related emissions	-2,624 kg/yr
Transport-related Rebound Effect	14%	Rebound travel emissions	+367 kg/yr
Annual emissions from domestic energy (per dwelling)	5,500kg		
Increase per day of home working per week	3.3%	Change in domestic energy emissions	+275 kg/yr
Change in company emissions per annum	0 kg/yr	Change in company emissions	0 kg/yr
		Total net change in emissions	-1,982 kg/yr
		Net change in emissions per flexible worker	-198 kg/yr
		Net change in emissions per employee	-20 kg/yr

8.58. These values (20 kg/yr per employee and (approximately) 200 kg/yr reduction in CO_2 per mobile worker) are reasonable 'Rules of Thumb' for Scottish-wide analysis, though we would recommend using the relevant regional values (as described in Sections 8.2 – 8.4 above) when using the spreadsheet tool to test specific schemes.

[50] Source: Law Society Survey 2013 – see Section 7.2 of this report for details

9. CONCLUSIONS

Conclusions from the Case Studies

9.1. The key conclusions from the five Case Studies are as follows:

Key Findings - Aberdeenshire Council

- notable reductions in emissions from buildings, business travel and travel to work by employees have been achieved in the last 2-3 years at Aberdeenshire Council;
- introduction of flexible working has been adopted by around 10% of staff in Aberdeenshire Council and this appears to have contributed to corporate emissions reductions though they can only be directly related to the reduced emissions from commuting at this stage; and
- flexible working will be an important strand in the Council's property rationalisation and therefore will indirectly at least contribute to further emissions reductions in the organisational carbon footprint through property disposals and opportunities for more efficient energy management in retained buildings.

Key Findings - BT

- around 69% of BT employees currently work flexibly in some way;
- rebound effects from additional travel are estimated to be less than 10% of the total emissions savings made from commuting;
- homeworking reduces annual corporate emissions between 0.7t CO_2 and 1.4t CO_2. The higher number is expected if energy savings per employee (from the employer's offices) are included in the calculations;
- each home worker avoids 7.8kg CO_2 for every day they do not commute (averaged across all modes of transport); and
- sizeable reductions in emissions, rental costs and utility bills have been achieved for properties across BT's portfolio thanks to the creation of a flexible estate and accommodation rationalisation permitted by flexible working practices.

Key Findings – Fife Council

- primary data have been obtained from a survey of flexible workers in Fife Council albeit from a small sample;

- the returns show that carbon emissions reductions of approximately 15% have been realised from changes in commuting (car) travel patterns amongst those adopting flexible working arrangements. Relatively low levels of travel rebound effects were reported from the survey although these are expected to be under reported to some extent; and

- overall the limited data from the Fife Council survey suggest a reduction of between 150kg and 170kg of CO_2(e) per employee per annum from reduced travel-related emissions, partially offset by an increase of around 10% in their domestic energy use.

Key Findings – Law Society Members

- 57% of the members of the Scottish Law Society who completed their 2013 'Diversity' survey reported having an opportunity to work 'flexibly', either from home or via some other form of flexible working;

- of those reporting this opportunity, the average frequency of working flexibly was around 0.75 days per week, equivalent to an average frequency somewhere between once a fortnight and once a week;

- when considering only the set of respondents reporting a decrease in their travel as a result of flexible working, the corresponding frequency of their flexible working was around 1.5 times per week;

- around 5% of respondents reported that a) flexible working had led to a change in their work-related travel per week and b) that they used a car as their main mode for work trips;

- combining these various factors, we estimate that flexible working among the Scottish legal profession currently results in an average reduction in car use of between 5 and 6 minutes per week **per member of the Law Society**;

- if an organisation similar in nature to the Scottish legal profession, but currently offering no flexible working scheme, were to introduce a flexible working scheme similar to that currently-available to Law Society members (as described above) then the resulting reduction in car use might also be expected to be lie within this **5 and 6** minutes of car use per week per employee range;

- based on a typical average commuter speed of around 48Kph, this would convert to between 4 and 5km of reduced car vehicle per employee per week, or between 200 and 260 car kilometres per employee per year; and

- applying the Scottish-wide emission rate of emission of 165 g/km (as derived in Chapter 8 of this report) to these car trips would suggest a reduction in CO_2(e) emissions of between 33kg and 43kg per employee per year in work travel-related emissions.

