Less Traffic, More Jobs: The Direct Employment Impacts of Developing a Sustainable Transport System in the United Kingdom

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Executive Summary

Green policies to promote public transport, cycling and walking could lead to the creation of 130,000 new jobs by 2010, which would more than offset the loss of around 43,000 jobs in the motor industry as a result of decreasing car use. Furthermore, if measures were taken to encourage the use of cleaner, more efficient vehicles and leasing rather than car ownership, another 35,000 jobs could be created.

This report assesses the direct impact on jobs of pursuing sustainable policies for surface-level passenger transport in the UK. It takes as its starting point the provisions of the Road Traffic Reduction (National Targets) Bill. This would require the Secretary of State for Transport to draw up and implement a plan to ensure that traffic levels fall by 10% by 2010, over 1990 levels. Secondly it uses targets published in the Royal Commission on Environmental Pollution's eighteenth report *"Transport and the Environment"* to forecast future use of trains, buses and bicycles. By combining the two, a sustainable transport scenario (STS) has been created. This is used to assess the effects of traffic reduction and the promotion of alternatives on jobs in the transport-related industries.

Sustainable transport policies involve more than traffic reduction. New technology is required to increase vehicle efficiency and reduce pollution from the traffic that remains. Assumptions are therefore made about the uptake of such new technology, and its effect on employment are assessed. Finally, as policies to reduce traffic and promote alternatives are liable to change ownership patterns, the employment effects of an increase in car leasing are considered.

Driving Change

To model the impact on employment in the car-based industries, Friends of the Earth commissioned top economic consultants ECOTEC Research and Consulting Ltd. ECOTEC used the baseline STS to predict the effect of traffic reduction on the car-related industries. This suggested that about 43,000 jobs could be lost from the industry, mainly in vehicle maintenance and repair. Secondly, ECOTEC used assumptions on the uptake of greener technology and the increased use of car-leasing to assess the likely effect of sustainable transport policies as a whole on the car-based industries. The combined effect of these policies is to reduce job losses in the car-based industries to about 8,000.

Reducing the environmental impact of the car is fast becoming a key battleground for firm survival in the car industry. The results of the high technology scenario in particular show that in terms of employment this means that jobs in those firms that act decisively and with foresight today by investing in the next generation of vehicles with radically lower environmental impact will be more secure than those in firms which are left behind.

The Direct Employment Effects of the Scenarios within Car-based Industries		
	Total Employed (2010)	**Change from current (Number)**
Current employment	1,072,000	
STS baseline	1,029,000	- 43,000
High Technology Scenario	1,049,000	- 23,000
High Lease Scenario	1,043,000	- 28,000
Combined High Technology and High Lease	**1,064,000**	**- 8,000**

Job Generators

The increases in cycling, bus travel and rail travel included in the STS will all generate employment. Friends of the Earth therefore augmented the work of ECOTEC by making conservative estimates of how increases in travel demand in these modes will create jobs (see table below).

Direct Employment Impacts of the Cycle, Bus and Rail Components of the STS	
Sector	**Jobs (number)**
Cycle	9,000
Bus	31,000
Rail	90,000
TOTAL	**130,000**

Taking account of these gains shows that the net effect of the STS on direct employment would be likely to be positive. The net impact according to the different variations on the STS is given in the table overleaf.

If the environmental and employment benefits of moving toward a sustainable transport system in the UK are to be realised then a range of policies that complement and reinforce each other is required.

The Road Traffic Reduction (National Targets) Bill provides the ideal vehicle to ensure these policies get debated in Parliament. And even if the Bill is not taken up this year, the Budget provides an excellent starting point for the new Government to make progress on: shifting the burden of taxation off labour and onto transport pollution;

cutting perverse subsidies that prolong the dominance of the current unsustainable transport system; shifting public expenditure priorities in the transport sector toward public transport; and installing price differentials to encourage greener car and greener fuel technologies.

Estimate of the Net Direct Employment Impact of the STS (jobs)			
	Car-based Industries	**Cycle, Bus and Rail Industries**	**Net Effect**
Baseline STS	- 43,000	+ 130,000	+ 87,000
High Technology Take-up	- 23,000	+ 130,000	+ 107,000
Combined high-tech, high lease	**- 8,000**	**+ 130,000**	**+ 122,000**

These measures aimed at creating the sustainable transport system that we all want will integrate economic and environmental objectives in a way that would strengthen environmental protection, create jobs and benefit all sections of the community.

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Introduction

"*The real choice is not jobs or the environment. It's both or neither*"[1]

Over the last few years the linkage between environmental protection and employment has attracted considerable attention[2]. This has happened not because it is seen as a problem but because it offers a vital opportunity. No longer are the two considered as opposing goals. Research continues to demonstrate that, overall, protecting the environment increases employment. The focus of attention has now moved on to identifying the combination of policies that can realise this "win-win" potential most effectively. At the same time there is a need for more detailed research into how individual economic sectors fit into this economy-wide picture of a "double dividend".

This report provides a more detailed examination of the direct employment impacts of transforming the transport sector toward the goal of sustainability. It is a key sector in the 'jobs and environment' debate. On the one hand it makes a substantial contribution, directly and indirectly to national employment. On the other hand, in its current form it threatens sustainability environmentally, economically and socially. Public concern over these negative impacts has led to a new political consensus that transforming the transport sector requires urgent attention[3]. Environmental, social and economic factors have all played their part in this change. The basis of the consensus is that allowing road traffic growth to continue at its present rate is not an option - it is unsustainable[4]. There is also some broad agreement on what needs to be done such as increasing the provision and use of public transport, encouraging walking and cycling, and adopting planning policies that reduce the need to travel. It is now vital that a coherent and effective package of policies is developed and implemented swiftly.

The impact on employment of reducing the environmental impact of the transport sector is sometimes put forward as a barrier to significant change. There is, however, little evidence of how employment in the sector would be affected by such a transformation. This report aims to help fill that gap and show that many opportunities exist for substantial job creation from developing sustainable transport in the UK.

Chapter 2 summarises how the transport sector threatens sustainability and provides a scenario for moving towards sustainable transport by 2010. This scenario is used in Chapters 3 and 4 to assess the employment impact of making the transformation to a sustainable transport sector. Chapter 3 examines the employment impact of the sustainable transport scenario on car-based transport systems. This chapter is based on a report commissioned by FOE from ECOTEC[5]. Chapter 4 examines the employment gains that are likely to be made in other modes of transport under the scenario. The final chapter assesses the policy options most likely to reap the dual benefits of environmental protection and job creation in transforming the transport sector.

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Time to Move on

2.1 An Unsustainable Path

The environmental impacts of the transport sector have moved high up the political agenda both nationally and internationally. The role of emissions from road traffic in increasing levels of urban air pollution and contributing to climate change is now a pressing political issue. But it is not the fact that the transport sector must be transformed if it is to stay within environmental limits alone that has triggered doubts about it’s future direction. The social costs of increasing road traffic and the economic failures and inefficiency of the transport system have also contributed to the conclusion that the transport sector has been following an unsustainable path. It is time for the sector to move on to a path leading toward sustainability. This Chapter provides a summary of how in terms of environmental, social and economic goals the present development path of the transport sector is threatening sustainability. It also presents a scenario for the first stage of developing a sustainable transport system up to 2010.

2.2 Motoring Toward Environmental Limits

The transport sector in the UK is dominated by the car for passenger transport and by lorries for freight transport. Cars[6] account for 86 per cent of distance travelled by people excluding walking. Lorries account for around three quarters of freight transport[7]. This dominance of the internal combustion engine has made a significant contribution to local, regional and global environment threats including climate change; urban air pollution; acid rain; habitat destruction; and resource depletion. It is also getting worse. The increasing numbers of cars and the increasing dominance of road traffic outstrip what progress has been made in increasing energy efficiency and undermine attempts to achieve air quality targets.

Climate Change

The latest report from the scientific experts of the Intergovernmental Panel on Climate Change makes it clear that emissions of greenhouse gases, and in particular CO_2, are are having a discernable, destabilising impact on global climate[8]. The limits of the atmosphere as a “*highly mobile dump for our waste*” have been reached[9]. Transport is the fastest growing source of CO_2 emissions in the UK. Over the last ten years the amount of energy used by the sector in the UK has increased on average by 3% per annum. Road transport dominates the sector’s emissions as shown in Table 1.1. By 1993 road transport alone emitted 20% of the total CO_2 emissions in the UK[10].

Table 2.1: Percentage share by mode in total UK transport sector CO_2 emissions		
	1984	**1994**
Road	83.9	87.2
Rail	3.2	5.1
Air (civil)	3.2	5.1
Shipping	6.5	5.1
TOTAL	100	100
TOTAL (million tonnes)	31	39
Source: Transport Statistics Great Britain 1996 Edition		

Reducing CO_2 emissions to a sustainable level provides one of the constraints for transport sector development. The EU has agreed to stabilise CO_2 emissions at 1990 levels by 2000. This, however, is considered by the IPCC as "*only a very modest first step to reach stabilisation of carbon dioxide concentrations*"[11]. Friends of the Earth, in developing the concept of environmental space as a policy tool, has calculated target reduction levels for UK CO_2 emissions of 88 per cent by 2050 and at least 30 per cent by 2010[12]. Substantial reductions in the CO_2 emissions from the transport sector will be needed if such targets are to be reached. Current emissions from road traffic alone excedd the total UK emissions permitted in 2050 according to this approach.

The Government, however, continues to protect the status quo in the transport sector in its latest position on CO_2 emissions. If different sources of CO_2 emissions are to receive unequal treatment the rationale for such a policy needs to be made clear. The Government's present CO_2 reduction strategy appears to rely mainly upon the ongoing restructuring within the power sector that has increased fuel switching, the so called "dash for gas", with action on controlling CO_2 emissions from transport minimal[13]. But while switching to gas in the power sector is a trend that will inevitably tail off, CO_2 emissions from transport are rising. The Government has to address the transport sector's role in climate change as a matter of urgency - if does not future generations will be disadvantaged by a less healthy environment, diminishing biodiversity and an increasingly unstable climate, with all that is likely to bring.

Urban Air Quality

Around the world air pollution in cities has become a pressing environmental and human health issue. The high concentration of cars and lorries in urban areas is a major contributor to the problem. The toxic chemicals released by the ever increasing number of motor vehicle exhaust pipes is taking a high toll on human health. Pollutants including ozone, hydrocarbons, sulphur dioxide, oxides of nitrogen (NO_x) and fine particulates (PM10s) have all been repeatedly associated with respiratory diseases, an increased susceptibility to lung infection and longer term lung damage[14]. Benzene, present in car exhaust fumes, is known to increase the risk of cancer. The Royal Commission on Environmental Pollution concluded that: "*At present pollutants from* *vehicles are the prime cause of poor air quality that damages human health, plants and the fabric of buildings*”[15].

Acid Rain

Acid deposition is largely caused by SO_2 from coal-fired power stations but emissions of oxides of nitrogen also play a significant role. Road transport accounts for 51 per cent of NO_x emissions in the countries of the European Union[16]. Across much of the UK, acid deposition currently exceeds the critical loads for soil and freshwater systems including many protected sites such as Sites of Special Scientific Interest[17]. Some 334 SSSI’s in England and Wales covering some 1,477,041 ha are threatened by acid rain.

Habitat and Countryside Destruction

Road building also threatens sustainability. Large areas of countryside and open space are destroyed because of road building. Even some amongst the best examples of Britain’s wildlife habitats are threatened by plans to build or widen roads[18]. The Newbury bypass has caused significant damage to three sites of special scientific interest (SSSIs) and the M3 extension at Twyford Down damaged two SSSIs. In all a total 141 SSSIs covering over 240,000 ha was under threat from proposed road building in 1995-97. Road building in urban areas can also remove areas of the few green space that exist and with a subsequent loss of amenity and tranquillity.

Resource Depletion

Road transport also uses up finite resources. Road construction and maintenance account for 32 per cent of non-renewable primary aggregate use in the UK[19]. Cars themselves use up resources too. In the UK, for example, estimates suggest that new car manufacture accounts for the following proportions of total primary metals consumption: 11% of steel; 11% of aluminium; 42% platinum; 27% of lead; 10% of copper and 4% of zinc. To achieve sustainable levels of metals extraction, it has been argued that a global cut in primary consumption of 50% is needed[20].

2.3 Eroding Social Welfare

“*There is a point where economic gain no longer improves quality of life, but reduces it. With regard to transport use that point may well have been reached.*”[21]

Sustainability is about meeting peoples needs within environmental constraints. At present the transport sector is fast approaching some of those constraints and at a pace that makes overshooting them a frighteningly real possibility. But there is also growing concern and evidence that the transport sector is, at the same time, failing to meet people’s needs effectively or efficiently.

