

# The Benefits of Retrofitting Sustainable Transport

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## **Abstract:**

Travel plans are a method of either retrofitting or designing in at the outset sustainable transport options into a building's use and design. They can include physical or structural enhancements to a site, such as improvements to walking and cycling routes, cycle storage and bus routes and stops. However, they can be much more than this. In order for them to succeed they need to support and deliver behaviour change and engage the community. These changes in behaviour can impact how a site is used by changing how people travel to work or by developing working practices that encourage people to work more flexibly, from home or meet through virtual means, reducing the demand for both office and car parking space. This paper will explore the impact of retrofitting travel plans and changes in working practices on a building. Examples will be drawn from a series of case studies to show how such policies affect the demand for and use of space. This change in use can help to cut both carbon emissions and costs, whilst developing opportunities to improve productivity. The examples will then be used to demonstrate the innovative techniques used to change behaviours and support the use of technology to communicate virtually, reducing the demand for corporeal travel. What this paper will show is that retrofitting need not just be about physical changes, but that changes in behaviour and use in a building are an important factor using sustainable transport initiatives as an example.

## **Keywords:**

Behaviour change, flexible working, sustainable travel, travel plans, virtual meetings.

## **1 Introduction**

Travel plans, or as they were then known, green commuter plans, were first introduced into the UK in the early 1990s. As with the name the definition has also developed from one that purely includes transport initiatives in the 2004 *Smarter Choices* report,

“...a package of measures put in place by an employer to try and encourage more sustainable travel, usually meaning less car use, particularly single occupancy car use (Cairns et al., 2004).”

to the more recent Department for Transport (DfT) definition that includes working practices.

“... a package of measures produced by employers to encourage staff to use alternatives to single-occupancy car-use. Such a plan for example, could include: car sharing schemes; a commitment to improve cycling facilities; a dedicated bus service or restricted car parking allocations. It might also promote flexible-working practices such as remote access and video conferencing” (Department for Transport, date not stated-a).

Travel plans were conceived as a de-centralised approach of dealing with congestion at the point of generation, with the overall aim of changing site specific travel behaviour. The site can be anything that produces traffic, though originally applied to workplaces and schools, but more latterly also developed for shopping centres, residential areas, faith sites, railway stations and personal travel planning (Enoch, 2008). The package of measures can include both increased and improved transport mode choices and reducing the need to travel through flexible working practices or teleworking. These are likely to be supported by marketing and information campaigns to inform the staff of the new or existing choices available. Included in the package may be the disincentive of car parking charges, or the incentives of subsidised public transport or car parking cash out schemes. The balance between the choice of physical changes to the site, increased modal choice, marketing and behaviour change measures will depend on the specifications of the site, and the culture of the organisation.

However, travel plans have had to develop. In the late 1990s and early 2000s there was fairly good assistance and funding within local authorities to support travel planning, but partly as a result of the comprehensive spending review in 2010, this support has reduced and the concept has developed. Historically a regulatory approach through the planning system outlined in *Planning and Policy Guidance 13: Transport* (PPG13) (Department for Communities and Local Government, 2001) has been taken. PPG13, as part of land use planning law gives local authorities a mechanism to develop legally binding agreements with developers for the funding of travel plan initiatives (Rye, 2002). This obligation or agreement is known in England as a Section 106 of the '*Town and Country Planning Act*' (Communities and Local Government, 1990). Travel plan initiatives can also be secured through a finite planning condition that requires certain facilities to be in place before a development opens, such as bus shelters, cycle paths and/or sheds. In contrast an obligation requires on-going funding for a specified period of time for such things as bus services. More recently, travel plans have been included as a requirement of BREEAM accreditation.

This planning approach to travel planning offers the potential to design in sustainable transport and alternatives to transport (ATT) at the development stage of a new building. If a building is extended or substantially altered, thus requiring planning permission, these initiatives can be retrofitted to the site. Yet as travel plans have developed they have become so much more. Rather than just physical initiatives, behaviour change and altered working practices have become important. These can modify the structure and culture of an organisation, which potentially have greater effects on how the building is used and its impact on the environment.