Key Findings - RBS

- 71 employees from the flexible working trial programme were estimated to save 36.2t CO_2 annually (on average 0.51t CO_2 per person). Although difficult to interpret, data suggests that average travel emissions savings of 9.3kg CO_2 per participant were achieved for each day of home working;

- it was found that transport emissions were three times higher for commuters, compared to someone consistently working from home; and

- overall, the combined results suggest that the pilot flexible working programme at RBS had a net positive effect on carbon emissions through lowered energy use at their properties, and reduced commuting travel emissions.

Summary of Findings for Carbon Abatement Potential

9.2. Information and data provided by the organisations participating in the study has been analysed to determine the effectiveness of flexible and mobile working in these organisations in reducing carbon emissions. The key findings from this analysis are:

9.3. Flexible and mobile working has clearly resulted in reduced travel to work emissions for those taking part. Where survey specific quantified data have been made available (for Fife Council staff) this suggests that emissions reductions in the order of at least 15% may be achieved across a sample with a mix of different flexible working approaches.

9.4. Where the primary or secondary data have allowed, annual carbon emissions savings due to flexible working have been calculated or reported at 80kg CO_2 (Aberdeenshire Council), 680kg CO_2 (BT), 170kg CO_2 (Fife Council) and 510kg CO_2 (RBS) per flexible worker. These data are drawn from different studies however they suggest that savings in travel emissions are typically in the hundreds of kilograms of carbon per annum. Higher emissions savings at BT can probably be related to a higher average travel to work distance (and different types of flexible working) than for Fife Council for example.

9.5. Quantified travel emissions reductions on a unitised basis were quoted for two companies and were quite consistent. BT report avoidance of commute emissions of 7.8kg CO_2 per day and RBS report 9.3kg CO_2 per day for home working participants.

9.6. Travel rebound effects were identified from relevant data returns (Fife) and from other organisational surveys (BT) and from the information provided these appear to be fairly modest (perhaps as low as 10%) although a

statistically significant sample would be required to verify this finding for the primary data obtained from employee surveys.

9.7. The limited data available from the Fife Council staff survey indicate that building energy costs (heating, lighting, cooling etc.) may increase in the order of 10% when workers undertake more of their working day from home or other locations.

9.8. Flexible and mobile working has allowed or supported organisations' efforts to reduce carbon emissions in offices through property rationalisation although data are not available to specifically quantify the extent to which flexible working contributes to this (since rationalisation is intrinsically linked with many other programmes and factors).

9.9. The combined effects of mobile and flexible working in large organisations represent a significant opportunity to reduce carbon emissions from the combined effects of reduced travel and property emissions.

9.10. The findings from the specific (Fife) staff survey results add weight to the broader view from the literature that flexible and mobile working yields carbon emissions reductions from travel when implemented in a sustained manner. The survey findings do not indicate that emissions benefits from reduced commute travel would be significantly outweighed by travel rebound effects or home/remote office energy consumption increases and they provide some useful indicative ranges for these effects. Review of information provided from the other three organisations in the study does not contradict this finding.

9.11. Evidence presented in the MVA study's interim report (based on data from the NTS) suggests that despite the work related travel reduction effect of flexible working, many flexible workers (to date) have higher overall annual mileages, and therefore travel emissions, on average than workers who commute regularly. These effects appear to be related to income and are not necessarily borne out by the findings of the organisation specific surveys for this study. In addition it might be postulated that as flexible working becomes more prevalent and is adopted by a greater range of worker types and those in lower income brackets the effects of 'travel rebound' would be expected to reduce.

