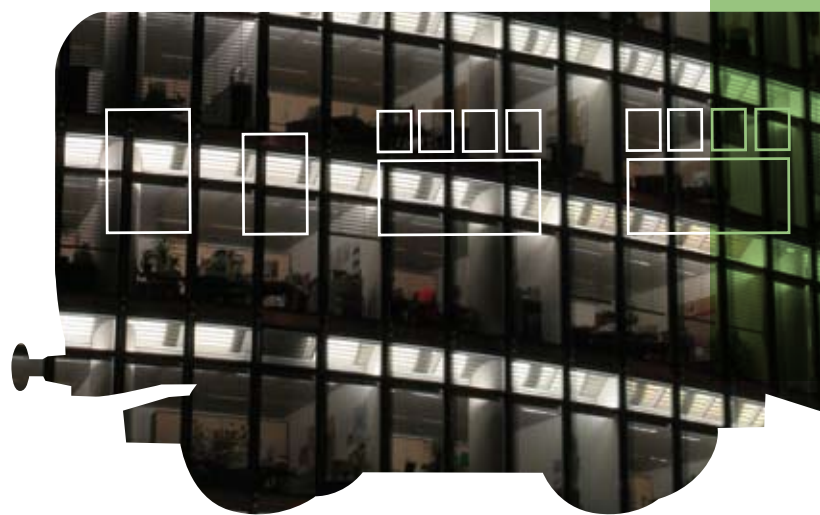
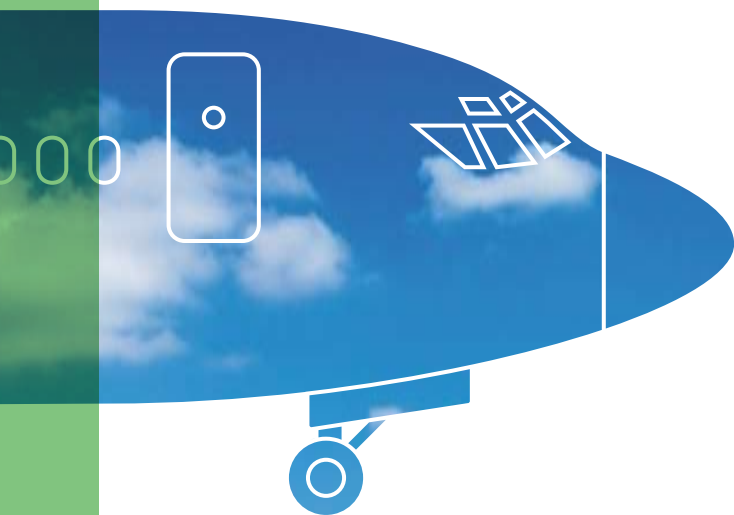
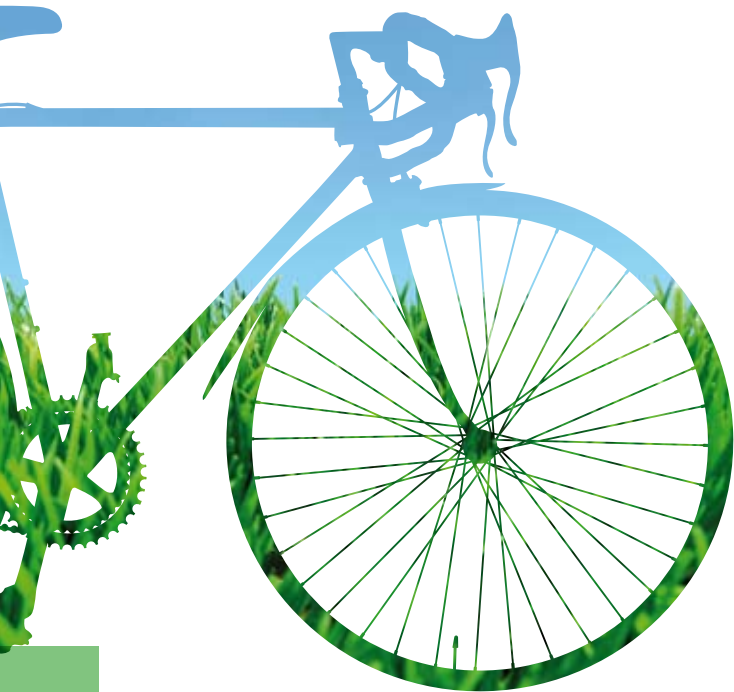


The carbon journey

Managing work-related travel emissions



The occasional exciting destination or the drive through the countryside on a sunny spring morning should not hide the truth. Most business travel is expensive, generates greenhouse gas emissions and impacts productivity – workers are rarely productive when on the move. In the 24x7 world, compensating for lost working time spent travelling leads to longer working hours, less time spent at home, greater employee stress and lower productivity. Meanwhile, the associated carbon dioxide emissions are often a significant proportion of an organisation’s carbon footprint. Looked at this way, who would not want to make things better?