The research reported in this paper highlights this change in emphasis. It differs from previous research into travel planning, which has focussed on their effectiveness to reduce single occupancy vehicle numbers or vehicle miles travelled. For examples see (Rye, 2002, Shoup, 1997, Meyer, 1999, Cairns et al., 2004, Department for Transport, 2005). Specifically, this research investigates the benefits to a business in improving the real estate efficiency, cutting costs and carbon emissions, improving productivity and work-life balance. The research is limited in that it does not cover the individual perspective and only reports on the private sector workplace. The research is aimed at practitioners either in local authorities or consultancies looking to work with businesses at developing travel plans and ATT on a voluntary basis, hence the research concentrates on the benefits of travel plans and ATT to business.

The paper will draw primarily on two research projects, one as part of the authors PhD investigating the organisational embedding of travel plans, (Roby, 2010b) and a research project carried out on behalf of TfL to explore the development of sustainable business travel practices in the London area (Roby, 2010a). Both projects involved a multiple case study approach, using qualitative semi-structured interviews with people in relevant strategic positions within the organisations. It is the findings of these semi-structured interviews that will be reported within this paper.

The aims of the two projects were very different, but there were strong similarities in the findings from each. The aim of the PhD project was to understand how a process innovation such as a travel plan, becomes organisationally embedded, exploring the motivations and barriers to this embedding, whereas the project for TfL was aimed to illustrate best practice in sustainable business travel policies, and the potential for TfL to engage with businesses in this area. However, as mentioned, there were some strong similarities in the findings. This is perhaps not surprising when there are such strong relationships between the behaviour and cultural changes required, and motivations involved in reducing commuting and business travel. The findings show a strong link to the culture of an organisation in the success of adopting these policies, particularly where corporeal communication is replaced with virtual means. A strategy that encourages virtual communication for business meetings is more likely to support a flexible use of office space, encouraging more people to work from home or telecommute. However, an organisation that has less business travel and staff working fixed hours in the office, such as a call centre, another approach is needed to improve the efficiency of the real estate.

This paper will explore the effect of such policies on the use of a building and the resultant environmental and cost savings and other benefits to the business. Section 2 will cover the background of traditional working practices and the impacts that this has on office and home space use and draw on literature that demonstrates the cost and environmental savings from the use of virtual meeting technologies either for telecommuting or for business meetings; highlighting why these changes in working practices have become more relevant as organisational structures change. Section 3 will cover the research methods used and Section 4 will report and discuss the findings in more detail.

## **2 Background to a change in office space use**

As mentioned in Section 1, travel plans can be a mixture of lower carbon transport initiatives and smarter working practices that reduce the need for staff to travel. The previous section described what a travel plan is and how they are beginning to develop from the initial concept of managing travel to also consider the alternatives to travel. This section will focus on these alternatives.

Communication within business and between businesses is changing as the structure of organisations change, which has implications for the use of office space. Aguilera suggests that more organisations work from a number of sites, that the hierarchy is flattening and employee independence is increasing. All of these changes are likely to increase the need for communication (Aguilera, 2007). This change in organisational structure is accompanied by a change in the way organisations work, so that there is a greater use of project or innovation teams. These teams can be geographically dispersed

generating an increased need for communication, which could be either achieved through physical or virtual means (Hildrum, 2007).

As the way people work changes, offices are used differently. Work by Felstead suggests there is potential to reduce the office space required by business. His work proposes that workstations and offices go unoccupied for as much as two thirds of the working week. By using the office space in a flexible way, office space is only provided when needed (Felstead et al., 2005), there are very few fixed desks and the office utilisation rises. This has several benefits to an organisation; it allows an organisation to expand the workforce without investing in new buildings, function with less office space (Felstead et al., 2005), reduce costs, create environmental savings through not heating and lighting empty office space and reducing travel. Watkinson suggests that typical cost savings from each office desk relinquished are £9,000 per year (Watkinson, 2008), with energy savings of 404 kwh/m<sup>2</sup> treated floor area for a typical air conditioned office (Carbon Trust, 2003, Figure 1, pp10). With examples of organisations such as Sun Microsystems improving office utilisation in some areas from 20% to 75-80% through supporting teleworking (Watenberg, 2011), and Oracle BV reducing space per employee from 23m<sup>2</sup> to 13m<sup>2</sup>, through a greater use of hot-desking and the use of open meeting areas, such as a central café (Banister et al., 2007), it can be seen there are potentially large savings that can be made from the retrofitting of such measures. Estimates by Romm suggest that policies such as hotdesking could save a business 3500 kWh a year per worker. With incremental home electricity consumption of 500 kWh, based on telecommuters spending about one third of their time at home, net savings would be 3000 kWh a year (Romm, 2002). The introduction of flexible working practices can also deliver savings to the UK economy of £287m through reduced staff turnover and £3.2b from reduced absenteeism. For example, BT has improved retention from mothers returning after maternity leave through their Anytime Anywhere work scheme to 99% compared to a national average of 40% (Lister and Harnish, 2011).