9.12. Our analysis (set out in Chapter 8 of this report) presents a 'worked example' based on Scottish-wide average 'default' parameter values (derived from the various Case Studies, our analysis of Scottish traffic emissions rates and SHS Travel Diary etc.) to predict a net reduction in carbon emissions of around 200kg per annum per flexible worker working 1.5 days per week from home and reducing their business travel by one trip every ten weeks.

9.13. A spreadsheet tool which accompanies this Final Report can be used the various assumptions, for example to test the impact of regional variation in the various emissions-related parameters and/or the scale of the flexible working scheme being assessed.

9.14. In the longer term it is expected that the contribution of home energy emissions to the carbon balance will reduce as the energy efficiency of housing stock and the carbon intensity of the grid electricity mix improves over time. Home workers may also be amongst those most likely to make additional energy efficiencies in their dwellings. This will tend to further increase the potential carbon savings associated with flexible working.

Conclusions

9.15. Overall the following 7 conclusions may be drawn:

Conclusion 1 - Flexible working, particularly home working, reduces travel emissions and when considered in combination with travel rebound effects and increased energy usage in the alternative work place can deliver net carbon savings. This finding is consistent with most of the reviewed literature on the emissions effects of flexible working.

Conclusion 2 - There is a range in the available quantified estimates of the travel emissions reductions which are typically achieved from flexible working and the range appears to be in the order of hundreds of kilograms CO_2 per annum per flexible worker. This range is partly explained to the variation in average travel to work distance across the organisations surveyed and the type of flexible working adopted.

Conclusion 3 - The significance of these savings is likely to reduce for smaller commute distances (e.g. less than 15km distance home to work) as the contribution of travel emissions savings starts to be outweighed by the effects of travel rebound and particularly increased home energy use; albeit that over time emissions from building energy use should decline with improved energy efficiency measures and a lower carbon intensity energy mix. Similarly home working by staff who previously used public transport or active travel to commute to the main place of work is unlikely to result in a carbon positive outcome for those workers (albeit savings may still accrue from rationalisation of the organisation's buildings – see below).

Conclusion 4 - Travel rebound effects appear to erode between 10% and 20% of the primary benefits from the reduction in commuting-related emissions.

Conclusion 5 - All the emissions reductions benefits calculated for travel emissions, home energy emissions changes and travel rebound effects under-estimate the overall carbon savings. Implementing flexible working for larger organisations would allow for property rationalisation and thus step changes in emissions associated with more-carbon-efficient property portfolios.

Conclusion 6 - Whilst data on carbon savings from changes in property management are complex to allocate to the implementation of flexible

working, the results from the survey indicated the scope for wider corporate emissions reductions and clearly supports the positive view on this aspect identified in the wider literature. Data from BT suggest that average per flexible worker emissions reductions double when the impact of office energy savings/property rationalisation is added to the estimated benefits of travel emissions reductions.

Conclusion 7 – Getting organisations to participate in direct research associated with flexible working is extremely difficult. This problem is compounded by the fact that, while those most-closely involved with the initiatives are often enthusiastic and willing to take part, the final decision is taken by others more-senior and/or in other departments, who often over-turn the original agreement to participate.

Recommendations Regarding the Future Appraisal of Flexible Working Schemes

9.16. In order to use the spreadsheet tool developed here, the following data should be collected as part of the monitoring and evaluation of any new flexible/mobile-working scheme:

- the nature of the flexible working being undertaken (e.g. homeworking, flexible hours, remote working etc.);
- the proportion of employees who change their travel behaviour as a result of the Flexible Working scheme;
- the average reduction in number of commuting and business trips per week by those who change their travel behaviour;
- the proportion of the removed commuting and business trips which were previously 'car driver' trips;
- the average length of car commuting and car business trips removed;
- details of any transport-related rebound effects (i.e. additional car trips made as a result of the flexible working);
- estimation of any increase in domestic energy use, ideally estimated on a 'per day working from home' basis; and
- any data on energy saving by the company which can be attributed to the mobile working initiative being appraised.