Work-related travel is a significant contributor to the UK’s carbon dioxide (CO₂) emissions, and often accounts for 25% to 75% of an organisation’s total emissions. The good news is that reducing the CO₂ emissions created by travel brings cost savings, increased productivity, and improved employee health and satisfaction.

Despite there being some areas where the problem is difficult to estimate, many of the reduction strategies can be implemented with relatively little cost and disruption – so business travel is a great place to start on the journey towards becoming a lower carbon enterprise.

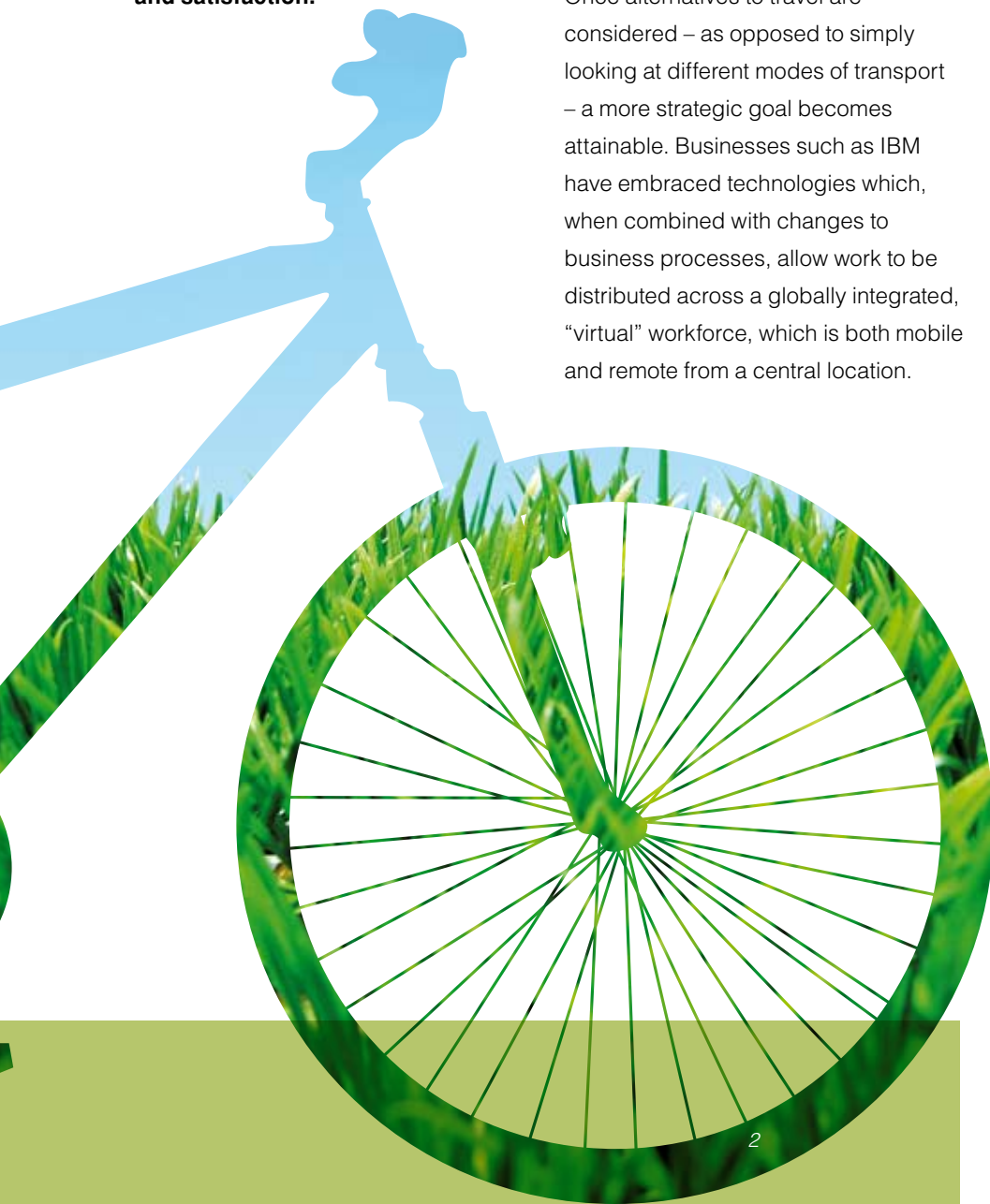
Once alternatives to travel are considered – as opposed to simply looking at different modes of transport – a more strategic goal becomes attainable. Businesses such as IBM have embraced technologies which, when combined with changes to business processes, allow work to be distributed across a globally integrated, “virtual” workforce, which is both mobile and remote from a central location.

It means that employees work where it makes most sense. Quite apart from the gains in productivity and savings in cost and CO₂, the resulting changes in demand for accommodation can lead to significant savings in the property portfolio.

Travel can be an emotive subject when it comes to changing working patterns, so care and imagination are required when designing and implementing solutions.