People’s needs to communicate, to meet, to have access to their workplace, to have access to services such as shops and leisure facilities and to have access to new experiences can be met directly by the transport sector. The current dominance of the car, however, is far from equitable. Those without cars are increasingly badly served by the transport sector and consequently find it harder to meet their needs. As more and more services centralise or relocate on the assumption that people have access to cars, so those without such access are disadvantaged. The development of out-of-town superstores, for example, provides those with access to a car the choice of a wide range of foods, often at lower prices than in ‘local’ stores due to economies of scale. But those without access to a car are more dependent on local shops that, in the face of such competition, now offer less fresh foods and are less able to keep prices low. In the UK roughly a third of the households do not have regular use of a car. At the same time a quarter of households have access to two or more cars[22].

As well as being inequitable in how it meets people’s needs for access directly, the transport sector also obstructs people meeting other needs. Good health, for example, is an essential component of social welfare. Vehicle emissions and road traffic accidents, however, significantly damage human health through air pollution, accidents, noise and the encouragement they give to sedentary lifestyles.

2.4 Transport’s Changing Economic Role

The movement of goods is vital to any economy. But the relationship between transport and the economy is a dynamic one. The demand for transport services continually changes. Forty years ago many businesses and homes required fuel to be delivered to their doorstep. Now electricity and gas supply networks bring energy into the house directly. The restructuring of the economy over the last few decades away from heavy manufacturing and towards services has also changed the nature of the economy’s transport requirements. Most recently the accelerating digital revolution has opened the potential for the substitution of information for travel in some sectors of the economy.

There is also continual variation in the modes of transport employed within the UK economy. Over the past thirty years road transport has increasingly met the transport needs of the economy just as rail, canal and horse drawn vehicles had done before. At the heyday of each of these there must have been the same temptation to believe that continued expansion of the dominant transport type was, in some way, a prerequisite for economic development.

It is a misconception that is currently applied to the car. Margaret Thatcher’s infamous comments about the need to let nothing stand in the way of the “great car economy” typify this view. Transport policy has also been constructed around this viewpoint. The problem with this starting point for developing transport policy is that it confuses the objective of meeting peoples needs with expanding one of the means of achieving that objective. More alarming, however, is that the evidence to support the assertion has been scarce and where it has been presented it has been less than convincing. In fact, some basic statistics comparing the relationship between road transport and the economy indicate that this assertion maybe wrong. In Britain more than twice the number of car kilometres per person are travelled for each unit of economic output (when measured as GDP) than in Japan[23]. In other words Britain maybe “great” on the “car” side, but it is less so on the “economy” front. A recent international study of new firm formation, a key indicator of economic development, found that road infrastructure was not an important influence in any of the seven countries studied[24].

The three basic justifications for the assertion that expanding the road network is good for the economy and therefore good for employment are that it: lowers transport costs; aids regional development; and provides direct employment. Each of these arguments is considered in turn.

Transport Costs

The central argument used by advocates of further road-building and continued expansion of road transport is that it will reduce business transport costs which will benefit the economy in a way that will create jobs. Both parts of this argument - that road building significantly reduces costs and that such a reduction would generate employment - have been increasingly discredited.

Traffic congestion on the roads has been estimated by the CBI to cost UK industry some £15-20 billion annually[25]. In the past the apparent solution to congestion was to build more roads, but research has shown that although new roads provide a short respite from congestion, they also generate more traffic so compounding rather solving the congestion problems. In December 1994, the Government's Standing Advisory Committee on Trunk Road Assessment (SACTRA) confirmed that new roads cause more traffic, and that congestion slows down traffic growth[26]. Only reducing overall traffic levels will improve congestion.

If road building were to reduce transport costs would it stimulate the economy in such a way as to increase employment? Only 3-5% of business operating costs are transport costs. But if the argument is that prices will fall, a better measure is the percentage of firms' sales revenue accounted for by transport costs - in the UK this is actually around 2%. Some 25% of these costs are unrelated to the use of the road network, such as warehousing and loading. Even if road building affected a 10% reduction in transport costs, which is generous, and this was totally converted to price reductions these would only be on average 0.18%. This is very unlikely to have much effect upon the level of economic activity and even less so to impact upon employment levels[27].

Reducing transport costs, although commercially desirable is rarely a key factor in the competitive strategy of firms. This is particularly true in growth sectors of the economy where innovation, quality and product differentiation have central roles and where substitution of information for transport is increasingly sought. By the same token, work on the competitiveness of national economies has shown generalised factors, such as the quality and state of the road network, to be less important than more specialised factors, such as a narrowly defined skills in the labour force and highly specialised pieces of infrastructure. The main reason for this is that generalised factors such as roads "*support only more rudimentary types of advantage*" and "*are usually available in many nations*"[28].

Regional Development

The argument that road-building aids regional development is that existing firms in peripheral locations will have better access to new markets and new firms will be attracted to the area. Evidence suggests that neither of these hopes are well founded.

Building a road between two areas offers better access to firms at both ends and along the route. Firms outside peripheral areas are often larger and have increasingly centralised distribution networks and they can use new roads effectively to access these markets in the peripheral region. There is increasing evidence that this can lead to jobs being sucked out of some regions. The Royal Commission on Environmental Pollution (RCEP), in its report on Sustainable Transport, noted that "*good roads can sometimes speed the decline of less prosperous areas by allowing their needs to be met conveniently from sources outside the area*"[29]. Research on the economic impact of new roads undertaken by Leeds University Institute for Transport Studies for the Highland and Islands Development Board concluded that although better roads do encourage more tourism and thus tourism-related jobs they also facilitate further centralisation and a consequent overall loss of jobs[30].

There is also little, if any, evidence to support the argument that new roads encourage firms to locate in the area. As part of a seven nation study, Cambridge University examined the reasons why firms locate where they do in the UK[31]. Transport links were not a major factor. The availability of capital and a skilled labour force were two of the key factors. Regional development schemes that provided a package of measures aimed at these factors were far more likely to succeed in attracting new firms. In other words, if the Government and local authorities wish to spend money on getting firms to locate in an area, there are far better ways of doing it than by building roads.

Direct Employment

Road building itself generates employment directly. This is also put forward by some as an important factor to be considered in transport policy. However, the construction of infrastructure for other modes of transport also creates direct employment. The key question is 'which creates more?' A study by the German Road League and the construction union IG Bau Steine Erden showed that as a job creator, road building was inferior to building rail infrastructure[32]. The report showed that investing DM 100 billion in road building would yield only 1,201 to 1,630 person-years of employment compared to 1,880 job-years in railway construction or 1,992 in local public transport such as light rail schemes.

In other words investing more sustainable modes of transport is not only environmental superior but provides better value for taxpayers money as a job creator. These findings are reinforced by a UK study of major investment scheme proposals to estimate the price-per-job of the schemes. Rail projects were repeatedly shown to be better value for money as job creators compared with road building[33].

2.5 Moving on to Sustainable Transport

The increasing environmental, social and economic costs of the present transport system demands a new direction for its development: one that achieves economic and social goals effectively and operates within environmental limits. In other words, a sustainable development path. The recently formed political consensus on transport recognises that the old supply-side and car-orientated logic of building more and more roads to keep pace with projected traffic growth is no longer publicly acceptable nor economically sensible. Such a change in political positions offers hope but only if it is turned into action based on the logic of sustainable transport. This has three main elements.

First, is the recognition that transport is a means to achieving increased access for individuals, households and firms. Only very rarely is it an end in itself. That fact has been anything but central to transport policy to date. Instead the goal has been increasing mobility regardless of purpose and, in particular, increasing mobility by car. Sustainable transport puts access rather than mobility at the centre. People need access to their workplace, to shops, to leisure facilities, to friends and family. Firms need access to suppliers and to markets. The ethos of mobility as a need in itself has led to a greater level of travel for the same level of access as shops, residential areas, workplaces and other land uses have moved further from one another.

Second, the logic of sustainable transport also recognises the heterogeneity of travel demands and the consequent need for providing a good mix of transport modes. It also recognises that access can often be provided more efficiently by planning for less transport or, given the advancing digital revolution, by means other than transport. Mobility has been a one-dimensional goal that has produced environmental damage, social problems and economic inefficiencies. It has done so, in large part, because it does not account for the heterogeneity of economic and social needs that exist in the real world.

Third, in order to operate within environmental limits, the transport system and the technologies used in it must continually increase resource-use efficiency and reduce pollution. This can be achieved through reducing transport intensity, shifting the balance between modes of transport to those that are less polluting and resource-use efficient and improving the technologies used in all modes of transport to reduce environmental impact.

Reducing the intensity of transport means providing the same level of access but travelling less distance, less often or not at all. The Confederation of British Industry recently identified reducing the intensity of transport as “the key challenge” for the future[34]. The European Commission has also recognised reducing intensity as a key part of transport policy[35]. Even the UK Government have taken some initial steps with planning policy guidelines for local authorities that aim to redirect retail development from out of town sites towards town centres. Reductions can be made in a number of ways including: the use of planning controls and guidance, the substitution of information for transport, increased efficiency of freight movements, increased car occupancy and reductions in the volume and resource intensity of industrial products. The employment impact of reducing transport intensity is discussed in Chapter 4.

Technological change to reduce environmental impacts is especially vital for motor vehicles. In its first report the Inter-Governmental Panel on Climate Change noted several examples of where progress could be made, including very efficient vehicle drive-chains, light weight construction, low air resistance design, and alternative fuels including electricity from renewable energy. We have just passed the centenary of the car yet it still uses effectively the same fuel hungry and polluting technology as it did 100 years ago. Significant technological change to reduce the environmental impact of the car is well over-due. Chapter 3 examines the employment impact of a set of established but under exploited technological advances in car technology that can aid sustainability.

In the longer term this sustainable transport logic will see fundamental changes in the role and make-up of the transport sector. But over the next ten to fifteen years two clear priorities emerge: to reduce the dominance of the car by shifting the balance of passenger travel towards collective modes of transport and low impact forms of private transport; and reducing the environmental impact of all transport modes, but especially the car, through technological change.

2.6 A Scenario for Sustainable Passenger Transport

The purpose of this report is to examine the potential employment impacts of these two changes. In order to do this we constructed a basic scenario of what progress towards a sustainable transport sector should have been made by 2010. This Sustainable Transport Scenario (STS) is for land-based passenger transport and is based upon the on the recommendations of the Royal Commission on Environmental Pollution's report on Transport[36] and the targets set in the original version of FOE's Road Traffic Reduction Bill, and to be reintroduced in the Road Traffic Reduction (National Targets) Bill which is being promoted by FOE, the Green Party and the Plaid Cymru Parliamentary Party. A reduction in road traffic of 10% by 2010 from 1990 levels was the target proposed in the Road Traffic Reduction Bill. The Royal Commission set targets of a 10% increase in urban journeys travelled by cycle in the year 2005 and for public transport to account for 20% of all passenger kilometres by 2005. Vehicle occupancy rates are taken as static as are the proportions of bus and train travel within public transport.

Table 2.2: The Baseline Sustainable Transport Scenario for 2010

	1993 Vehicle km (billions)	**1993 Passenger km (billions)**	**2010 Do Nothing Vehicle km (billions)**	**2010 (FOE) Vehicle km (billions)**	**2010 (FOE) Passenger km (billions)**
Car	336.80	577	481.60	302.0	514.0
Train	0.35	37	0.35	0.6	63.1
Bus	4.60	42	4.6	7.9	71.6
M'bike	4.2	5	4.2	4.2	5.0
Cycle	4.5	5	4.5	20.0	20.0
Walk	-	-	-	-	-

The STS does not include freight transport. However, most measures that could be adopted to achieve the development of a sustainable transport sector would stimulate some shift from road to rail and sea. The specific employment impact of this shift is not addressed in this report but in the section on rail transport the role of freight is mentioned.

The STS has implications for employment both directly and indirectly. This study focuses on the direct impact on employment levels in the sector itself and provides an analysis of the scale of these employment impacts and the probable impact on employment levels in the sector overall.

The direct impacts of the change will be felt in a range of industries, from manufacturing and construction to maintenance and financial services. Chapter 3 examines the impact on direct employment in car-based industries of the STS and is a summary of a separate report by ECOTEC Research and Consulting commissioned by FOE[37]. Chapter 4 examines the impact on direct employment in sectors involved in the other modes of transport specified in the STS, cycling, bus and rail.

3

Driving Change

3.1 Introduction

In the present unsustainable global economy the car industry is a heavyweight. Worldwide the output of the car manufacturing industry is astounding. Every minute 95 new cars are manufactured and sold - 24 hours a day, 365 days a year. The production for one day alone would generate a line of vehicles nearly 400 miles long[38]. For many other industries, such as steel, rubber, plastics and paints, car manufacturers are major customers and the oil industry too is highly dependent on the dominance of the car as a mode of transport.