9.17. In addition, it would be 'interesting' to collect qualitative data to inform future consideration of refinements to the use of 'Scottish average domestic dwelling emission rates', for example evidence of home-workers living in

dwellings which are above or below Scottish average emissions ratings and/or undertaking more-than-average energy efficiency improvements etc.

9.18. It goes without saying that schemes which increase the size of any of these 'primary' parameters in the list above or reduce the size of the 'rebound' effects are likely to perform well.

9.19. In particular, schemes which achieve a high take-up among the relevant workforce, successfully target employees with long car-based commutes and/or high levels of non-sustainable-mode business travel and/or can achieve significant carbon reductions within the company's accommodation portfolio are likely to perform well.

Recommendations Regarding the Use of Regional Parameters

9.20. As part of this study we have identified some significant variations in in the car mode share and average trip lengths of work-related travel to different geographic regions across Scotland.

9.21. The spreadsheet tool which accompanies this report can be used to test the impact of these regional variations and the relevant local parameters should be used when appraising individual schemes in specific locations.

9.22. The 'usability' of the spreadsheet tool could be further-improved by allowing the user to select the relevant geographic location from a drop-down list and using Excel 'lookups to re-set the various default values accordingly.

APPENDIX A – EXAMPLE TRAVEL AND EMISSIONS DATA SHEET

Travel and Emissions Monitoring Data Sheet

MVA Consultancy and Natural Capital are undertaking a research project on behalf of Transport Scotland to investigate the impact which Mobile and Flexible Working Programmes have on reducing the demand for travel.

Your employer is taking part in this research.

The purpose of the interviews with relevant key managers is to understand the nature of flexible and mobile working initiatives within your organisation and to try to quantify the benefits which these initiatives, with a particular focus on changes in energy use and greenhouse gas emissions. In addition to a qualitative discussion with the relevant managers, we would be interested in attempting to quantify the impacts of flexible and mobile working on your organisation's travel and its fuel and energy use.

If you have any questions about the research please contact Shirley McCoard, Project Manager at MVA Consultancy, on 0141 225 4413 or at smccoard@mvaconsultancy.com

Where you have available data please could you try to populate the table below and provide estimates on the follow up questions in terms of the impact of flexible and mobile working on patterns of travel, energy use and/or carbon emissions (where these are monitored). We would be grateful if you could provide values for the most-recent year for which you have figures available for your operations in Scotland.

Monitoring of Mobile & Flexible Working

Total number of staff in organisation in Scotland	
Total number of staff in organisation eligible to participate in mobile or flexible working	
Please specify the specific departments within your organisation that are taking part in **this** research	
Number of staff participating in:	
Occasional working from home	
Full-time working from home	
Working at/from locations which are 'closer to home' than the 'normal place of work'	
Working flexible hours	
Using technology such as tele/video conferencing etc to reduce business mileage	
Using other technology (eg downloading data using hand held devices to avoid travel to depots/offices etc)	
Other (Please specify)	
Total number of staff participating in all forms of mobile/flexible working	
Energy Use in Buildings	
Consumption (KWh) per annum	
CO_2 emissions (kg or t) per annum	
Organisation Fleet Vehicles	
Fuel consumption (litres) – diesel – per annum	
Fuel consumption (litres) – petrol – per annum	
(and/or) Vehicle mileage – per annum	
CO_2 emissions (kg or t) – per annum	
Business Mileage	
Vehicle mileage – car/van – per annum	
Business mileage – train - per annum	
Business mileage – aviation – per annum	
CO_2 emissions (kg or t) – per annum	
Commuting Mileage (if measured)	
Vehicle mileage – per annum	
CO_2 emissions (kg or t) – per annum	
Organisation Carbon Emissions (if available)	
CO_2 emissions (kg or t) – per annum	

July 30, 2013

Follow Up Questions from Monitoring Data

Please can you answer all questions below which are relevant to the data you have been able to complete in the table above.