Work-related travel covers both “business travel” (for which staff can claim expenses) and “commuting” (for which they can’t). Whilst this paper does not address logistics and distribution per se, there are also impacts on business travel related to establishing overseas business partners.

The key is pragmatism. Progress, as this paper argues, comes from focusing on what can be done rather than what cannot.



Understanding the scale of the problem

Travel – sales reps on the road, customer service visits, meeting clients, even travelling to and from the office – is a part of business life. However, the costs add up. In 2001, the annual travel bill for US companies was estimated at \$110 billion¹. The cost will only be exacerbated by rising oil prices, environmental regulation, pollution taxes and schemes to lower emissions.

While transport is responsible for 13.1% of global GHG (greenhouse gas) emissions², the UK's official figures put transport at around 25% of national emissions in 2004³, and this excludes international aviation and shipping; if included, the figure jumps to around 32%⁴ (see Figure 1). However, what proportion of "Transport" is work-related (i.e. business travel and commuting), and what proportion is "leisure" or "logistics"? In 2005, some 30% of all journeys were undertaken for business or commuting purposes⁵ so we may estimate that nearly 10% (30% of 32%) of the UK's emissions are from work-related travel.

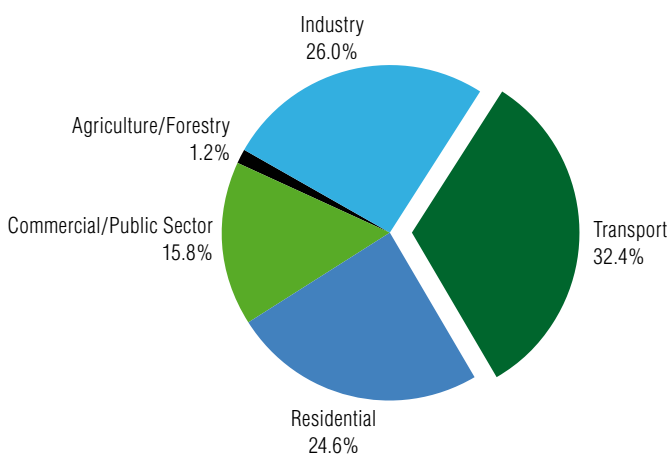


Figure 1: UK carbon emissions by sector as a share of total emissions (2005) with international aviation and shipping (end user)

However, for many businesses, the relative importance of travel is far higher than the global or national statistics would suggest. The carbon impact of business travel varies from industry to industry, and can be significant. This is especially true for service-based businesses and those whose manufacturing operations are outsourced or contracted from the upstream supply chain. Some examples illustrate the point:

- *A global aluminium producer: 0.1% of their carbon emissions*
- *A UK Government department: 16%*
- *A UK retail bank: 21%*
- *A European publisher: 34%*
- *A UK Government agency: 65%*
- *The UK practice of a leading management consultancy: 77%*
- *A UK-based not-for-profit organisation: 95%*

Commuting is harder to pin down, due to a lack of travel data, but there is no doubt that business decisions on what work is done where and by whom have a large impact on work patterns and travel choices. There is also a connection between commuting,

office and domestic emissions. Using offices as efficiently as possible reduces the need for both floor-space and energy, but an increase in working from home (reducing emissions from commuting) may lead to an increase in domestic emissions and fuel costs.

"Smart-working" study

The relationship between domestic emissions and commuting emissions was recently studied by IBM and Defra.

The results indicated the complexity of the relationship between the two. Whether working from home or commuting to work would produce fewer emissions depended on the individual's mode of transport, their distance from work, their type of home and the season of the year.

The move to a service economy, as companies take to road, rail, and air to carry their services to clients and customers, can only increase this focus on industry's travel emissions. Outsourcing of manufacturing and services around the world leads to yet more business travel. It also means an increase in the relative contribution of travel to a business's direct emissions. "Nearly half (45%) of business travellers say they were travelling more in 2005/06 for business than they were in 2004/05... The main reason for the increase... is business expansion, both overseas (33%) and in the UK (18%)⁶."

Organisations are increasingly focused on the reduction of CO₂ emissions associated with their business travel. The challenge is, those emissions can be fiendishly difficult to track down and analyse because the necessary travel data is not usually available in the format or detail needed.

Towards a solution

Emissions from travel can be complex and hard to estimate. Nevertheless, businesses should make a start in order to build a baseline from which to assess improvements. We also need a better understanding of the pattern of travel within the organisation: how are people travelling? Why are they travelling? How do their journeys fit into the business strategy? This will allow us to develop appropriate solutions.

Travel is often perceived by employees as being integral to achieving business objectives, creating an impasse. Traditional working methods should be challenged in a way which demonstrates that the same business results can be achieved whilst emitting less CO₂.

Business travel and commuting are emotive subjects, and a concerted effort will be needed to change the culture of the company. Resistance can come from unexpected sources so organisations should be prepared to apply comprehensive change management techniques from the outset.

An approach is presented in Figure 2, the phases of which are explained on next page.