The car manufacturing industry itself consists of a small number of major companies. The largest of these have turnovers the size of the GDP of medium sized countries. The size and concentration of the industry make it an extremely powerful player economically and politically. It also means that the industry can be a substantial barrier to any changes, economic, political or social, that threaten its position or require it to change. As two industry experts put it:

"The automotive industry is highly political. However, much as it may seek to portray itself as operating on free enterprise principles, it continuously seeks to influence political decisions."[39].

Under the sustainable transport scenario described in Chapter 2 the reduction in car travel can be expected to reduce employment in car-based industries. That loss will be offset at least in part by employment growth in industries involved in the expanding modes of transport which is dealt in Chapter 4. But the imperatives of sustainable development will also drive forward changes in cleaner car technology and, at an initially more gradual rate, in car-ownership. The car industry will need to reduce its consumption of resources, increase fuel efficiency and reduce overall emissions. In order to do so it will need far more radical technological innovation than it has managed to date. These changes may also partially offset the losses in the sector by increasing its employment intensity. As the car as a mode of transport becomes part of a more diversified transport sector so the strength of car ownership as a social force is likely to be slowly eroded. People will use a range of transport services provided by different modes of travel including the car but at a level that makes justifying ownership more difficult. This change will also have direct employment impacts.

In order to examine the employment impacts of the sustainable transport scenario on car-based industries in the UK and how that impact varies with the changes in technology and ownership that are likely in a sustainable scenario, Friends of the Earth commissioned ECOTEC Research and Consulting Ltd. The rest of this chapter (except for section 3.5) provides a summary of their work. This is also available as a separate report.

3.2 Modelling the Employment Impacts of the STS

The modelling work calculated the current employment in car-based industries. It then produced an estimate of how the sustainable transport scenario would affect this employment. Most of the detailed modelling concerned how employment in the industries concerned would be affected by two different levels of technological development and uptake and two levels of change in ownership patterns.

As with all modelling work a number of informed judgements are involved. These are explained in full in the ECOTEC report. The methodology did not attempt to take account of indirect employment effects or effects induced by changes in income as a result of changes in direct employment.

This current employment level supported by the car-based transport in the UK is estimated to be 1,072,000, around 4% of the UK workforce. This employment includes: the manufacture of materials inputs (such as steel, rubber and plastics); the manufacture of vehicle components; the assembling and disassembling of vehicles; and the operation of the vehicles (such as road construction, fuel supply, retail services and maintenance). The most significant levels of employment are generated by vehicle use, with some 73% of total employment accounted for by vehicle operation. The level of car travel demand in 1993 was 577 billion passenger kilometres (pkm). Given the associated employment, calculated for 1993, 1.86 jobs might be said to be generated for each million pkm in the UK.

Under the sustainable transport scenario (STS) car travel demand falls by 11% to 514 billion pkm. The effect of reduced demand on employment will not necessarily be linear. Changes in demand will affect the industries involved in different ways. For example the fuel industry will be more directly affected than the production of cars themselves. The share of employment associated with vehicle manufacturing will increase as will the employment intensity of car travel. The estimated level of employment for the STS in the car-based industries is 1,023,400, a loss of almost 50,000 jobs due to reduced car travel demand. However the employment intensity of the sector would increase to 1.99 jobs per million pkm.

The next stage of the modelling was to calculate the changes to this baseline level of employment under the STS due a higher take-up of newer technologies that reduce environmental impacts and a modest shift from car ownership toward vehicle leasing. The following sections summarise the results of this modelling. In addition to a more detailed description of the employment changes associated with each component of these scenarios, tables are presented which aggregate the changes according to the four stages of the life-cycle of a car mentioned above. The industrial sectors included in each of these stages are listed as Appendix 1.

3.3 Gear Change

To date environmentally driven technological change in the motor industry has essentially involved some reduction in body weight and exhaust-pipe technologies. Although end of pipe technologies will continue to be important, the major technological challenge facing the car industry in a sustainable economy is how to radically improve energy efficiency and to move to more sustainable and, as soon as possible, renewable forms of energy. The model therefore considered the uptake of new materials and changes in fuel type.

New materials are capable of making an important contribution to the future sustainability of the transport sector. Their use is likely to be pervasive across all types of vehicle manufacture. The main reason for use of new materials is to reduce vehicle weight and thus enhance fuel efficiency. Some alternative materials have environmental impacts themselves which would need to be considered in the development of the industry. In the modelling work the impact of new materials was combined with the fuel type changes as the latter all, to a greater or lesser extent, require reductions in car body weight. However, all the changes in materials considered were predicted to have a small impact upon employment levels.

There are several different technologies that offer alternatives to the traditional petrol driven internal combustion engine. Some of these are already on the market. Most still rely upon fossil fuels either directly, such as natural gas powered vehicles, or indirectly, such as electric vehicles charged from power stations. However, they all involve some type of environmental improvement on the current engine technology. Friends of the Earth has recently published research into the possible benefits of different fuels. However, in order to model the employment benefits of greater uptake of such technologies a “high-tech” variation of the STS was agreed with ECOTEC which consists of projections in technology uptakes that are achievable. It should be stressed that Friends of the Earth does not necessarily suggest that this mix of technologies will eventually be adopted in the proportions outlined. The scenario has merely been adopted to show the sorts of employment impacts that could result from the rapid pursuit of cleaner, more efficient technologies.

The high technology take-up scenario involves the following assumptions on vehicle design changes and market penetrations:

- market penetration of 10% for Compressed Natural Gas (CNG) fuelled vehicles;
- market penetration of 15% for ultra-low emission petrol and diesel vehicles;
- extension of electric vehicles to 5% of the total vehicle park in urban areas;

- extension of hybrid vehicles to all taxis and 10% of remaining total vehicle park; and

- introduction of new materials to achieve weight reductions in new vehicles.

10% Market Share of Natural Gas Vehicles (NGVs)

Gas fuelled cars are already on the European market. Much of conventional vehicle body and parts are retained in natural gas vehicles. The overall employment impact of such a change results from vehicle conversion and maintenance, and a new fuel supply infrastructure.

No substantially new production technology will be required to produce NGV's. The conversion at the manufacturing stage will involve a 5% increase in employment - an estimated 650 extra jobs. The impact upon on the after sales maintenance and repair sector is also modest with an increase of 400 jobs.

Table 3.1: Employment Impacts of a 10% Market Share of Natural Gas Vehicles

Stage of vehicle life-cycle	Employment change by 2010
- material inputs	-500
- components manufacture	0
- assembly / disassembly of vehicles	+647
- operational	+660
TOTAL	**+800**

The supply and distribution of petroleum fuels would lose out to the gas supply industry. The net employment impact of this shift would be a loss of around 500 jobs because of the lower number of jobs per unit of output in gas supply compared to the oil industry. This change will have another short term employment impact though the installation of a gas supply infrastructure to existing filling stations. The model assumes that due to the short-term nature of the work involved the impact over the period of the model will not be large, creating 260 jobs. Table 3.1 highlights the importance of the manufacture and service stages of the gas powered vehicle life cycle in generating additional employment. The employment generated at either stage compensates for the loss in employment in primary industries. The net effect of this part of the scenario is the generation of around 800 jobs.

15% Market Share of Ultra-low Emission Petrol and Diesel Vehicles

Significantly cleaner petrol and diesel vehicles are being developed by many motor manufacturers. Their introduction may become mandatory throughout Europe[40] . At the same time, complementary reformulations are likely to be made to fuels to minimise emissions and enable the new technology to be introduced[41]. Reformulated fuels would leave the demand for petroleum-based products largely unaffected. There may be a slight increase in fuel efficiency that implies a small loss in jobs in petroleum refining. The major employment impacts involve the conversions of engines and the changes in maintenance and repair. The total net impacts of reformulated fuel vehicles from engine conversion, increased maintenance requirements and fuel supply infrastructure modifications are an additional 1,000 jobs.

5% Market Penetration of Electric Powered Vehicles (EPVs.)

Of the more radical alternative technologies, electric vehicles are probably the closest to the market. California's Zero Emission Vehicle Regulations have been provided a strong stimulus for this development. All major car manufacturers are developing electric vehicles. On 4 January 1996, General Motors announced that it will begin marketing its range of electric vehicles in California and Arizona. Renault is supplying the Swedish public sector with 150 electric vehicles. Ford has an electric vehicle on trial with the UK Post Office for trips less than 100 km per day.

Vehicles running solely from electric power represent a fundamental shift away from traditional manufacturing methods. They will also require significant weight reductions through use of new materials. These characteristics of EPV production result in significantly larger impacts on employment than the take-up of NGVs or reformulated fuel vehicles. The impacts at the manufacturing stage will be much greater due to the need for additional production lines. It is unlikely that firms will be able to manufacture EPV cars with existing facilities and staff. The potential for sharing of production runs is unknown, but it is unlikely to exceed fifty to sixty per cent of the final vehicle in an optimistic scenario. It is calculated that for this reason the vehicle manufacture sector will experience an increase in employment of around 3,200 jobs.

The change in fuel sources will also affect employment. A loss of 750 jobs from extraction and refining of petroleum is offset by the creation of 700 jobs in the electricity generation sector. Specialist units are likely to be set up within electric utilities to manage vehicles related production, and to conduct research and development. Changes in materials input would also create a small number of jobs.

Table 3.2: Employment Impacts of a 5% Market Penetration of Electric Vehicles

Stage of vehicle life-cycle	Employment change by 2010
- material inputs manufacture	60
- components manufacture	400
- assembly / disassembly	5,100
- operational phase	600
TOTAL	**6,200**

The increase in demand for electrical motors and their associated components is calculated to increase employment in these industries by 2,300 direct jobs (1,800 of these are included in the assembly stage of the life cycle). This accounts for 37% of the total change due to this element of the scenario. New employment is also likely to be generated through the demand for new light weight components.

The specialist nature of EPVs will create new opportunities in the after sales maintenance sector: an additional 500 jobs are estimated by the model. Retraining will be necessary for motor engineers to work on the electrical power units. Table 3.2 illustrates the employment impacts of this part of the scenario with the majority of new jobs being created in the manufacturing sector.

100% of Taxis and 10% of Remaining Market Share Powered by Hybrid Engines

Hybrid vehicles combine two or more technologies in an attempt to capture the advantages of each. The most common combination under development at present is the use of electric and combustion engine technologies. A few European manufacturers have developed cars using hybrid engines that are close to being launched commercially[42].

Table 3.3: Employment Impacts of an 11% Market Share of Hybrid Vehicles

Stage of vehicle life-cycle	**Employment change by 2010**
- materials input manufacture	-400
- components manufacture	600
- assembly / disassembly	9,200
- operational phase	2,700
TOTAL	**12,100**

A significant market potential for mixed power vehicles is likely to develop within the time period of the modelling exercise. The assumption that all taxis and 10% of the remaining purchases will be hybrid powered implies that by 2010 hybrid engine vehicles will take up 11% of new car purchases. The major negative impact on jobs of this change will be the loss of 750 jobs in petroleum industries. This will not be offset to the same extent as for electric vehicles by gains in the electricity sector because many hybrid designs use self-charging battery units which capture energy currently lost through friction during operation. Demand for electric motors, batteries and associated components will increase and this is calculated to increase employment by 2,700 jobs (a large proportion of these jobs are in sectors included in the assembly stage of the life cycle). Change in raw materials demand is estimated to create a further 400 jobs. Since hybrid technologies represent a significant movement away from traditional production methods, some 7,100 additional jobs will be generated by the need to operate a parallel manufacturing line. This is the largest direct employment associated with hybrid engine technologies and the high technology take-up scenario as a whole. The second largest impact of new technologies occurs because of the need for specialist maintenance. Some 2,300 additional jobs are estimated by the model by 2010.

The Overall Employment Impacts of the High Technology Scenario

The “high-technology” version of the STS has clear employment benefits which are summarised in Table 3.4. Investing in new technologies that require changes in production plant, maintenance and servicing is the main factor in increasing employment above the baseline scenario. This point is particularly relevant at a time when most car manufacturers are reducing job numbers. Where large car manufacturers are investing heavily in traditional production lines jobs numbers are remaining static at best. A recent announcement by BMW that it intended to invest in its Rover subsidiary to raise production by 60 per cent, for example, is not expected to create jobs but ‘secure’ existing ones[43].