Research on the impacts of telecommuting in the home is still early. However, to date it suggests that there are benefits to individuals and the environment, although there are concerns about the rebound effects. Individuals are receiving a 'virtual raise' by reducing costs on petrol, car maintenance, dry cleaning, lunch etc. (Raiborn and Butler, 2009), but energy costs are likely to increase. Although increased energy demand is dependent on whether the home heating cycle is changed to all day, and in the summer working at home will cut overall demand (Banister et al., 2007). The main concerns are the potential rebound effects from more telecommuting. For example, for transport, from the availability of a car at home or the need to make additional trips to the shops or for child transport that would have been part of the commute. Despite this there is still estimated to be only a 24% rebound effect as a % of commuting savings. Other rebound effects include location, where people are prepared to move further away from the office as they no longer commute each day, or space rebounds where office savings are offset by individuals moving to larger houses or extending (James, 2004). These rebounds are still to be quantified and require longitudinal studies. Yet evidence suggests there are benefits to the local community, with time saved from commuting allowing people to participate in local activities and greater use of local shops and facilities.

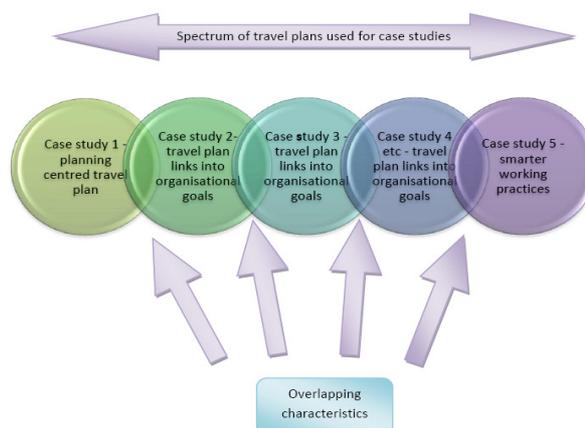
Due to these domestic, commercial and environmental savings, the DfT are realising the importance of ATT and for the first time have a minister responsible for this area, Norman Baker (Department for Transport, Date not stated-b). This work is still in the early stages, but the DfT have invested money in calling for evidence of the business benefits of ATT (Department for Transport, 2011). Although energy use from buildings is not specifically part of their remit, should the proposal that commuting become a compulsory monitoring element within the Green House Gas Protocol, carbon emissions from transport could become part of the overall building emissions (Macbeth, 2010).

However, ATT are less likely to be included in a travel plan as part of a planning consent, as they tend to be retrofitted into existing rather than new buildings. The introduction of such technologies and working practices is more likely to be done in conjunction with the contraction of office space as will be explained in more detail in section 4.

### 3 Research Methodology

The findings within this report are drawn from two research projects, both using a ‘two-tail’ multiple case study approach. A multiple case study approach was taken as it allows for in depth studies within a real life context, of a selected range of cases to empirically establish the causes of a phenomenon (Saunders et al., 2007, Yin, 2009).

Using a multiple case study approach was necessary to build up the complete picture of maturing travel plans and business travel policies. In the case of travel plans, they can range from those that are closely aligned to the requirements of a planning consent, through those that are beginning to make links into organisational goals. At the other extreme of the range are organisations that have changed their working practices so that work becomes an activity rather than a time or place, which impacts on transport and building use, although not the primary aim. For business travel again there was a range of policies and practices, from those that focussed on reducing carbon emissions and costs from corporeal travel, to those that included reducing the need to travel as well, and the working practices that supported greater use of virtual meeting technologies.



**Figure 1: Multiple case studies overlapping spectrum**

The multiple case study approach involved firstly identifying case studies at either end of the range, but then also to identify case studies that fitted between the two extremes.

The aim of the choice of case studies was to build up this picture of the entire spectrum, with case studies overlapping in characteristics. This helped to improve validity through replication, but also offering uniqueness to the research as Figure 1 represents.