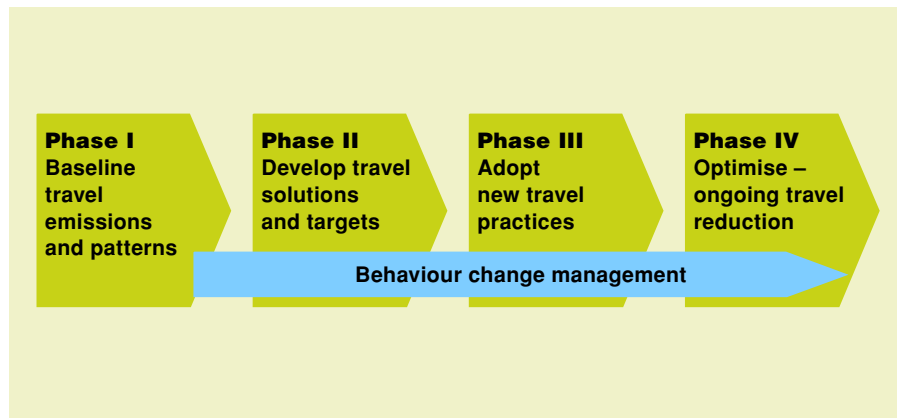


Figure 2: Approach to travel emissions management



Phase I: Baseline travel emissions and patterns

Typically, a company expenses system tracks the financial cost of business travel but, as expected, is not designed to estimate the CO₂ emissions associated with travel. For example, expenses claims for air travel do not capture the miles travelled, or the exact mode of public transport used.

And expenses systems are of no help at all in estimating the emissions from commuting – travelling to and from work. IBM’s own studies on client engagements showed commuting accounted for between 10% and 40% of total work-related travel, the remainder being business travel.

a) Estimate the baseline

Although the most accurate way of measuring emissions is by actual checks at the tailpipe, this is currently impractical. Measured volumes of fuel consumed provide a very good way of approximating the CO₂ produced (although combustion actually produces a variable cocktail of gases and particulates depending on the vehicle, climatic conditions and driving style), but capturing this data for each journey requires complex telemetry-based solutions which are only now emerging in the trucking industry. The fuel usage on a commercial flight can be doubled by such factors as wind patterns, the direction of flight, loading, the airports involved and the type of aircraft used.

It would be easy to assume that the difficulty of obtaining accurate data will prevent useful action, but this is not so. In any case, the law of diminishing returns applies as you seek for greater accuracy in quantifying travel emissions. A practical place to start is by considering the distance travelled and the mode of transport used, in line with Defra’s (Department for Environment, Food and Rural Affairs) published figures, as shown in Figure 3.

International Standards

When quantifying greenhouse gas emissions, it is important to use a recognised standard, such as the Greenhouse Gas Protocol⁷ or ISO 14064⁸, to ensure that those from travel are seen in the context of the organisation’s overall emissions. These standards define what should be included in an organisation’s emissions, to ensure that they are fairly stated, and how they should be reported. The GHG Protocol also provides guidance on how emissions should be estimated.

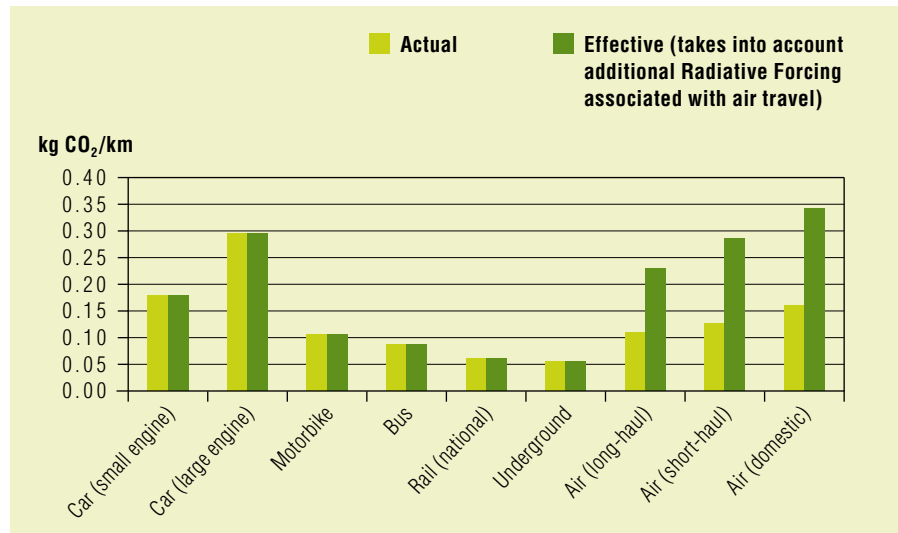


Figure 3: Emissions produced by various modes of transport (Source: Defra, 2007)

Measuring fuel use

IBM is working with leading organisations in the travel and transportation industries to develop “first of a kind” solutions to optimise fuel usage involving vehicle monitoring and analysis of driving patterns. Advanced sensors and telemetry combined with IBM data analytics should enable fleet organisations, individual drivers and purchasing managers to make better informed decisions regarding fuel usage and carbon emissions, which could lead to reductions in both, as well as cost savings.