Energy Use in Buildings	**Response**
• Where there have been changes in building energy use (increases or decreases), can any of these changes be directly attributed to the implementation of mobile & flexible working patterns?	
• Can you say to what extent mobile and flexible working has influenced the building energy use (ie as a ±% change)?	
Organisation Fleet Vehicle Mileage	
• Where there has been a change in fleet vehicle mileage (increases or decrease), can any of these changes be directly attributed to the implementation of mobile & flexible working patterns?	
• Can you say to what extent mobile and flexible working has influenced the organisation's fleet vehicle mileage (ie as a ±% change)?	
Business Mileage	
• Where there have been changes in business mileage (increases or decreases), can any of these changes be directly attributed to the implementation of mobile & flexible working patterns?	
• Can you say to what extent mobile and flexible working has influenced business mileage (ie as a ±% change)?	
Commuting Mileage (if measured)	
• Where there have been changes in commuting mileage (increases or decrease), can any of these changes be directly attributed to the implementation of mobile & flexible working patterns?	
• Can you say to what extent mobile and flexible working has influenced the commuting mileage (ie as a ±% change)?	
Organisation Carbon Emissions	
• Where there have been changes in overall carbon emissions (increases or decrease), can any of these changes be directly attributed to the implementation of mobile & flexible working patterns?	
• Can you say to what extent mobile and flexible working has influenced your organisation's overall carbon emissions (ie as a ±% change)?	
Effectiveness of Measures	
• Which flexible and mobile working initiatives have been most effective in reducing travel and/or emissions (can you also say by how much/what proportions?)	

If you have any other monitoring data specific to the mobile and flexible working measures which have been introduced can you please share these with us?

Thank you for your assistance.

APPENDIX B – ONLINE STAFF SURVEY

Employee Mobile and Flexible Working Survey

MVA Consultancy and Natural Capital are undertaking a research project on behalf of Transport Scotland to investigate the impact which Mobile and Flexible Working Programmes have on reducing the demand for travel. Your employer is taking part in this research and the purpose of this survey is to understand the ways in which you work flexibly and the impact this may be having on your travel behaviour.

This research is being conducted in accordance with the Market Research Society and Data Protection Act. All responses to the survey are completely confidential and anonymous and you will not be identified in the reporting of the research in any way. Your contact details will not be passed onto any third party and will be used only for the purposes of this research.

If you have any questions about the research please contact Claire Fitzsimmons at MVA Consultancy, on 0141 225 4406 or at cfitzsimmons@mvaconsultancy.com

About you

1. **What organisation do you work for?**

2. **What is the postcode of your normal place of work?**

3. **What is your job title?**

4. **If you regularly work at different locations, please list/describe these other locations here:**

Your work-related travel behaviour

5. How far is it between your home and your normal place of work?

- ☐ *Under 5 miles*
- ☐ *5-10 miles*
- ☐ *10-20 miles*
- ☐ *20-30 miles*
- ☐ *Over 30 miles*
- ☐ *Not Applicable*

6. How long does it normally take you to travel between your home and your normal place of work?

- ☐ *Less than 10 minutes*
- ☐ *10-20 minutes*
- ☐ *20-30 minutes*
- ☐ *30 minutes to one hour*
- ☐ *Over 1 hour*
- ☐ *Not Applicable*