All the case studies had an embedded dimension, examining individual sub-units such as departments or work-groups within that organisation (Saunders et al., 2007). This unit of analysis was chosen as one of the objectives of the research projects was to understand not just how the person responsible for business travel or travel planning perceived the benefits to the organisation, but also to gain an insight into what other members of the organisation perceive as the benefits. In order to do this a range of people were interviewed in areas such as human resources, information technology, procurement, corporate social responsibility, and environment and health and safety.

Data collection was in the form of in depth semi-structured interviews. Semi-structured interviews were chosen to explore the same themes across the different departments, but due to the diversity of roles, it was necessary to have a degree of flexibility in the questions to ensure the interview remained relevant to the interviewee.

All the interviews were recorded and transcribed. This data was then analysed iteratively to unpack the themes and trends emerging from the data. No attempt was made to place a quantitative weighting to these issues. This was for several reasons. Firstly, across the case studies it was only possible to speak to one person within a department, so a direct comparison of issues was not possible. Secondly, there was a diversity of case studies to achieve the spectrum required. It would therefore be misleading to try to attribute a value to the occurrence of a particular topic. Because a topic did not re-occur could be an indication of the specialities and types of organisations involved in the case studies, rather than a lack of importance. However, the advantage of using a range of interviewee specialities meant that it was possible to develop a wider understanding of the context in the organisation.

## **4 Findings and Discussion**

This section will now discuss the findings from the qualitative interviews. It will demonstrate how the businesses in these studies have realised the importance of retrofitting sustainable transport initiatives along with a change in working practices to reduce costs and cut carbon emissions. However, the most important element of change has been behaviour change and not changes to the physical environment, although updating communication technology and altering the configuration of the office space have been important in supporting this behaviour change.

Perhaps the most important behaviour change aspect has been the alteration in mind-set of the organisations to realise that managing carbon emissions from their buildings alone is not enough. Some of the businesses in these studies were service sector businesses, such as consultancies, accountants and legal firms, and as such the majority of their carbon emissions came from the energy consumption in the buildings. Buildings have been their priority as they account for roughly two thirds of their total carbon emissions, but with transport accounting for most of the remaining third, travel was an area that could not be ignored. This is of particular importance because as emissions are reduced from buildings, without management, transport will become a larger proportion. With these sorts of figures it was not surprising that managing business travel and commuting was considered the next obvious step.

However, it was not just the scale of carbon emissions that prompted action; businesses are also looking at ways to cut costs on real estate and energy. One approach to do this is the use of flexible working practices that reduce the demand for office space. Other businesses see it as a way to manage the growing workforce within the existing real estate, thus improving profitability. Several of the organisations interviewed pointed out that they just didn't have the office space to allocate desks to every member of staff, and everyone going into the office would be a serious health and safety issue.

One organisation took a particularly strategic view of their office capacity. The review started over 15 years ago as part of a strategic policy to reduce building space, but also to reduce the amount that people needed to travel. This was done by creating hubs to develop a logical spread of office space based on where their staff and customers were located. This policy has saved them over 1,800 years in travel time and means that they spend £700 million a year less on building infrastructure than they did in 2000. Part of this policy involves enabling workers to be home based. This particular organisation has 15,000 home based workers. In one year this saved twelve million litres of fuel at a cost saving of £10 million, equating to 54,000 tonnes of CO<sub>2</sub> (Telecommunications provider). Another organisation has cut costs through a mixture of flexible working practices and measures to support modal shift to reduce overflow car parking. This has delivered substantial cost savings from rented overflow car parking costing £1,000 per space per year (Energy provider and producer).

These are impressive annual savings, but what does this mean for office utilisation. Within the first organisation, one of the London offices that used hotdesking (shared desk space) and break out meeting areas had a daily footfall of 10,000 people sharing the office space. If the each person had their own desk, the office would only be able to accommodate 1,000 people (Telecommunications provider). Another organisation talked of reducing offices from four to two with plans to go down to one, without reducing staff numbers (Accountancy).

To be able to successfully reduce office capacity requires a change in attitude to the office and how the office space is utilised. One organisation spoke of how they now had a greater desk sharing ratio, but simultaneously had a much more open environment, so that it was possible to work anywhere, with break out areas to support a more collaborative approach to working. Another organisation that implemented a desk sharing policy, because space was underutilised, found that by removing allocated desks, people's attitudes to the office changed. Without that fixed desk to go to, staff no longer felt an obligation to be in the office (Pharmaceutical). What was also beginning to emerge was a more structured approach to the working week, where staff would arrange their meetings either face-to-face or in telepresence suites on their 'office days', using their days at home to fulfil other tasks. The culture was becoming one where staff worked more flexibly both temporally and spatially, and performance was measured on outcomes and not 'presenteeism' (Management consultant).