These solutions point the way to the next generation of in-vehicle technology which will actually monitor emissions as well as fuel usage.

IBM's own work has indicated that, although emissions come from a range of different modes of transport, road and air travel have the greatest contributions to the CO₂ emissions of an organisation's business travel. So, the first step is to estimate the emissions from these modes.

From this simple beginning, it will be possible to increase the scope and sophistication of measurement, increasing the information provided about the vehicle: fuel type and engine size, for example, or – perhaps one day – loading, driving style, and weather conditions. Figure 4 shows how the scope of the analysis might be increased to provide a more accurate estimate of travel emissions.

Where's the data?

It should be simple to estimate travel emissions; after all, we only need to know the mode of transport and the

distance travelled. However, existing expenses systems typically only capture mileage figures for private and company car journeys. For other modes, we may have to go to our travel providers (if we use one). Generally, the more detail the better:

- *What distance was travelled by what mode of transport?*
- *What are the fuel type and engine size of the car?*
- *How much fuel was consumed?*

Commuting travel data is generally not collected at all. Arrangements will need to be made to encourage staff to provide this information.

- *How far do they travel to work?*
- *What mode of transport do they use?*
- *Data on walking and cycling needs to be gathered so that any shift towards "zero emission" commuting can be measured.*

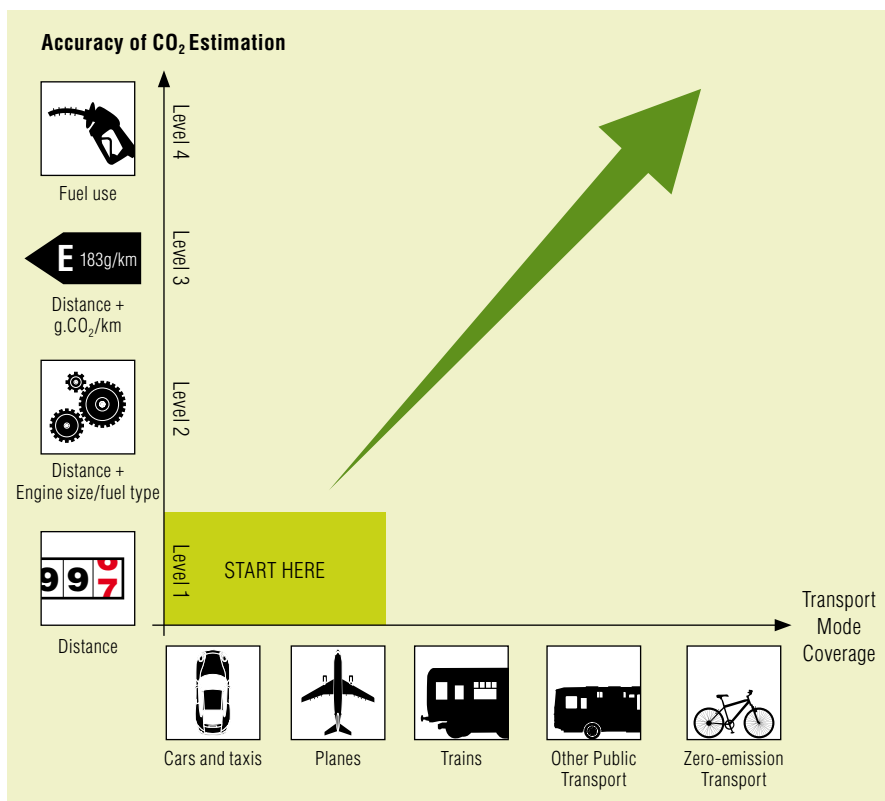
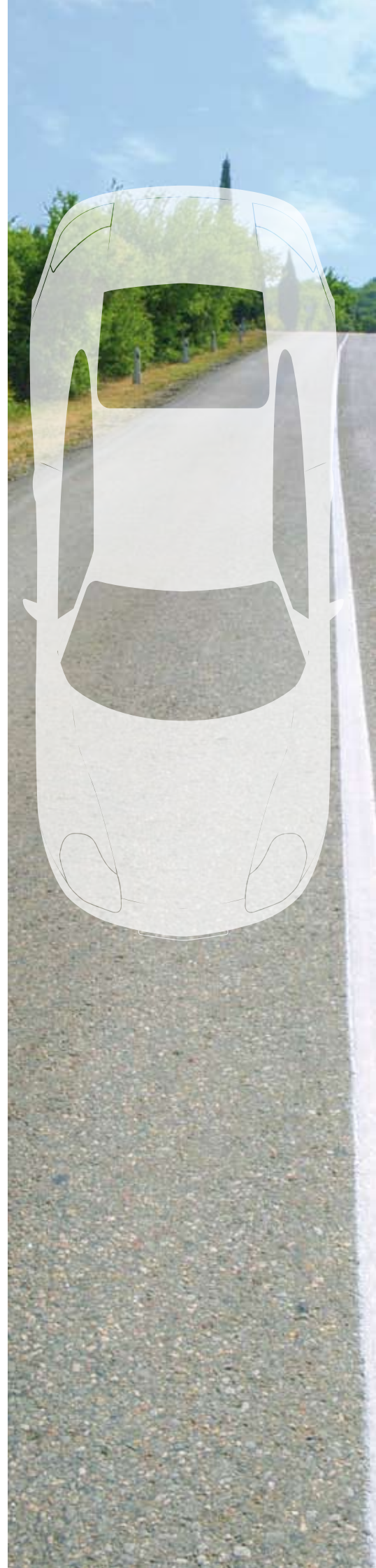