Table 3.4 Employment Impacts of the High Technology Scenario

Stage of life-cycle	**Employment Change 2010**	**Total Employment 2010**
- material inputs manufacture	- 750	49,200
- components manufacture	+ 1,000	71,400
- assembly / disassembly	+15,400	213,400
- operational phase	+ 4,700	715,000
TOTAL	**+20,300**	**1,049,000**

3.4 One Careful Owner

Car ownership is intimately entwined with the dominance of the car as a mode of transport. Disconnecting car ownership from the demand for travel services will be an important part of developing a sustainable society. Cars can become another mode of transport that people pay for when it is appropriate rather than a hefty investment that is used for virtually all journeys to justify itself and because it’s parked outside. However, the cultural and social position of the car is such that releasing the grip of car ownership will be a gradual process. In order to model the employment impacts of starting such a shift the growth of leasing was used. Leasing here refers to longer periods, such as a year or two, rather than a week or two. Clearly this does not represent a great shift but it does at least represent a change in the right direction. Most importantly the firm providing the vehicle remains the owner of the vehicle and as such has an interest in the upkeep, lifespan and eventual disposal of the car.

In 1994 company cars accounted for between 50% and 60% of all new car sales in the UK. At present only 9% of all company vehicle purchases are through leasing or hire purchase schemes. For private new car sales outright purchases or credit arrangements are the norms. However, the options for leasing arrangements are growing. Most major manufacturers, and some large distributors, operate such schemes in the UK. Experience to date is, however, limited.

In order to model the likely employment impacts of developing such leasing arrangements above the baseline scenario the following assumptions were made:

- an increase in company car fleet's converted to lease schemes at 10% per year;
- a 10% growth in take-up of private lease-purchase schemes per year; and
- no net increase in the UK stock of vehicles through the take up of lease schemes.

Table 3.5 Employment Impacts of the High Lease Scenario		
Stage of life-cycle	**Employment Change by 2010**	**Total Employment 2010**
- material inputs manufacture	0	50,000
- components manufacture	650	70,700
- assembly / disassembly	0	198,000
- operational phase	14,400	725,000
TOTAL	**15,100**	**1,043,700**

Assuming that leased vehicles are purchased for replacement, there will be no effect on fuel supply industries, or vehicle manufacturing. However, the leasing firms that own the vehicle are likely to provide more regular servicing than private owners. In a service industry, such as car leasing, the product supplied by the firm consists of far more than just the hardware, in this case a car. The model assumed that leased vehicles are on average serviced twice as regularly as those bought by outright purchase. The increase in demand for maintenance services generates an additional 11,800 direct jobs. Increased demand for spare parts is calculated to create a further 2,600 jobs in distribution and 650 in manufacture.

The net impact of a high lease scenario is in the order of 15,100 additional jobs. This is an increase from the baseline STS of 1.5% by 2010. Table 3.5 summarises these impacts.

3.5 New Opportunities

There is little doubt that the move to a sustainable transport sector, through a reduction in the use of cars will lead to cuts in employment in motor manufacture and maintenance. However, the modelling work demonstrates that despite such job losses, shifting the car-based industries themselves towards sustainability can partially offset those losses through increasing the employment intensity of the sector. Table 3.6 shows the direct employment impacts of the scenarios modelled.

More research is needed into the employment benefits of the car sector moving towards sustainability. The impact of these changes on wider economic activity and the interrelationship with other modes of transport both require attention. It is also important to note that not all technological developments have been considered in the model, nor have more rapid rates of uptake. One additional technology is worthy of a separate mention. Hydrogen fuel cells offer the potential for cars to be fuelled by renewable energy[44]. That prospect may not lie within the time period of the model, but Daimler-Benz AG unveiled a fuel cell-powered passenger car at the 1996 Berlin Motor Show. Many other major car makers are reported to be working hard on fuel cell systems for passenger cars, including General Motors, Ford, Chrysler, Toyota, Honda, BMW and Renault. One senior Mercedes-Benz executive believes that the car industry should regard "*battery powered cars as an intermediary step to hydrogen-based fuel-cell cars*"[45].

Table 3.6 The Direct Employment Effects of All Scenarios

	Total Employed 2010	Change from STS baseline (Number)	Change from STS baseline (%)	Employment Intensity * Jobs/mill pkm
STS baseline	1,029,000	-	-	2.00
High technology Scenario	1,049,000	20,300	2.0	2.04
High lease Scenario	1,043,000	15,100	1.5	2.03
Combined High Technology and High lease	1,064,000	35,400	3.4	2.07

* Employment Intensity of the sector in 1994 was 1.86 jobs per million pkm

The technological changes included in the scenario can benefit from the current trends in the motor industry itself. Stagnant markets, tough competition and pressure to consolidate mean the industry is facing a watershed. "*Without overstating the case, if the strategic priority that characterised the industry in the past was growth, that of the future will almost certainly be survival. And, simply put, those companies that act decisively and with foresight today will almost certainly have a better chance of making it in the future*"[46]. The cult status of the car is also waning in some sections of the market. In these markets cars are seen as a means and not an end. The industry itself recognises this trend, with the primary segmentation of the car market being "*no longer Big Car vs Small Car but Car Lover vs Utilitarian Transportation Buyer*"[47].

The industry now knows that reducing the environmental impact of its product is becoming one of the main battlegrounds for firm survival, as shown by the race to develop micro-cars and electric and hydrogen powered vehicles. The impact upon employment is clear. Jobs in those firms who are part of the shift to the next generation of vehicles with significantly lower environmental impact will be far more secure than those with firms that are left behind. The response to ZEV regulation in California shows that the pace of change has to increase. It is a challenge that greatly favours those progressive and innovative firms that are willing and able to develop appropriate vehicles. The role of Government policy in managing this change to benefit the environment and employment is discussed in Chapter 5.

4

Job Generators

4.1 Introduction

Chapter 3 reviewed employment trends with the car industry and related sectors as a result of reduced car mileage. However, the Sustainable Transport Scenario (STS) described in Chapter 1 also included growth in travel by cycle, bus and train at the expense of the car. These changes have the potential to generate jobs to further offset the losses in the car-based industries. Each of these modes is considered in turn below. In addition the employment impacts of two other components of sustainable transport not directly included in the STS, walking and reducing transport intensity are also discussed.

4.2 On Yer Bike

Cycling provides an alternative mode of private transport to the car for many shorter journeys. The potential for cycling replacing car-use is illustrated by the fact that almost three-quarters of journeys undertaken in the UK are less than 5 miles[48] and 75% of the UK population can cycle[49]. In congested urban areas cycling is also often the fastest means of transport. Yet in Britain only about 2% of journeys are now by bicycle[50] compared to the Netherlands where on average 30% of trips to work are made by bicycle[51]. The Royal Commission on Environmental Pollution has recommended that the government adopt a target of increasing the proportion of urban journeys made by bicycle to 10% by 2005[52]. The Government in response has set targets of doubling journeys made by cycle over the 1996 baseline by 2002 and doubling it again by 2012 resulting in approximately a 8% modal share for cycling[53]. The STS used in this study uses the Royal Commission target to generate a passenger kilometre level of 20 billion by 2010.

Cycling's best known connection with employment matters stems from a former Government Minister's comments about the mobility of the UK labour-force - that unemployed people should move to find a job by getting "on yer bike". However, the development of a sustainable transport system in the UK will see cycling itself as a job creator. The direct employment benefits stem from the manufacture and sale of cycles and cycling goods, the provision of cycling services and building appropriate infrastructure.

Cycle infrastructure

Investment in cycling infrastructures will be needed after decades of transport planning and road building that have squeezed out the bicycle. This will include: investment in the existing road network to accommodate cycles and the introduction of traffic calming; the construction of cycle lanes that provide a physical separation from the rest of the highway "*in order to dissuade motorists (moving and parked) from encroaching on cyclist's space*"[54]; the provision of secure storage sites; and even providing facilities at workplaces to change and shower.

The estimates of the employment impact of the planned National Cycle Network (NCN), that has received lottery funding, provides an indication of the numbers of jobs to be created in developing cycle infrastructure. Sustrans, the Charity behind the NCN, has used analysis of the construction of existing cycle routes in estimating that the 5,400 person-years of employment will be created in constructing the NCN and a further 600 person-years in project management[55]. Other direct employment from constructing the NCN includes an estimated 500 person years in transport planning jobs, related to the need for traffic calming, road crossings and the like, and 100 full-time path rangers. In total this is equivalent to 750 full-time jobs over a ten year period[56].

The NCN, however, will only provide the skeleton of a cycle infrastructure and substantial additional investment will be needed, particularly in urban areas, to facilitate the development of cycling as a mode of transport. There are no detailed estimates of the quantity of investment needed to facilitate the levels of growth in cycle use targeted by the RCEP or the Government. Some indication is given by local authority spending. The City of York adopted a cycling strategy in 1988 that included creating a 50 mile (80km) network of safe cycling routes within the City. By 1995 nearly half the network had been completed at a costs of around £1.1 million[57]. A whole range factors mean that the potential for cycling and the level of investment needed to reach that potential will vary geographically. However, there are plans for initial investments in cycling infrastructure put forward by local authorities across the UK. Submissions by local authorities for cycling schemes to be funded by central Government totalled £14.5 million in 1994/95 and more than £20 million in 1995/96[58]. If the levels of cycling included in the STS are to be reached this initial level of proposed investment would increase as investments became more substantial and were made in more places. Over the period of the scenario the level of investment may begin to tail off if rapid investment had occurred in the first few years. We believe that a very conservative estimate of public investment in cycle infrastructure under the STS would be an average of £20 million per year over the scenario period (in addition to the NCN). This level of investment would create a further 960 jobs if the Sustrans estimate of £31,000 per job is used.

Private investment in cycle infrastructure would also increase in the STS. In particular, employers, retailers, leisure services and transport services would invest in cycle parking, storage, security and where appropriate cycleways. No assessment of the employment generation potential of this type of investment has been made in this report.

Manufacture, Sales and Services

The manufacture and sales of cycles and cycling equipment and the provision of maintenance services will provide extra jobs under the sustainable transport scenario. However, the relationship between increased cycle usage and employment in the sector is difficult to gauge. For example, the number of households with at least one cycle has increased in recent years yet the amount of milage and number of trips by bicycle has decreased[59]. This is mainly due to two factors, the growth in sales of cycles for occasional leisure activity and increasing safety concerns, particularly for children, discouraging cycling on ordinary roads. This mismatch between ownership and usage is most striking in the case of schoolchildren, who account for 60 per cent of bicycles sold[60]. Some 80 per cent of children own bikes[61] but the numbers who cycle on local roads declined from 66 per cent in 1971 to 25 per cent in 1990[62].

Technological developments encouraged by the expansion of cycling as a sport and leisure activity, such as lightweight frames and better gearing, have increased the opportunities for building and selling cycles that are primarily a mode of transport. The majority of the workforce in the cycle industry, as with the car industry, is employed in sales and maintenance. Those sections of the industry will benefit directly under the STS. The UK cycle manufacturing industry is also likely to benefit as it is well placed to play a leading role in such a development with its strength in quality and innovation. One example of how a British manufacturer is meeting the demand for cycles as a commuting machine is the development of the Brompton folding bike that can be carried easily on buses and trains and used at either end of the journey.

As the use of cycles as a mode of transport increases, markets for relevant accessories, such as those associated with safety, comfort, security and carrying luggage, will also increase and create extra jobs. There is also increasing scope for bicycles to be used by businesses. Alongside expanding cycle use by traditional users, such as the Post Office and police, other businesses such as cycle couriers have developed. New cycle technologies have also increased the scope for business use of the bicycle including the provision of services and delivery of goods. Some firms and local authorities also offer cycle allowances to their employees for cycle use in the course of their work. Firms which innovate to compete in these markets will create jobs as they expand.

Putting figures on the employment impact of these changes is difficult, not least because no precise total employment figure for the sector is available. The Bicycle Association estimate that around 20,000 people are employed in the UK cycle industry with the majority in retail and distribution businesses[63]. One method of estimating the employment benefits in the industry with an increase in cycle use is to compare the UK with other countries in Europe. The Netherlands has an exceptional cycle culture so it is probably more representative to compare the UK with Germany. Cycling’s journey share in Germany is close to the Royal Commission’s recommended target at 12 per cent compared with current 2 per cent in the UK. Yet sales of cycles per capita in Germany are only just over twice those of the UK[64]. From this we derive a first estimate of a doubling of cycle sales in the UK by 2010 under the sustainable transport scenario, which is line with recent market analysis[65]. New technologies in cycle manufacture, increasing imports and the demand for low maintenance bikes may reduce the employment gain from the sales increase. On the other hand the expansion will mean a development of new products in both cycles and accessories. A conservative estimate of the employment impact of a doubling of sales is therefore for a 40 per cent increase in employment across the industry representing 8,000 new jobs.