These changes in working practices were supported by new and improved ways of communicating. A point that was repeatedly raised by the interviewees was the impact of the younger generation entering the workplace on the communication culture. This generation is technology literate and used to communicating with people all over the world through a variety of communication means and do not understand why these methods are not used more in the office. This is very far from the concept of an

allocated desk space; a concept driven by the post-industrial revolution's use of paper and face-to-face communication. Whereas, digital technologies make it possible to access documents and communicate anywhere. A frequent comment was that businesses were being pushed by this younger workforce to use applications and technology that supported a boundaryless office such as cloud computing and unified communications.

In order to bring about this change in culture a variety of behaviour change techniques were used to encourage, support and incentivise sustainable travel and flexible working practices. For example, it was recognised that training was an important factor in how to manage and be managed remotely (Telecommunications). The downside of digital communication technology is that there is so much more information available on a daily basis. One organisation described how they had to find ways to get their messages heard 'above all the noise' (IT consultant & outsourcer). Storytelling was one approach, not just internally within the organisation, but also in the national press. Other approaches, particularly to reduce business travel, included carbon accounts for the top travellers, aimed at encouraging them to reduce their business mileage. Further techniques involved incentives either at the business unit or individual level. At the business unit level it can help to create a bit of friendly competition between departments. Reporting of carbon emissions from business travel and linking this to incentives such as awarding acres of rainforest, in one organisation proved to be a strong motivation (Accountancy firm).

Beyond the cost reductions and carbon emissions there are other 'softer' benefits to the organisation, such as improved productivity. Flexible working can help staff feel empowered in their roles and so more likely to give greater discretionary effort. One example given was how the saved travel time was used by staff who worked at home. In that travel time saved, 60% went to their personal lives, such as getting up later, spending more time with the family, taking exercise etc., but 40% of that time went back to the business. Other examples given described how the use of telepresence suites which were only available for specific and limited periods of time, led to a better managed and more productive meeting culture (Management consultant).

However, the sorts of approaches outlined above do not work for all organisations or for every part of an organisation and other techniques are needed. A particular example was an energy supplier who had two sites either side of a road. One site was a call centre, where all the staff worked in shifts, arriving and leaving at the same time. Working at home was not an option, but because the start and finish times were so predictable, car sharing worked well. So here the behaviour change was driven by the type of role. The nature of shifts meant that the building utilisation was high and the large numbers of car sharers meant the car parking space was efficiently used. However, on the other side of the road was the IT function. Here the staff worked in a less structured way, with people arriving and leaving anytime between 8am and 6pm. On this site car sharing was less successful, but flexible working both temporally and spatially was more effective (Energy provider). What this illustrates is the need to match the measures to the working practices and cultures of the organisation.

## **5 Conclusion and Further Research**

What became clear conducting this research was that in some organisations business travel, commuting and working practices are being considered in a holistic manner. As

can be seen from the comments regarding carbon emissions, some businesses are realising that as you begin to manage carbon emissions from the buildings, then travel becomes a larger proportion and so rises in importance.

It is perhaps not surprising that businesses are looking at travel and working practices holistically as the cultures and technologies that support virtual meetings for business meetings are the same or similar to those that support home or mobile working. However, what is interesting about these approaches is that the physical changes to a building play only a part of the process. The most important aspect is behaviour change. Without this it would not be possible to reduce the number of buildings and increase the ratio of desk occupancy.

It is an interesting time as more businesses are retrofitting these practices to the buildings and to their cultures as a way of reducing costs, carbon emissions, at the same time improving productivity, work-life balance and other human resource issues.

An issue that has emerged during this research, and one that could offer some interesting further research is the idea of changing ownership models. This work touched on the concept of changing ownership of desk space; with fewer allocated desks and more collaborative working areas. But this is a concept that is also emerging through the concept of staff sharing between businesses and car sharing in car clubs. This requires a very different mind-set to ownership that could be beneficial in reducing carbon emissions, as was pointed out by the interviewee who stated that when you did not have your own desk or office it took away the obligation to use it. This could apply on a wider scale to shared offices or hubs.

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