Figure 4: Emissions estimation – accuracy and scope





Commuting data

IBM has developed a proof-of-concept tool to allow staff to enter their standard weekly commute details. These can then be consolidated at the site or organisational level to provide an estimate of commuting emissions.

Gathering complete, actual travel data may sometimes be impractical, but realistic estimates can be made based on cost data, samples etc. This will enable initial efforts to be focused on those areas in which reductions can be most readily achieved. Data collection improvements can then be targeted on those areas where the effort will bring greatest benefit.

Where data is available, emissions should be estimated by mode and sub-mode of transport – e.g. not just “air” but “long-haul air” or “domestic air”. Below that, data needs to be analysed by department, function or process, so that appropriate action can be targeted.

A ‘heat map’ of travel emissions will show which parts of the organisation are responsible for the greatest contribution, identify problem areas, and help set more detailed reduction targets. This is illustrated in Figure 5.

All this information should be reliable and, where required, verifiable to satisfy the demands of regulators and, increasingly, auditors concerned over companies possibly trading on false information.

b) Understand the travel pattern

For commuters, the destination and purpose of travel are already clear, but developing alternative arrangements for business travel means finding out who is travelling, where they are going and what mode of transport they use, as well as why they need to make the journey.

- *Is travel related to internal meetings, and thus relatively easy to cut back, or does it lead to client-facing meetings, which may need changes in business processes if it is to be reduced?*
- *Which airports/stations are staff travelling between? Do you use travel providers who might be able to provide journey information?*
- *Can pool car managers or company car drivers supply information, including origin, destination, and purpose of travel?*

Then we can begin to develop appropriate ideas for emission reduction.

	Air			Rail	Road			Total:
	Air short	Air medium	Air long		Car – Own/ Company	Car – Hire	Car – Taxi	
Department A	1%	2%	2%	3%	10%	1%	1%	20%
Department B	0%	0%	3%	2%	3%	1%	1%	10%
Department C	1%	3%	5%	1%	6%	2%	2%	20%
Department D	5%	6%	10%	1%	10%	1%	2%	35%
Department E	1%	0%	0%	2%	5%	1%	1%	10%
Department F	0%	0%	0%	2%	2%	0%	1%	5%
Total:	8%	11%	20%	11%	36%	6%	8%	100%

Figure 5: Business travel emissions heat map

Phase II: Develop travel solutions and targets

Essentially, there are three travel changes we want to promote. These are, in order of likely impact on travel emissions reduction:

1. **Travel less**
2. **Travel lighter**
3. **Travel smarter**

Travel less: Note that travelling less does not mean not travelling at all; it may mean working from a more local office or from home for one day each week, or inviting fewer people to a meeting for which they would have to travel. Clearly, increased teleconferencing and videoconferencing have a significant role to play too; according to a recent study⁹, these are thought to have the greatest potential to reduce business travel by car (ahead of road pricing, business travel plans and personal carbon allowances).

The potential of video-conferencing

“Based on the German experiences, a 20% reduction of business travel in the EU through video conferencing could save 22 million tonnes of CO₂.” (Source: Saving the climate @ the speed of light, WWF/ETNO). This is equivalent to around one third of total UK emissions.

Working from home is one solution often suggested. Whilst some staff may resent having to pay for additional lighting and heating at home, these costs may be offset by savings in commuting expenses. Staff may also appreciate the time (and stress) saved each day in not having to commute.

There are usually clear business benefits associated with changing the way internal meetings are held and reducing the associated internal travel. Beyond these, travelling less tends to require more than changing behaviour: can work be rearranged and reallocated? Can technology facilitate remote working or provide alternative channels to the customer?

A fast track to reducing internal travel

A regular “total travel ban” works wonders in reining back unnecessary travel. This management process enables vital meetings to be treated as exceptions whilst alternatives are sought for the remainder. Combined with the rollout of voice-based collaboration systems and technology for information sharing, the ban can create the catalyst for the adoption of new working practices, as well as providing short-term cost-savings which can be re-invested in enabling solutions.