7. How many days per week do you work?

- ☐ *One*
- ☐ *Two*
- ☐ *Three*
- ☐ *Four*
- ☐ *Five*
- ☐ *Six*
- ☐ *Seven*

8. On how many of these days do you travel to travel to your normal place of work?

- ☐ *One*
- ☐ *Two*
- ☐ *Three*
- ☐ *Four*
- ☐ *Five*
- ☐ *Six*
- ☐ *Seven*

9. What is your main mode of travel to work?

- ☐ *Car as driver*
- ☐ *Car as passenger*
- ☐ *Bus*
- ☐ *Train*
- ☐ *Underground*
- ☐ *Taxi*
- ☐ *Walk*
- ☐ *Cycle*
- ☐ *Other (please specify below)*
- ☐ *Mixed modes (please specify below)*

Other (please specify)

Mixed modes (please specify)

Mobile and Flexible Working

10. What forms of flexible working does your organisation support/encourage? (tick all that apply)

	Yes	*No*	*Don't know*
Occasional working from home	☐	☐	☐
Full-time working from home	☐	☐	☐
Working at/from locations which are 'closer to home' than the 'normal place of work'	☐	☐	☐
Working flexible hours	☐	☐	☐
Using technology such as tele/video conferencing etc to reduce business mileage	☐	☐	☐
Using other technology (eg downloading data using hand held devices to avoid travel to depots/offices etc)	☐	☐	☐
Other (please specify below)	☐	☐	☐

Other (please specify)

11. Do you ever use any form of mobile and/or flexible working?

☐ *Yes*

☐ *No*

12. When did you begin mobile and flexible working ie date (please specify as MMYYYY)?

13. How often do you do each of the following:

	Always	*Most days*	*1-2 days per week*	*A few times per month*	*A few times per year*	*Never*
Working from home	☐	☐	☐	☐	☐	☐
Working at/from locations which are 'closer to home' than the 'normal place of work'	☐	☐	☐	☐	☐	☐
Working flexible hours	☐	☐	☐	☐	☐	☐
Using technology such as tele/video conferencing etc to reduce business mileage	☐	☐	☐	☐	☐	☐
Using other technology (eg downloading data using hand held devices to avoid travel to depots/offices etc)	☐	☐	☐	☐	☐	☐
Other (please specify below)	☐	☐	☐	☐	☐	☐

Other (please specify)

14. Has the amount of work related travel you undertake (commuting and/or travel for work) changed as a result of implementing flexible and mobile working?

☐ *Yes*

☐ *No*

15. If Yes, please estimate the percentage change ie decrease/increase

Impact on your other travel behaviour

16. While working from home, do you make any car trips:

	Yes	*No*
During working hours	☐	☐
Outwith working hours that you would have normally done as part of your journey to/from work	☐	☐

17. If yes, how often do you make these trips and for what purpose?

	Every time I work from home	*About half the times I work from home*	*A third of the times I work from home*	*A fifth of the times I work from home*	*Less frequently than a fifth of the times I work from home*
Shopping	☐	☐	☐	☐	☐
Escorting others to school	☐	☐	☐	☐	☐
Trips to college or other education	☐	☐	☐	☐	☐
Health appointment eg Doctor	☐	☐	☐	☐	☐
Work-related trips	☐	☐	☐	☐	☐
Visiting friends/relatives	☐	☐	☐	☐	☐
Other Personal Business	☐	☐	☐	☐	☐
Other (please specify below)	☐	☐	☐	☐	☐

Other (please specify)

Please state what proportion of these car trips are additional (ie would not have taken place at all if you had not been working flexibly) and when you would normally make them.

Shopping - **proportion of trips which are additional (as a % of overall trips)**

When would you normally make this additional shopping trip?

--Click Here--

*During normal working hours **only***
*Outwith normal working hours **only***
***Both** during and outwith normal working hours*

Escorting others to school - **proportion of trips which are additional (as a % of overall trips)**

When would you normally make this additional trip escorting others to school?

--Click Here--

*During normal working hours **only***
*Outwith normal working hours **only***
***Both** during and outwith normal working hours*

Trips to college or other education - **proportion of trips which are additional (as a % of overall trips)**

When would you normally make this additional trip to college or education?