Indirect employment benefits

Although the analysis in this study is focused on direct employment in the transport sector it is worth noting that there are also indirect economic benefits of developing cycling as a mode of transport. Reducing congestion costs by getting car commuters to switch to cycling is regarded by the Bicycle Association as providing the bicycle's "*most substantial benefits for industry*"[66]. Cycling can also improve the image of towns and cities as being attractive, efficient and providing a high quality of life to existing workers, firms and residents. It also can help attract firms willing to invest in the local economy. Increasing cycling as a mode of transport would also increase the health of those workers who cycled and this too will have economic benefits as a healthier workforce is a more efficient one. The exact implications for employment of each of these indirect economic benefits are difficult to measure but, importantly, they are all positive effects.

Finally, cycling is already a popular leisure activity. Extending safe cycle networks and increasing the numbers of people who cycle regularly will help create jobs in cycle tourism, which has a low environmental impact and tends to generate revenue that is retained in the local economy. Sustrans have used existing analyses of cycle tourist related expenditure to forecast that the NCN will directly support 5,000 permanent jobs in tourist related activities[67]. In addition the expansion of a cycle network will help to attract more cycle tourists from overseas. Such visitors already account for 1 per cent of foreign visitors to Britain[68].

4.3 On the Buses

The Mayor of Chicago neatly summed up the role of the bus in terms of sustainable transport policy when recently he remarked that: "*Buses must continue to play a major role in urban life. But the conventional internal combustion engine cannot*"[69].

On the one hand buses are well suited to meeting people's travel needs in urban and rural areas. They are a flexible form of mass transport that can help to reduce congestion. They are also vital for the old, the young and the third of UK households without a car. In some inner city areas the numbers of households without a car is twice the national average. On the other hand emissions from diesel engines play a significant part in the health problems caused by air pollution and also contribute to CO_2 emissions. The major problem for bus transport in the UK at present is that current trends appear to be providing the worst of both worlds.

Since deregulation, prices have gone up and passenger journeys have decreased, yet vehicle kilometres have increased[70]. In other words, the sector is emitting more pollution but taking fewer passengers. At the same time despite some investment in smaller buses there has been, until recently, an overall decrease in investment in new vehicles leading to an ageing vehicle fleet. From 1986 to 1991 the number of vehicles more than 12 years old increased from 19 per cent to 29 per cent[71]. Engine age is one of the key determinants of pollution emissions from buses[72]. A recent market intelligence report on the industry emphasised that as well as an environmental impact, this decline was likely to have an impact on the viability of the industry.

“*... the industry still seems to be operating too many old and scruffy vehicles for its own good*” which is “*... likely to have a serious, although not obvious, affect on passenger attitudes and hence on their retention as fare paying customers in the future*”[73]

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If bus transport is to take its place in a sustainable transport sector in the UK, it will have to reverse these trends. Meeting peoples travel needs in the next century will require the bus sector to innovate, invest and integrate its services with other modes of transport such as rail and cycle. In the scenario for 2010 bus transport will have increased by 70 per cent. Both vehicles and the infrastructure will have been transformed to provide an extensive network of reliable, convenient, comfortable, quick and well-integrated services with considerably reduced environmental impact per unit of provision. These changes will create jobs in a number of ways.

Bus manufacture

There will be more jobs in manufacturing buses. UK bus manufacturing firms have been hard hit by the contraction in the industry as a whole and the decreasing levels of investment in what was left. Between 1988 and 1992 the number of buses produced in the UK fell from 16,500 to 8,517[74]. At the same time the average size of a bus decreased with the expansion in the market for minibuses following deregulation. Over the past two years however, demand has started to increase[75].

Employment figures for the industry and for its component suppliers are not separated out in published statistics. However, at a global level in 1995, Volvo employed 3,620 in its bus operations with an output of 6,830 vehicles[76]. This ratio of employees to vehicles can be used to provide a rough estimate of the UK bus manufacturing workforce: of 4,500 at present. But Volvo’s bus making is a global business and it also employs many people attempting to open up new markets. A more conservative estimate of employment in the sector is to assume that the same figure: 4,500 would include component suppliers, subcontractors and sales staff. Under the sustainable scenario the bus market would expand substantially with a consequent increase in employment. Even a return to the level of bus manufacture in the early eighties would create in the region of 4,000 jobs in the industry. This assumes a similar response in terms of the employment to unit output ratio, as was applied in the assessment of the car industry in Chapter 3. These increases in employment would be strengthened as existing buses were replaced or upgraded in response to demands for reduced emissions.

The European Union diesel emission standards have required new buses to meet higher emission standards over the last few years. These limits, and the tests that measure vehicles against them, will be tightened further by 2000. In addition to such policy responses to urban air pollution the need to reduce CO_2 emissions will also increasingly influence bus technology. The market for technologies for reducing pollution from diesel vehicles and other fossil fuelled vehicles will expand under a sustainable transport scenario. In the near term the use of exhaust traps to reduce the emission of particulates will be important. Manufacturing, installing, maintaining and recycling such equipment will create jobs. For example, two UK companies, Johnson Matthey and Eminox, have developed one of the most advanced traps, which simultaneously reduces noxious emissions and particulates. Several bus companies have already installed the system on some buses. Eminox already employs 72 people manufacturing and installing the technology. Under present market conditions the firm expects to double that number in three years[77]. Under the sustainable transport scenario that figure is likely to increase several fold. It is important to note that such end of pipe measures do not represent an alternative to inherently cleaner engines because older engine and body designs are less amenable to retrofit. The trap mentioned above, for example, requires the bus to burn low-sulphur fuel.

The use of alternative fuels in buses is expanding. As with the car industry, such developments will increase employment in the sector. Several technological options exist which are similar to those described for the car industry. It is not entirely clear which options are likely to expand most significantly over the next decade although Compressed Natural Gas (CNG) and Liquid Petroleum Gas (LPG) seem likely to be favoured[78]. Gas powered buses are already on the market and the subject of increasing interest amongst UK bus companies. National Express, for example, recently bought 14 gas-powered buses from Volvo for use between Walsall and Wolverhampton[79]. Although the engine and chassis for these buses are manufactured in Sweden, the bodies will be built and assembled in Northern Ireland. They emit considerably less of the pollutants associated with poor urban air quality and associated human health problems than diesel engines. However, natural gas is a fossil fuel and although overall emissions of greenhouse gases (CO_2 and CH_4) are reduced in comparison with conventional fuels, they remain a problem. Compressed natural gas vehicles are best seen as an important stepping stone between diesel and non-fossil fuels. The employment impact of market penetration of CNG in the bus sector is likely to be similar to penetration in the car industry. This would mean that new jobs created in the manufacture of buses and in repair and maintenance sector would outweigh job losses in the fuel supply sector. Additional jobs would also be created in converting bus depots to supply CNG and LPG, although the numbers would probably be small.

Beyond the use of cleaner fuels in combustion engines, we can expect increasing use of batteries and fuel cells during the scenario period. Electric buses offer some considerable reductions in emissions from the vehicles themselves which is important in urban areas. However, these vehicles remain indirectly responsible for emissions, including CO_2, from power stations suppyling the national grid from which the batteries are recharged. Greater input from renewable energy to the grid would reduce this problem. Trials of electric buses are already underway in several towns in the UK. Hybrid buses, electric vehicles with a small engine generator to increase their range, are under development by several European manufacturers. Hybrid buses are being tested on several routes in the UK at present.

Fuel cells offer a longer term and more sustainable solution. Like batteries they convert chemical energy into electricity efficiently, but unlike batteries they do not need recharging. Hydrogen powered fuel cells also do not emit pollution at the point of use. The cost of hydrogen production, particularly and critically by methods that do not use fossil fuels, and technological hurdles concerning storage and fuel cell efficiency, mean that hydrogen powered buses are only a longer term option. However, buses offer a good starting point for the technology due to the size of the vehicles. Already buses using hydrogen powered fuel cells are being used in trials in Belgium and Canada, although they use hydrogen produced with the use of fossil power, and thus like battery powered buses, at present offer only the limited benefit of displacing emissions away from urban areas. The majority of the jobs created by increased penetration of electric and hybrid buses would be in the manufacture of components and assembly of vehicles.

The modelling work done by ECOTEC on car-based transport systems, summarised in Chapter 3, has shown that as new technological options are followed the employment intensity of manufacture increases. Employment in the bus and coach industry will therefore increase due to higher output levels but also because the number people employed per bus made will be greater for the sector overall. The more radical the departures the greater this employment benefit will be. Despite the contraction in the industry the UK still has the potential to exploit these employment opportunities. The electric buses operating in Oxford have been developed by a consortium of three UK-based firms using many UK-based component suppliers[80]. Although hybrid technology in Europe is dominated by German and Italian firms, one UK engineering firm has developed a prototype hybrid bus[81]. Many of the alternative fuelled buses have converted UK manufactured buses. In a high technology scenario for the bus industry, similar to that modelled for the car industry, further employment benefits are gained. In the manufacturing sector the increase would be around 200 but, as the modelling work showed, many of the jobs will be created in the maintenance sector.

Operation

This double employment benefit of more output and greater employment intensity would also be felt in the maintenance of buses. Not only would there be more buses to maintain but because regular high-quality maintenance is essential to the environmental performance of buses there would also be an increase in the maintenance per bus compared with current levels.

Since deregulation there have been major changes in the organisation of bus maintenance. First, maintenance of vehicles has increasingly been contracted out which means that the employment figures for the sector no longer include all maintenance jobs. Second, the old practice of stripping down and refitting older buses has been replaced in the larger firms by a “MOT philosophy” where older buses are replaced rather than upgraded[82]. At present the number of maintenance staff recorded in the Transport Statistics is 25,000. An increase of 70 per cent in vehicle mileage, with larger vehicle fleets, greater intensity of maintenance per vehicle (including maintenance on emission control technologies) and the penetration of new fuel and engine technologies would bring significant increases in employment. If all of these pressures for increased employment only brought a 50% rise in the total number of maintenance staff this would still mean an increase of 12,500 jobs.

There has been a steady decline in the number of bus crew over the last few decades. This has been due to a steady decline in passenger numbers and productivity changes such as the introduction of driver only buses. Since deregulation the decrease in passengers and employment has continued. Although the reduction in passenger numbers has contributed to job loss there are other factors of note. Private sector firms have reduced the number of staff per unit of service by tighter scheduling, reduction in breaks and removing spare peak capacity. As the new private bus firms merge to form a far more concentrated sector, the potential for realising economies of scale in administration has led to further job losses. Some observers have warned that these trends are symptomatic of a sector fast turning into an oligopoly focused on a smaller network of profitable routes[83].

Under the sustainable transport scenario these market conditions would change but it is difficult to forecast the level of employment gain that would result, given the strength of these current trends. What remains true is that each new bus operated on a route needs a new driver for that route. Even if the doubling of passenger kilometres and vehicle kilometres only brought a very modest 15 per cent increase in operating staff over current figures, this would represent in the region of 15,000 extra jobs.

Bus Infrastructure

Finally, improvements in the infrastructure of bus service will be needed under the scenario and this too, will generate employment. At present bus services are often hindered by car congestion. Many urban areas are now introducing new traffic management measures to give buses priority or to separate buses physically from car congestion. The design and installation of these measures vary considerably in its employment generating potential. However, one of the most employment intensive methods, the installation of physically separated bus lanes and guided bus lanes are increasingly being seen as a good option both for developing new routes and improving existing ones. In addition to jobs created in installing the guide way, such systems can be the stimuli for increases in passenger numbers that require more buses and more drivers. In Leeds the installation of a guided busway on an existing route has brought work to a wide range of subcontractors. It has also resulted in increased passenger numbers leading to two extra drivers being employed on the one route[84]. Bus priority schemes also include intelligent signalling systems that recognise and give the green light to buses as they arrive at junctions. These can create jobs in manufacture as well as installation.

Further jobs will be created in the upgrading of bus shelters and information provision. Shelters have been installed on some routes in the UK with seating, lighting and information provision either by telephone or a real-time display board. For example, Northumberland-based Symtol Engineering, diversified from their traditional defence industry market to use precision sheet work to produce bus shelter advertising boardings and electronic passenger broadcasting shells for bus stops resulting in a 40 per cent increase in staff numbers[85].

4.4 Rail

Under the sustainable transport scenario passenger kilometres travelled by rail would increase by around 80% by 2010. This expansion would involve several different types of rail travel including commuter lines, urban tram systems and inter-city lines. The issue of freight moving from road to rail is not included in the STS but is considered below. The major advantages of rail as a mode of transport stems from its:

- comparatively efficient use of energy (less pollution, greenhouse gases and oil dependency);

- promotion of compact land-use patterns;
- far lower accident rates; and
- accessibility for non-car owners as well as car owners.