Travel lighter: Given the significantly lower emissions per mile of rail (and bicycle!) compared to single-occupancy car and plane, a change of transport mode needs to be encouraged. This need not equate to a ban on particular modes of transport, but it should mean a marked shift away from them. However, whilst travelling less will be accompanied by a reduction in travel costs, this may not be the case for mode shift. If people take the train rather than cheap flights or the car, for instance, their CO₂ emissions will fall, but the financial cost may rise.

Travel smarter: There are other things that can be done: their impact on emissions is likely to be less than the preceding two and may be difficult to estimate, but are still worth encouraging. These changes involve staying with the same mode of transport but reducing its impact. It includes car-sharing and moving the cars in the car scheme to more efficient models.

Most travel changes will generally lead to increased working time, whether by cutting commuting time by working from home, or enabling staff to work on the train.

Single-car occupancy

“In 2006... 85% of both commuting and business car trips had only one occupant.” (Source: Transport Trends – 2007 edition, Department for Transport)

The need for behaviour change

management: Attitudes of both clients and company staff can provide barriers to change. Clients may insist on meeting the consultants who are working for them, while staff may see travel as a perk of the job, and view alternatives as inconvenient or inefficient. If there is no incentive for change, there may be little commitment to change.

Travel as a perk

“Over three-quarters (78%) of business travellers enjoy travelling for business.”
(Source: The Barclaycard Business Travel Survey 2005-06)

A formal programme for change, brought in by senior management, should provide clearly-defined reduction targets and responsibilities.

- *Staff need to be engaged, to seek their attitudes to climate change and their ideas on travel emission reduction.*
- *There should be visible leadership, setting a positive example.*
- *Travel suppliers (e.g. fleet operators) and clients should be involved in the travel reduction programme, with agreements on the form and frequency of meetings as part of the strategy.*

Change management efforts should start with the identification of solutions and continue throughout the programme.

Voluntary vs. mandated changes

In our experience, a key lesson is to make sure that you are clear about which new ways of working are “voluntary” and which are “mandated”. Employee engagement to encourage voluntary action is very different from that to gain buy-in to “mandatory” new policies.

As one government client found recently, by mixing their messages they quickly got embroiled in a Union and middle management revolt around policy changes when trying to encourage new behaviours, many of which encompassed incentive schemes which the employees actually wanted!

a) Develop solutions and travel alternatives

So, having identified the behaviour changes we want to see, we need to encourage and support them. What will it take?

Some changes may require executive-led initiatives. Others are best devolved into the organisation and left to the ingenuity of the local management and workforce.

- *Can work be re-allocated and diaries re-scheduled to reduce the need for travel? If not, how can travel be carried out with minimum impact?*
- *Are there trade-offs to be made between travel costs and productivity?*

Fleet management

HM Revenue & Customs' Fleet Manager has implemented a programme to reduce the g/km CO₂ rating of new vehicles added to the User Chooser Admin Fleet by 5g every six months, so as to meet the requirement that new cars should emit no more than 130 g/km by 2010. For general administrative vehicles HMRC is moving immediately to the 130g/km standard or below whenever possible.

For example, CO₂ emissions budgeting could be introduced for individuals, departments, and for the organisation as a whole, with published league tables and incentives.

Three areas of improvement are highlighted below.

1) Modify your travel policy – to incentivise changes in travel choice and behaviour

Consider changes such as selecting only low-emission cars for car pools, fleets, and company car schemes;



setting a flat rate for mileage allowances, so drivers of economical cars see an immediate and personal benefit; reviewing when and whether air travel should be permitted where rail is a good alternative.

IBM's programmes

IBM's work-at-home programme allows employees' "work" office to be their homes, whilst the mobile employees programme enables employees to work from home a designated number of days each week.

In the US alone, the work-at-home programme conserved approximately 8 million gallons of fuel and avoided more than 61,600 metric tons of CO₂ emissions in 2006.

2) Improve your infrastructure – to enable changes in working practices
Teleconferencing, videoconferencing, and instant messaging are all ways of cutting travel; convenient rail ticketing arrangements and improved cycling facilities will encourage lower CO₂-emitting travel.

3) Be innovative – try something new
Personal pledge schemes and personal CO₂ allowances, linked to tangible staff benefits (such as, for instance, retail vouchers or additional vacation) are examples of ideas which can help to make the change fun, interesting and lasting.

Innovative approaches

Scottish and Southern Energy has produced a "carbon league table" for business travel covering their 13 main business units. It includes reduction targets and is updated monthly.

Since a centrally-funded cost centre was set for train travel, it has seen a two-fold increase with large reductions in air and car travel. A £20 "fine" is charged for each flight made which goes towards a carbon sequestration fund, and "no fly" months have been introduced.

Crucially, sponsorship for these changes has come from the company's Chief Executive.

b) Set targets

Targets for reduction need to be agreed and set at an organisational level and, ideally, cascaded to a departmental (or even individual) level to encourage accountability. They should be ambitious but achievable; and their accomplishment should be part of formal personal objectives.