--Click Here--

*During normal working hours **only***
*Outwith normal working hours **only***
***Both** during and outwith normal working hours*

Health appointment eg Doctor - **proportion of trips which are additional (as a % of overall trips)**

When would you normally make this additional health appointment trip?

--Click Here--

*During normal working hours **only***
*Outwith normal working hours **only***
***Both** during and outwith normal working hours*

Work-related trips - **proportion of trips which are additional (as a % of overall trips)**

When would you normally make this additional work trip?

--Click Here--

*During normal working hours **only***
*Outwith normal working hours **only***
***Both** during and outwith normal working hours*

Visiting friends/relatives - **proportion of trips which are additional (as a % of overall trips)**

When would you normally make this additional trip visiting friends/relatives?

--Click Here--

*During normal working hours **only***
*Outwith normal working hours **only***
***Both** during and outwith normal working hours*

Other Personal Business - **proportion of trips which are additional (as a % of overall trips)**

When would you normally make this additional trip for personal business?

--Click Here--

*During normal working hours **only***
*Outwith normal working hours **only***
***Both** during and outwith normal working hours*

Other - **proportion of trips which are additional (as a % of overall trips)**

When would you normally make this additional trip?

--Click Here--

*During normal working hours **only***
*Outwith normal working hours **only***
***Both** during and outwith normal working hours*

26.a Do you think there has been a net change in the amount of petrol/diesel used by you and other members of your household as a result of your flexible working?

- ☐ *Yes*
- ☐ *No*

26.b If yes, can you say by how much?

- ☐ *INCREASED by about 10%*
- ☐ *INCREASED by about 25%*
- ☐ *INCREASED by about 50%*
- ☐ *INCREASED by about 75%*
- ☐ *INCREASED by about 100%*
- ☐ *DECREASED by about 10%*
- ☐ *DECREASED by about 25%*
- ☐ *DECREASED by about 50%*
- ☐ *DECREASED by about 75%*
- ☐ *DECREASED by about 100%*

Energy Usage

27. Please confirm whether you ever work from home or a location 'closer to home' than your 'normal place of work':

- ☐ *I work from home*
- ☐ *I work from a location 'closer to home' than my 'normal place of work'*
- ☐ *Both of the above*
- ☐ *None of the above*

28. When working from home or a location closer to home than your normal place of work, how many others are usually in the building with you?

☐

28.a Who are these other occupants of the building?

- ☐ *Family*
- ☐ *Flatmates*
- ☐ *Lodgers*
- ☐ *Friends*
- ☐ *Work colleagues*
- ☐ *Strangers*
- ☐ *Other (please specify below)*
- ☐ *There are no others in the building with me*

Other (please specify)

29.a Do you use extra heating and lighting at the alternative location as a result of your flexible working?

- ☐ *Yes*
- ☐ *No*

If 'No' please explain

29.c If 'Yes' can you say by how much energy costs may have increased?

- ☐ *[NCREASED by about 10%*
- ☐ *INCREASED by about 25%*
- ☐ *INCREASED by about 50%*
- ☐ *INCREASED by about 75%*
- ☐ *INCREASED by about 100%*

30.a Do you driver fewer miles overall per year because you are undertaking flexible working?

- ☐ *Yes*
- ☐ *No*

30.b If yes, by how much?

Large decrease	*Smll decrease*	*No significant change*	*Small increase*	*Large increase*
☐	☐	☐	☐	☐

30.c If not 'No significant change' please provide an estimate of the size of this change (vehicle miles per year)

30.d What sort of vehicles do these changes apply to?