Rail travel creates employment directly through the operation of the service, supply of rolling stock, building and maintaining the infrastructure. It also has indirect employment generating potential at local, regional and national levels. As a modern, safe, efficient, comfortable, environmentally sound and reliable rail service is developed as a part of a sustainable economy it will be a significant job generator. This section examines the considerable potential for job creation that the growth in rail travel included in the STS presents. It should be noted, however, that assessing the employment impact of rail expansion is considerably more difficult at present given the uncertainties resulting from the privatisation process.

At a European level, railways have been identified as a key job creator to offset job losses in the car industry that would result from developing a sustainable transport system[86]. Under a European scenario that saw passenger kilometres by car fall 21.4% and by rail increase 35.6% by 2010, employment increased above a baseline scenario by more than 500,000 jobs in the rail sector across Europe. The same analysis indicated that the UK would benefit from more than 90,000 extra jobs[87]. These jobs result from the increased usage of rail, and the investment that would be required to achieve it. These findings provide an indication of the importance of the rail sector as a job creator in a sustainable economy.

Infrastructure

The fabric of the rail network, now in the hands of Railtrack, consists of some 23,000 track miles of railway which have been starved of sustained investment for many years. One assessment commissioned by Railtrack suggested as much as £11 billion needed to be spent on bridges, tunnels and sea defences[88]. To compound the problem the privatisation process has caused a hiatus in UK rail investment that has had a severe impact on the railway industry in the UK. The Railway Industry Association describes the situation as a “state of crisis”[89]. Calls for tender for major signalling schemes by British Rail and Railtrack have steadily fallen from 10 in 1990/1 to only 1 in 1994/5. Figures for the turnover in the electrification sector and the switch and crossing sector also show a dramatic fall over the last five years. The danger is that this hiatus may have badly damaged the ability of UK based firms to realise the job creation potential of increased investment. The UK now lags well behind other European countries in its track replacement rate and recent accidents have put into sharp relief the dangers that the ageing signalling systems present. These deficiencies impact directly upon the reliability, safety and comfort of rail services.

Railtrack has announced its plans for investment in the renewal and development of the rail network up to 2001[90]. It plans to spend £4.9 billion on renewals and £0.9 billion on developing the network (the Thameslink 2000 project accounts for more than half of the development spending). Railtrack also plans to spend £0.7 billion on property maintenance at over 2,000 stations and depots. This programme represents a first step in developing the rail network to a level where it can play its full role in a sustainable transport system. Under the STS an more extensive programme of investment and development would be required. In the longer term this would lead to a higher baseline level of employment in the sector. In the near term, however, many more jobs would be created as the programme caught up with past under-investment. This work would last well beyond 2010.

Tram or light rail systems are also an area of increasing investment in the UK and one which is likely to be an important element of a sustainable transport system in many urban areas of the UK. Manchester and Sheffield have both seen major investment in tram systems. Work is under way on the Midland Metro for Birmingham and nearby towns and a tram system is planned for Croydon. Leeds, Nottingham, Portsmouth, Liverpool, Bristol and Cardiff are all considering similar schemes. Manchester's Metrolink, the first of the new tram services, opened in 1992 and now has Government approval for the first extension to the system[91].

Investment in the network leads to employment in the manufacture and installation of track, track fittings, signalling, electrification equipment and the building and refurbishment of stations. Estimates of the employment generated by each of these activities are amalgamated in assessments of the job creation figures for particular rail investments. As these projects vary considerably depending on the type of line, the inclusion of tunnels and bridges, the density of building and population and other factors, an assessment of the national employment impact is difficult. However, as case studies such projects do provide an indication of the level of direct job creation associated with rail investment.

The CrossRail project in London, which would link West and East London, would create 53,920 person-years of employment in the UK in the construction phase alone[92]. Only 20% of this work is labour employed directly on the project. The rest stems from induced expenditure including about 20,000 years created in off-site contractors. Unemployment in the UK would be reduced by 5,150 during the construction phase. Over half of this reduction in employment would occur outside London. The Midland Metro light rail project is estimated to create 1,100 jobs during construction[93]. Friends of the Earth has previously drawn attention to research from Germany showing that pound for pound these rail investments create more jobs than road building programmes[94]. It is difficult, however, to use these figures to get an accurate estimate of the total numbers of jobs that would be created in upgrading the rail infrastructure in the UK.

Rolling Stock

A similar situation exists for the rolling stock used on the UK rail network. British Rail's fleet of 11,000 passenger trains, recently sold off to three private firms, have an average age of 17 years. In 1992 the Railway Industry Association (RIA) produced figures for the output of rolling stock units if British Rail's strategic document "Future Rail" was implemented in full[95]. Over a ten year period it was forecast that between 5,000 and 5,750 rolling stock units would be produced. In the event orders plummeted and the RIA forecast that once the delivery of 164 Networker units for the King's Cross to Peterborough and Kent coast lines were complete there will be no outstanding orders for trains for the first time in the history of the UK rail industry. This reduction in orders has led to whole works being closed. Most recently the York works of ABB were closed due to the lack of investment during the privatisation process[96]. The US firm that now owns British Rail's heavy freight business, Wisconsin Central Transportation, announced in 1996 that its order for 250 diesel electric locomotives over the next 10 years had been placed with General Motors of the US[97].

Despite these setbacks the UK rail industry remains capable of competing for orders in every aspect of rail investment from electrification to ticket systems. In September 1996 the first order since privatisation was placed. The managers of Chiltern Railways ordered 12 coaches worth £34 million from Adtranz which will be built in Derby. Adtranz is also working with one of the new rolling stock leasing companies to upgrade some 2,000 old 'slam door' coaches and has also recently launched a new tilting train for high-speed lines adapted for UK conditions. Both these projects, if they bring in orders, will result in further work for the Derby plant. After years of redundancies the Derby works has been recruiting for new staff over the last few months[98].

The UK market for rolling stock and other rail products is set to expand. A number of the franchises to operate trains on certain lines have included commitments to refurbish fleets or buy new rolling stock as shown in Table 4.1[99]. Several train operators have also expressed interest in the new tilting high-speed trains. The expansion in the home market that would occur under the sustainable transport scenario would provide a substantial opportunity for those firms not only to win orders but to increase employment.

Table 4.1 Orders expected for new trains

Franchise	Operator	Needs
LTS Rail	Prism	44x4 carriage trains
Midland Mainline	National Express (NEG)	12x2 carriage
Gatwick Express	NEG	6x9 carriage
North London Railways	NEG	20 carriages
ScotRail	NEG	47x3 carriage
South West Trains	Stagecoach	30x4 carriage
Chiltern	M40 Trains	4x3 carriage
South East Trains	Connex	127x4 carriage
Cross Country	Virgin	296 carriages
West Coast Main Line	Virgin	40x10 carriage
Anglia	GB Railways	20x4 carriage
North West Regional	GW Holdings	70 carriages
Regional North East	MTL	16x3 car

Operation

Operation of railways provides direct employment in a variety of areas from driving to ticket sales. The total number employed by British Rail has decreased over the last decade. This is one of the most problematic areas for assessing the employment impact of rail expansion because of the restructuring of the industry and changes in working practices. Some of these are similar to the changes that occurred in the bus industry, such as contracting out of maintenance work and introducing tighter schedules for onboard staff but the changes here also involve reductions in clerical staff and the numbers of middle managers. Wisconsin Central Transportation has given notice that there will be “lots of job losses”[100] following its takeover of rail freight and leaked documents from three of the new rail operators suggest large job cuts are being considered[101]. The train drivers’ union ASLEF has agreed a deal with the Great Western rail company that will see up to 50 drivers jobs go in return for increased pay under new flexible contracts[102]. However, some rail operators have taken on new staff in areas such as telesales[103]. The numbers of jobs lost and new jobs created will vary in terms of both amount and net balance between different firms and regions. In some cases the predictions of the new private sector rail operators to cut costs through redundancies may be exaggerated; Stagecoach, the operator of South West Trains, reduced its number of drivers by 70, only to find that it had too few drivers left to operate its services[104].

It seems likely that there will be a short term and uneven reduction in overall numbers employed in the operation of rail services. However, once these structural changes have occurred, any increase in rail use and expansion of the network would lead to job creation. As the provision of rail travel is increasingly treated for what it is, a service industry, jobs will be created in a range of other activities from marketing to ticketing.

Indirect impacts

Rail investment also can have significant impacts upon employment in the wider economy. An analysis of the economic impact of the CrossRail proposal mentioned above forecasts the creation of 18,000 extra jobs by 2010 once the benefits of the scheme feed through the economy. Unemployment is predicted to be reduced by 11,000 by that year[105]. Over half of these benefits are forecast to occur outside London. Rail investment projects in London are likely to be more effective at generating jobs than similar schemes in other UK cities. This is for several reasons including: the disproportionately high employment generating potential; the complementary relationship with other UK regions; and the fact that its economy tends to compete with other financial centres, mainly outside the UK. A similar study of the London Underground Core Investment Programme in 1993 forecast “36,320 extra jobs on a running basis in London and 34,520 extra jobs elsewhere in the UK by 2003"[106]. By the same year unemployment would be reduced by 12,710 in London and by 28,410 elsewhere in the UK.

Investment in InterCity lines also creates jobs in the economies it serves. Proposals to upgrade the West Coast main line have been at a developed stage for some years. At the most basic level the signalling is now more than 25 years old, the track needs realignment and the power supply for the electrified line needs strengthening. This investment represents the “core” investment proposal. But, given the importance of the line, proposals for an upgrade to allow the use of the new faster 225 tilting trains and to accommodate modern freight systems have been presented by Railtrack. The use of 225 trains would require extra track work and considerably more investment to the overhead power lines. Increasing the freight moved on the line will be facilitated by the use of "piggy back", "high cube" and extra long trains. Piggy back and high cube trains carry lorry and sea containers respectively and are therefore vital for integrating the rail with other transport modes in freight movements. Railtrack has commissioned a job generation study of the project which is due out in 1997[107].

Overall employment impact.

These changes in the rail sector offer a substantial number of new jobs. The urgent need to repair and upgrade the UK's rail infrastructure, in particular, will be a major source of additional employment both up to and beyond 2010. Despite the hiatus in orders caused by privatisation, the UK rail industry remains capable of exploiting this demand and using it as a springboard to win orders abroad as rail capacity at an international level continues to grow. The manufacture of rolling stock and associated components has been hardest hit by the investment crisis. However, here too, significant numbers of jobs would be created under the STS. Employment in the operation of rail services is more difficult to predict. Despite the growth in passenger kilometres the current trend is for reducing employment intensity. Yet the emergence of operating rail transport as a 'service' industry is likely to create employment, both in traditional and new roles. Taking these various assessments into account the figure in the European study cited at the beginning of the section of an increase in employment of 90,000 in rail-based industries from a 35 per cent increase in train passenger kilometres appears optimistic. But the STS includes an increase in passenger kilometres of 70% or twice this level. In such circumstances the same figure for employment gain: 90,000, becomes a reasonable, conservative estimate.

4.5 Other Developments Outside the Scenario

The sustainable transport scenario presented in chapter 1 includes the most fundamental changes that need occur in the transport sector to make progress towards sustainability. However, other changes will occur that complement the movement from cars to cycles, bus and rail. One of these, the overall reduction in transport intensity, does have important implications for the future of transport and the associated employment. First, walking is considered.

Walking

It is perhaps indicative of the unsustainability of current trends in transport that walking is often not even considered as a mode of transport. Yet the number of walking trips is three times that made by public transport[108]. The existing direct employment associated with walking, through the construction and maintenance of paved areas and footpaths, is modest but would increase in a sustainable transport scenario. Developing a network of safe and attractive footpaths in cities and towns would create a range of jobs from the manufacture of paving materials, lighting and street furniture to repair and maintenance.

Pedestrianisation of town centres brings many local environmental benefits including improved air quality, increased safety and more attractive surroundings. It is less significant, on its own, as a method of replacing other forms of transport with walking because people from outside of town and city centres travel to the centre by car or public transport. However, where pedestrianisation schemes are linked with efforts to encourage people to live within such centres they will have a greater impact in terms of traffic reduction and changing how people get to shops and other central services. The use of pedestrianisation as part of such broader schemes is increasing and is likely to continue as PPG13 takes effect and concepts such as urban villages continue to influence developments.

The employment impacts of pedestrianisation are likely to vary considerably given the different types of schemes and the nature of the local economy. Direct employment benefits in the construction and the increased repair and maintenance needs will be small. Indirect effects on employment in the local economy are difficult to judge. Reviews of the economic impact of previous schemes suggest that there will be at worst no job loss and there is the potential for employment gains through increasing the vitality and viability of the centre. One measure of economic impact is the effect on turnover of businesses in the area. Two international studies have shown that pedestrianisation overall has a positive effect on turnover[109]. Another measure of economic impact is rental values. The most recent survey of existing schemes in the UK suggests that the overall effect of pedestrianisation on retail rental performance has been “one of neutrality”[110] to date but notes that with increasing quality of project design the benefits are more likely to be increased.