Reduction target

"We will establish a carbon accounting system for Natural England by March 2007 and put in place measures to halve our greenhouse gas pollution by 2010."

(Source: Natural England, Strategic Direction, 2006 - 2009)

c) Develop an emissions reporting system

Carbon management is not a one-off operation, but a continuous improvement exercise, and a reporting system for travel emissions should be established alongside the existing management information systems.

Information needs to be collected and analysed regularly (at least quarterly) in order to track improvements and target continued efforts on the most important areas, which may well change as the business grows and transforms.

Whilst one-off initial estimations can be done manually, large organisations will find that collecting, evaluating, and analysing all this information requires investment in an effective travel emissions management system. The complexity of this exercise, the labour involved and the need for consistency mean that data collection and emissions estimation should be automated wherever possible.

An emissions information system should include targets for key performance indicators such as average CO₂ emissions per employee-year or per journey-mile. Selecting the right metrics is important – both to ensure that practical estimation is possible and to drive the right behaviours.

Phase III: Adopt new travel practices

Once solutions have been introduced as part of a formal change management programme, progress against targets need to be monitored through the emissions management system. A localised pilot of the new ways of working may be needed to make sure that there are no unforeseen negative consequences.

The level of success should be assessed over several months, rather than the first few weeks, to ensure that behaviour change "sticks" and does not revert to earlier practices. Policy changes, financial incentives and/or any innovative schemes are likely to be required to reinforce or sustain desired behaviours.

Phase IV:

Optimise – ongoing travel reduction

Longer-term changes will address business processes and organisational responsibilities so the company achieves the desired business outcomes with less travel. For example, management of the property portfolio can support a “green” transport policy (e.g. by locating offices close to public transport hubs; providing company buses to link in with public transport provision; and negotiating with local authorities to improve public provision).

Rethink your business model – to optimise workplace, workforce, work location and work-related travel

Optimise the elements which influence travel emissions – consider changes to work processes and work practices, location of property, and enabling IT solutions which encourage the virtualisation of work, so that tasks can be carried out in different locations.

IBM client engagements

In the UK, IBM has estimated the CO₂ emissions associated with travel on a number of its client engagements. The results have shown that emissions are affected greatly by the client’s location with respect to public transport hubs.

Making the case for change In conclusion

The case for change needs to be made formally, clearly, and often. A company’s ability and readiness to manage emissions will evolve as business priorities change.

Cutting CO₂ emissions is going to become increasingly important as public attention focuses on climate change and environmental responsibility. New legislation and regulations and rising costs are likely to increase the pressure for change in the near future.

But there are several clear business benefits, including reduced travel costs, increased productivity, and less pressure on employees. The company that embraces change will become increasingly attractive to environmentally-aware talent. Typically, business travel costs will already be managed and these should be brought into the business case to demonstrate bottom line advantages.

Both business travel and commuting can be significant parts of an organisation’s carbon footprint. They also represent a significant slice of the UK’s ever-growing transport emissions.

Travel is an important aspect of carbon management. It offers immediate benefits as well as more strategic gains, and, for certain organisations, it is ideal as a starting point to engage the business in change.

Much of the information needed to estimate emissions related to business travel and analyse patterns of business travel is already available, but it needs to be integrated into a single picture. Gaps in the information need to be plugged.

For commuting travel, little information has been gathered so far. Several mutually-supportive approaches are available to encourage changing behaviour and a reduction in emissions.

Large organisations should invest in a travel emission information system, linked to travel pattern analysis, to maximise the financial and environmental effectiveness of the emissions reduction programme.

The next steps are:

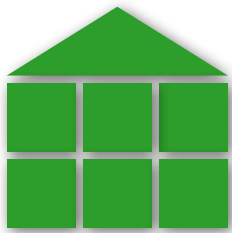
- **Start with business travel**, rather than commuting, to build the strongest business case and achieve the best business and financial benefits.
- **Start with what is there.** Review what information is already available in your own systems and those of your travel providers. Plan to address information gaps, but don’t let this get in the way of progress.
- **Estimate and analyse.** Starting with road and air travel, implement a process to estimate emissions and identify the big contributors.
- **Build the case for change**, which could cover travel costs, CO₂ emissions and lost working time, as well as “softer” issues.
- **Enthuse staff.** Show how changes would benefit them so that they become willing participants in the programme.



To discuss the issues raised in this paper, please contact:

Jon Z Bentley
Partner, Innovation and Carbon Management
IBM Global Business Services
Mobile: +44 (0)7802-452-148
Office/fax: +44 (0)117-929-5962
Home/fax: +44 (0)117-973-6273
E-mail: jon.z.bentley@uk.ibm.com

Michael Hardisty
Travel Emissions Leader
IBM Global Business Services
Mobile: +44 (0)7803-956-808
Office: +44 (0)20-7021-9077
E-mail: michael.hardisty@uk.ibm.com



IBM United Kingdom Limited

76 Upper Ground
South Bank
London
SE1 9PZ

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