- ☐ *Small petrol car*
- ☐ *Small diesel car*
- ☐ *Large petrol car*
- ☐ *Large diesel car*
- ☐ *Other please specify*

Other (please specify)

Impact on work - flexible workers

31. On a scale of 1 to 5 where 1 is 'Not important at all' and 5 is 'Very important', how important is the ability to work flexibly:

	1 Not important at all	*2*	*3*	*4*	*5 Very important*	*6 Don't know /Unsure*
to you	☐	☐	☐	☐	☐	☐
to other members in your team/department	☐	☐	☐	☐	☐	☐
to your employer as a whole	☐	☐	☐	☐	☐	☐

32. What are the main benefits of flexible working?

to you

to other members in your team/department

to your employer as a whole

33.a Are there any disbenefits?

☐ *Yes*

☐ *No*

33.b If yes, what are the disbenefits:

to you

to other members in your team/department

to your employer as a whole

Impact on work - non-flexible workers

34. On a scale of 1 to 5 where 1 is 'Not important at all' and 5 is 'Very important', how important is the ability to work flexibly:

	1 Not important at all	*2*	*3*	*4*	*5 Very important*	*6 Don't know /Unsure*
to other members in your team/department	☐	☐	☐	☐	☐	☐
to your employer as a whole	☐	☐	☐	☐	☐	☐

35.a What are the main benefits of flexible working?

to other members in your team/department

to your employer as a whole

36.a Are there any disbenefits?

☐ *Yes*

☐ *No*

36.b If yes, what are the disbenefits:

to other members in your team/department

to your employer as a whole

About You

37. Age:

- ☐ *Under 18*
- ☐ *18-24*
- ☐ *25-34*
- ☐ *35-44*
- ☐ *45-54*
- ☐ *55 - 64*
- ☐ *Over 64*

38. Gender:

- ☐ *Male*
- ☐ *Female*

39. What is your home postcode?

40. How many cars or vans are normally available for private use by members of your household?

- ☐ *None*
- ☐ *One*
- ☐ *Two*
- ☐ *Three*
- ☐ *Four*
- ☐ *Five*
- ☐ *More than five*

Other relevant information

41. **If you have any other comments that you would like to make in regard to mobile and flexible working, please use the space below.**

42. **As part of this research we will be undertaking a small number of focus groups in the near future with interested people who work flexibly. Would you be interested in taking part in this ongoing research?**

- ☐ *Yes*
- ☐ *No*

43. **If yes, please provide your email address.**

Thank you for taking the time to complete this survey.

Please now press the 'submit' button to submit your responses.

APPENDIX C – EMISSION RATES BY LOCAL AUTHORITY

	CO2 (e) Emission Rates g/Km		
Local Authority	**AM Peak**	**Inter-Peak**	**Difference**
Aberdeen City	161.7	161.48	0.2
Aberdeenshire	158.1	156.57	1.6
Angus	164.8	162.48	2.3
Argyll & Bute	158.0	159.03	-1.1
Clackmannanshire	153.1	153.15	-0.1
Dumfries & Galloway	165.5	165.63	-0.1
Dundee City	156.7	156.73	0.0
East Ayrshire	164.3	162.84	1.5
East Dunbartonshire	152.3	152.57	-0.3
East Lothian	167.3	166.71	0.6
East Renfrewshire	168.2	167.89	0.4
Edinburgh, City of	166.9	166.96	0.0
Falkirk	174.0	172.80	1.2
Fife	162.4	162.07	0.3
Glasgow	161.2	160.75	0.5
Highland & Islands	165.9	164.40	1.5
Inverclyde	163.5	161.87	1.6
Midlothian	157.7	158.69	-1.0
Moray	153.3	151.67	1.6
North Ayrshire	163.5	162.88	0.6
North Lanarkshire	173.6	172.59	1.0
Perth & Kinross	170.5	170.14	0.4
Renfrewshire	164.9	164.93	-0.1
Scottish Borders	152.9	153.40	-0.5
South Ayrshire	165.8	165.19	0.6
South Lanarkshire	170.4	170.93	-0.5
Stirling	166.4	166.07	0.4
West Dunbartonshire	151.7	151.58	0.1
West Lothian	167.3	167.53	-0.2
All Scotland	164.6	164.0	0.6

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