Reduction in transport needs

Transport intensity is the amount of travel needed to achieve a given economic goal or particular societal need. Reducing intensity is therefore not so much about which mode of transport should be used but whether the need can be met by travelling less distance, less often or not at all. In economic terms this means ‘can the amount of transport needed per unit of output be reduced?’ The CBI has recognised the importance of this element of sustainable transport and identified reducing transport intensity as “the key challenge” for the future[111]. This can be achieved in three main ways: more efficient use of transport movements; the substitution of transport by information technology; and developing settlement patterns that reduce the need for transport. Each of these and the potential employment impacts are discussed in turn.

Materials have to be transported from place to place in any economy, but there are a number of ways in which the same movement of goods can occur with fewer vehicle kilometres. In the UK over a quarter of lorry kilometres were travelled without a load in 1993[112]. Some businesses have been addressing this problem but progress has been patchy. The increasing use of computerised load-matching will allow for greater progress to be made. Improved vehicle routing using computerised systems can also yield reductions in both delivery costs and vehicle-kilometres. One large brewing group has reported a reduction of 5 per cent in its total annual kilometres from using such a system[113]. Some firms have made kilometre savings by shifting to a nominated day delivery system. Reducing the volume of goods through design, miniaturisation or reduced packaging, also reduces the transport needs per unit. National Westminster Bank halved the number of journeys that need to be made by waste paper contractor vehicles by installing compactors at more than 1,500 branches[114]. All of these methods of reducing transport intensity for material goods need to be considered in the context of the trend towards “just-in-time” systems. This has seen stocks reduced throughout supply chains and replaced by a greater number of smaller deliveries that correspond to the customers precise needs making the need for reducing intensity all the greater.

There are no readily available data on the direct impact of such measures reducing transport intensity upon employment. Employment gains could arise in a range of areas from supplying the hardware, software and services associated with the computerised systems mentioned to the design and redesign of products to reduce materials' use and volume. Employment losses from such a reduction in intensity are most likely in the fuel supply industry. But such changes will also bring efficiency benefits and cost savings to the firms involved which can increase competitiveness and the potential for job creation in the firms themselves.

Reductions in transport intensity are also possible through substituting information for transport. The convergence of computer and telecommunication technologies, both of which continue to develop at a rapid pace, offers a growing number of opportunities to substitute information for transport. One of the best known examples is telecommuting where workers use information technology rather than a mode of transport to gain access to the workplace. There is no single normal telecommuting practice but a whole range of practices. A recent survey for the Employment Department[115] found that 11 per cent of the work force worked at home for part of their working week and 6 per cent telecommuted. Teleworkers were found in all industries, regions and firm sizes. In Europe it is estimated that there are some 1.25 million teleworkers[116]. Those firms which operate telecommuting schemes cite reduced costs and the solving of transport problems as two of the main benefits and the managers of such schemes have a high-level of satisfaction with the schemes[117].

Teleworking has considerable potential in contributing to sustainable transport. It is most likely to be taken up by car-users, as opposed to people who use less environmentally damaging forms of transport to travel to work, and by those who have the longest and/or most congested journeys[118]. Around half of all car commuting miles are generated by just 6 per cent of car commuters - those with journey distances more than 35 miles. One study found that existing teleworkers had an average travel to work distance of 21 miles against an average of just more than 8 miles for all car commuters[119]. Concerns that increases in telecommuting may merely replace journeys to work by more frequent local journeys are not backed up by the few studies that have examined the issue[120]. Realising this potential is, however, a complex task that can't be analysed here. The question here is if telecommuting were to spread what would be the impact upon employment?

It is not surprising that a computing firm like Digital both employs a high percentage of teleworkers (about one third of its workforce) and expounds its virtues. Digital UK has over 1,200 "flexible workers" who it estimates save the firm £4.2 billion net each year and are also 20-30 per cent more productive[121]. However, the opinion that teleworking makes the sort of economic sense that will create employment is shared by others. The European Commission's Bangemann report on the Information Society identifies teleworking as a strategically important technology that will "constitute the nervous system of the economy"[122]. The report sets out various targets for increasing teleworking across Europe including an overall level of 10 million by 2000.

There are other possibilities for substituting information for transport. Video-conferencing, where one or more sites may be linked in both sound and vision, is one technology that offers some potential for reducing transport. As of November 1995, however, there were only about 100,000 dedicated terminals worldwide but with the introduction of desk-top PC applications that number was predicted to double in 12 months[123]. Many large firms have their own video-conferencing system which reduces the need for travel between sites. BT estimates that the meetings it holds internally by video conference is equivalent to 4,114,447 passenger miles[124]. Some of those meetings, however, will have been made possible by the technology rather than representing a decrease in travel. There are examples of where this technology has replaced travel. One firm, whose Board of Directors are split between London and Scotland, holds its board meetings by video-conference and uses its system for around ten meetings a day. Where it is applied efficiently video-conferencing can benefit the firms using it not only by reducing travel costs but also in minimising time away from the office of key personnel, thus increasing productivity. Surveys of business travellers show that replacing business travel by advanced telecommunications is an increasingly accepted trend[125].Although, air travel is the most likely to be substituted rail and car journeys will also be affected.

Potential employment benefits from the growth in telecommuting and videoconferencing are both direct and indirect. UK firms are well placed to exploit the jobs that will be created in the manufacturing and service industries that will facilitate these developments. In addition the efficiency gains enjoyed by the user industries also have the potential to create jobs. It would, however, be wrong to suggest that such advances in information technology are unproblematic for either sustainability or employment. Like any powerful force of change there are opportunities and dangers. The examples given above, however, indicate where these changes can aid the development of sustainable transport.

The third method of reducing transport intensity is to use land-use planning to ensure that unnecessary travel is avoided. At a very basic level, the closer homes and activities are to one another, the less need there will be for travel. The dominance of the car and the provision of new and faster roads has led to the location of new housing, leisure facilities, shops and other services according to the ability to access them by car. This has increased the need to travel. Land-use planning provides the opportunity to achieve a distribution and location of land-uses so as to reduce the need to travel[126]. It is an opportunity that the UK Government recognises as part of sustainable development. In 1994 the Department of the Environment produced guidelines[127] for planners that specifically encouraged a reduction in the need to travel and a shift from car to alternative means of transport with less environmental impact.

Research undertaken for the Department of the Environment suggests that a 10-15 per cent reduction in traffic could be achieved through such techniques. The employment impacts of such changes are several. One impact will be that the 10-15% saving in fuel use by passenger transport will reduce employment in the fuel industries. There may also be some wider impacts upon the car industry. Both of these effects are included in the modelling work by ECOTEC summarised in Chapter 3. Increases in employment may arise from the economic benefits of improving the quality and vitality of the urban environment. The Government makes this clear when it advises local authorities to adopt land-use and transport planning policies that:

"*Strengthen existing local centres which offer a range of everyday community,* *shopping and employment opportunities, and protect and enhance their viability and vitality*"[128].

The only study of the economic impact of PPG13 which considered both micro and macro economic impacts concluded that *"the effect of these changes on the national economy is likely to be very limited*"[129].

4.6 Direct Job Generation Under the Scenario

The increases in cycling, bus and rail travel included in the sustainable transport scenario wll generate employment. The estimates of how many extra jobs will be generated presented in this chapter have been calculated in a manner that is comparable with the methodology used in chapter 3 for changes in car travel. The figures are for the direct employment impacts alone and, like those in chapter 3, do not include multiplier effects. Table 4.2 summarises the estimates that have been made for the increases in cycle, bus and rail travel.

Table 4.2: Direct Employment Impacts of the Cycle, Bus and Rail Components of the STS

	Manufacturing and Sales	Infrastructure	Operation	TOTAL
Cycle	8,000*	1,000		9,000
Bus	4,000		27,000	31,000
Rail				90,000**
TOTAL				130,000

Note: no quantitative estimate has be made for the impacts of reducing transport intensity and increasing walking. Indirect impacts mentioned in this Chapter are not included.
* includes accessories
** includes a high proportion of jobs in repairing and upgrading infrastructure

From this we can conclude that there will be a substantial overall increase in direct employment associated with the increased use of other transport modes, and other measures in the Sustainable Transport Scenario. However, further research is needed to model these direct employment benefits in a more sophisticated manner in order to provide a more accurate estimate of how large the net increase should be. This report also does not assess the indirect employment impacts of the implications of the Scenario through its effects on wider economy.

There are a whole range of policy measures that can be used by central and local government to facilitate these changes. It is likely that these measures will also have different employment impacts. The final chapter will discuss how the relationship between transport policy measures and employment impact needs to be considered.

4.7 Net Direct Employment Impact of the STS

The Sustainable Transport Scenario set out in section 2.5 of the report will bring increases in the employment associated with cycling, bus and rail passenger transport and reductions in the overall employment associated with car transport.

Chapter 3 provided an assessment of the scale of the reductions in employment associated with car transport and demonstrated that if the uptake of cleaner technologies and leasing schemes increased then the associated job losses would be less. Chapter 4 has assessed the scale of the increases in employment associated with cycling, bus and rail passenger transport. The balance of these gains and losses, shown in Table 4.3, provides an assessment of the net direct employment impact of the sustainable transport scenario.

The direct employment associated with land-based passenger transport increases under the STS. In other words the reduction in employment associated with car transport is significantly less than the employment gains in cycling, bus and rail passenger transport. Table 4.3 also highlights that the net employment increase is larger if there is a greater take-up of cleaner technologies and leasing schemes in the car sector.

Table 4.3: Estimate of the net direct employment impact of the STS.

	Car-based Industries	Cycle, Bus and Rail Industries	Net Effect
Baseline STS	- 43,000	+ 130,000	+ 87,000
High Technology Take-up	- 23,000	+ 130,000	+ 107,000
Combined high-tech, high lease	- 8,000	+ 130,000	+ 122,000

5

The Route Ahead

5.1 Introduction

The analysis presented in this report has highlighted the potential for increasing employment at the same time as shifting to a sustainable transport system in the UK. Specifically it has shown that both reducing road traffic and greening car technology bring employment benefits. The mix of policies chosen to develop a sustainable transport system in the UK has to able to both deliver the changes in travel behaviour required and realise the potential employment gains. This chapter looks briefly at the factors that will determine whether that mix of policies is effective and create jobs before considering each of the broad types of policy that can be used.

5.2 Making Progress

First, and foremost, any mix of policies has to be effective in developing a sustainable transport system in the UK. Progress has to be made on three fronts. First, transport intensity should be reduced. In other words, people and businesses should be able to continue to do all the things they need to do but by travelling less rather than more. Second, the balance between different modes of transport has to be changed. Private transport choices with a low environmental impact (such as walking and cycling) and public transport (such as bus and rail) have to expand at the expense of the use of cars. Third, the environmental impact of the vehicles used in each mode of transport but, given its dominance, especially the car, has to be significantly improved by a leap forward in fuel efficiency, the introduction of cleaner fuels and new types of engine and an increase in the re-use of components.

Although the chorus of voices for such change continues to grow, the current dominance of the car presents major barriers. Consecutive Governments over the past decades have ploughed vast sums of tax-payers' money into building roads that are provided free at the point of use. The role of the car in society is now deeply embedded. The changing shape and distribution of cities, towns and villages is increasingly influenced by car transport. At a political level the firms that manufacture cars and the supply the fuel for them are some of the largest in world with significant influence on Government policy.

There are four basic criteria that any policy mix must meet if it is to be effective in overcoming these barriers. First, Government must make clear commitments to the nature and magnitude of the changes required and the timescale those changes need to occur in. This is vital because transforming the transport system toward sustainability will take over a decade and will require combinations of policies that operate over that time-frame. The form of such targets is discussed in more detail in section 5.4. Second, the true costs of road transport must be better accounted for by the mix of policies. Not only have successive Government's subsidised road transport through the roads programme but the full costs of car pollution have not been borne by the car user. Third, the mix of policies cannot simply raise the price of car travel and restrict car traffic without ensuring other modes of transport are developed in a way that provides viable alternatives. This will be particularly important in the early stages of the transformation in order to overcome years of skewed Government policy and to ensure that regressive social impacts do not arise - for example, for the rural poor. Fourth, the package of measures must go beyond purely transport policy to include those areas of policy which significantly influence progress toward a sustainable transport system, such as planning and technology policies.

5.3 Employment Generation

There are four key characteristics of the policy mix that should guide the choice of instruments to ensure that as well as being effective they also realise the employment benefits described in chapters 3 and 4.

Policies need to be ***clear, certain and predictable***. All policy instruments, whether they are financial incentives, performance standards or other measures, aim to change behaviour. They therefore need to send a clear message about what is required. It is equally important that there is, and there is seen to be, a firm commitment to the policy and its goals. If those who need to make changes are either unclear about what is required or sense that they may be able to avoid making changes they are less likely to change. Finally, as noted above, the changes required are major ones and will occur over a period of years and it is important that those responding to the policies know how demands upon them will change over time.

Investment by companies will be a vital component of developing a sustainable transport system. It will bring many of the jobs forecast in this report. The range of investment will be wide, from car manufacturers developing new greener car technology and rail service firms buying new rolling stock to entrepreneurs setting up new firms in transport services and households buying new bicycles. Whatever the type of investment it can be inhibited by uncertainty, whilst unpredictable policies risk damaging the industries that serve the transport sector in the UK. For example bus deregulation undermined the bus manufacturing industry whilst rail privatisation has seriously weakened rolling stock manufacture. On the other hand, predictable policies, such as the fuel price inflator, induce more investment in the right direction. This is particularly true if there is a clear intention to raise standards over time. If the policies seem weak, uncertain and are liable to be relaxed in the next few years then investment is likely to be postponed or directed at cheaper, less radical options.

Policies need to have ***appropriate timetables***. Within a 10-15 year timetable, as used in the sustainable transport scenario, the mix of policies is likely to include a range of policies implemented at different times or over different timescales. Those timescales need to strike the right balance between driving up the pace of progress but in a manner that allows firms in all the relevant sectors to respond strategically.

Policies need to be ***integrated***. Having policies that pull in different directions is bad for both the effectiveness and the impact on employment of any package of measures. It is not enough to have a set policies aimed at achieving environmental goals in the transport system that are isolated from others aimed at the economic and social performance of the sector. Any package of policies aimed at developing a sustainable transport system must integrate considerations for the environmental, social and economic impact, including employment.

The package of policies needs to ***stimulate innovation***. The transformations needed in the STS and, in particular, in the high technology scenario for the car-based industries shows the importance of innovation to both reducing environmental impact and gaining employment benefits.

5.4 Policy Options

In designing a coordinated package of measures aimed at developing a sustainable transport system there are range of policy types that can be drawn upon. This section looks at each of these types of policy to assess what role they can play in bringing about the required changes in the transport sector in a way that brings employment benefits. It is not the intention of this section to put forward a complete set of policies but to indicate the ways in which the double dividend of greener transport and job creation can be realised more effectively through appropriate policy choice and design.

One other point should be made before looking at the policy types. Over the last five to ten years the use of 'new' policy measures has increased. In particular, support for, and to a lesser extent the use of, financial incentives such as taxes, charges and tradable permits has increased. This has enriched the choice available to Governments in regulating economic behaviour. It does not mean that previously common policy measures are no longer viable - rather it means that Governments have a greater opportunity to choose the appropriate policy option or options to achieve particular goals.

Long-term Targets

Setting targets and timetables based on scientific and political judgements about desirable levels of amenity, acceptable risks to human health, ecological integrity and future security is a key responsibility of Government in achieving sustainable development. Such goals provide a framework within which combinations of policies can be designed to be effective over the longer-term.

In terms of both effectiveness and impact upon employment, long-term targets have major advantages. They can provide clear statements about the nature and magnitude of change required. This allows firms to make strategic and effective responses. Depending on their form they can also demonstrate a clear commitment on the part of Government. Commitment is strongest where targets are passed by Parliament. Statements by Government Ministers about environmental targets and timetables without a formal foundation have been shown to be vulnerable[130].

The Road Traffic Reduction Act passed by Parliament this year is a first step toward establishing such formal targets in transport policy even though the national target was eliminated from the Bill by the Conservative party as a condition of its support. The Act requires local authorities to set long-term targets for traffic reduction or the restraint of traffic growth, unless they can find a compelling reason not to. A new Bill, the Road Traffic Reduction (National Targets) Bill, being promoted by FOE, aims to force the Secretary of State for Transport to adopt a similar approach at the national level. The Royal Commission on Environmental Pollution's 18th Report on transport offers a firm foundation for developing other long-term targets that will help to increase the use of other modes of transport and reduce transport intensity.

The other critical aspect of such long-term targets is that they should be based primarily on what needs to be achieved and not on what short term analysis suggests is most likely to be achieved given current technologies, institutions and values. Progress in tackling environmental issues has a long history of being stifled by such short-termism. Innovation and the creation of business opportunities are stimulated by setting longer-term targets that offer real challenges. This report has shown that it is these processes that will not only deliver significant progress toward a sustainable transport system but to do so in a manner that also brings employment growth. The sustainable transport scenario, and in particular the high technology version suggested in this report, provides challenging targets but a timescale that encompasses established industry investment cycles, provides good R&D lead-time and allows for industry restructuring in a way that minimises economic costs and maximises economic benefits, such as employment.

A combination of targets for traffic reduction and fuel efficiency has been put forward by Friends of the Earth as a method of reducing CO_2 emissions from the transport sector in line with the UK's environmental space[131] . In addition to the target of reducing road traffic by 10% over 1990 levels by the year 2010 used in the STS, the environmental space study also proposes a 50% increase in fuel efficiency by the same date. This is a radical change which could stimulate employment in line with the high-tech uptake scenario. Given the timescale it is also one which the industry can achieve in a strategically planned manner.

Financial Incentives

Over the last decade, financial incentives, or market-based mechanisms, have been strongly advocated by many policy analysts and embraced in principle by various Governments. The Fifth Environmental Action Programme of the European Commission, for example, placed a heavy emphasis on such policy instruments and the UK Government has done the same[132]. The basis of these instruments is that for a given environmentally damaging activity, firms or individuals pay a charge or tax related to the amount of damage for which they are responsible. The more pollution they emit the more money they have to pay.

The main general benefit of financial incentives in achieving long-term environmental goals, of the type included in the STS, is that they provide a continuing motivation for environmental improvement. They are not tied to a given level of performance but encourage progress to be on-going. Some of these instruments, when applied in particular cases, will have other advantages. For example, increasing the price of road fuel to make the motorist pay for the environmental costs of travelling by car has low administrative costs because it is simple to apply and it hits the largest polluters hardest. On the other hand urban road pricing is far more complex to design and operate and consequently has higher administrative costs.

The effectiveness and efficiency (the total cost of achieving a given goal) of financial incentives needs to be considered in terms of how they operate in the real world, rather than in theory, for each case. Policy analysis in both pollution control[133] and energy[134] have shown that structural obstacles, lack of information and what is known as consumer irrationality can seriously undermine the effectiveness of financial incentives. In the case of transport, many factors, including a lack of investment in public transport, a long-running car-centric transport policy and a disastrous attempt to de-regulate the bus sector have led to the structural problem that at present for many journeys there is not a viable alternative to the car. The social position of the car also leads to ‘consumer irrationality’ through car dependency, the status for some of driving rather than using other forms of transport and the status of driving large or fast cars that are the least fuel efficient. These problems do not mean that financial incentives are not an option, just that have to be designed bearing these real world issues in mind and, crucially, operated as part of a set of integrated policies.

Shifting the balance of passenger transport between the car and other modes of transport can be stimulated by taxes that are relatively cheap to administer and put up the price of car use relative to other forms of transport. Increasing the price of road fuel is widely accepted as an appropriate method of both making car users pay the costs of their pollution and discouraging car use. The critical issue is the level of the tax. The current 5% escalator on road fuel duty is predicted to increase prices only to mid-1980s levels in real terms by 2005[135]. Increasing the escalator to 8% per annum[136] would make it more effective at cutting urban air pollution and reaching the Royal Commission on Environmental Pollution’s recommendations regarding fuel prices. The availability of cheap car parking also has a major influence on travel choice and encourages car use. Although controls over the location and cost of car parking is an important consideration in local transport planning, a national tax on car parking that increased costs across the board can be an effective accompaniment. At the same time existing financial incentives that encourage car use should be removed. The generous taxation treatment of company cars provides a perverse incentive to drive further through mileage banding. This also limits the effectiveness of the road fuel price escalator and should be corrected as a matter of priority.

Improving the environmental performance of technologies used in all modes of transport but especially the car can be facilitated by providing a price differential between those technologies. One simple reform, for example, would be to replace the current flat rate of £140 Vehicle Excise Duty per car by a system that is graduated with lower rates for cars that are more fuel efficient and pollute less. The present Government has already begun the process of using the tax system to install price differentials between cleaner and dirtier types of road fuel following the success of financial incentives at increasing the use of unleaded petrol. Friends of the Earth has previously published research that puts forward details of how these financial incentives can increase the use of cleaner fuels and increase fuel efficiency[137].

The advantage of using financial incentives in terms of employment impact, is that they provide an on-going motivation to innovate and improve performance. Where they take the form of a rising tax such as the road fuel price escalator the effect on innovation is enhanced and the certainty and predictability of the policy over the medium to long term is clear. Taxes also offer another major employment benefit, although it concerns the wider economy rather than just the transport sector. Where the revenue from such taxes is used to reduce the amount of tax paid by employers on each member of its workforce (employers' national insurance contributions) the resulting shift in the burden of taxation, known as eco-tax reform, has been shown to increase employment levels[138]. This provides an added reason for using financial incentives as a motivating force in support of other transport policy measures.

It is worth noting that if revenues from the tax changes proposed above were recycled to some degree to reduce employers' national insurance contributions, then according to existing studies all but the fuel producing industries in the sector would benefit from the shift in taxation[139]. However, this analysis uses data for broad sector headings and is therefore not likely to give a detailed picture. Friends of the Earth, while advocating eco-tax reform, recognises the importance of being able to forecast more accurately the impact of such changes on particular sectors and has, together with Forum for the Future commissioned Cambridge Econometrics to conduct a detailed study of the sectoral impacts of eco-tax reform to be published the summer of 1997.

Direct Regulation

Direct regulation is the use of law to define what firms and individuals can or cannot do with regard to specific environmental problems. Like financial incentives direct regulation can take many forms, such as technology standards or outright prohibitions. And like financial incentives they are good at achieving some policy objectives and not so good at others. For example, they are an effective way of ensuring a minimum standard or taking quick action to stop or severely restrict certain activities. On the other hand they are often not so good at directly stimulating innovation or providing the motivation for continuous progress to be made.

In terms of effectiveness direct regulation has a role to play both in greening transport technology and shifting the balance between modes of transport. Setting regulations on the minimum emission standards for new cars is a proven policy option. Moreover it can be used alongside financial incentives that stimulate car makers to go beyond compliance with the minimum standard. Where such regulations define the performance required rather than the technology to achieve it and provide an adequate lead-time they also can provide a stimulus to innovation[140]. Neither does the lead-time have to be that long. Research on the relationship between environmental regulation and innovation has shown that in many cases the technological solutions to tougher regulations are in fact close to the final stage of development[141]. There is a reservoir of technology which is under-utilized and could be tapped for rapid improvement[142]. Existing regulations can also be adapted to encourage uptake of such technologies. The standards for emissions element of the annual car MOT can be made more stringent and obligatory for all cars from one year after registration[143]. Finally, regulation is an effective way of ensuring that environmental information is made available to the public. This is important where financial incentives are operating which assume that consumers have the appropriate information. An easily understood and prominent labelling system for cars according to their fuel efficiency and emission of pollutants is needed.

Direct regulation can also have a role in effecting a shift from cars to other modes of passenger transport. The use of cars can be regulated in a number of ways, the effectiveness of which depends on how they are applied at a local level as part of a integrated set of policies. Examples of direct regulation of car use that could be used a package of measures include: changing those regulations already in place, such as reducing speed limits; limiting road access in cities at commuting times according the number of people in a car; and establishing or extending car free zones in town and city centres.

The attractiveness of public transport and the combination of different modes other than car can also be improved by well designed regulation. The rail sector has a regulatory body that is in a position to encourage or demand appropriate investment and ensure that services are developed in a way that offers a real alternative to car travel. It can also aid the integration of rail with other modes of transport such as bus and cycle. It needs to address these issues in a clear manner as a matter of urgency. The bus industry is 'deregulated' and, as a recent report to the Government[144] concluded, is suffering because of it. Coordination of the operations of individual bus companies to create an efficient and comprehensive overall bus service is vital if bus travel is to gain new passengers who currently use cars. Establishing the necessary strategic overview will not only require a review of how the market is regulated but institutional change as well. The Royal Commission has called for more and stronger Passenger Transport Authorities with a system of route franchising[145].

The employment impact of using direct regulation depends largely upon how stringent it is and the timescale for compliance. Many of the shorter term and more locally managed regulations are not likely to have a great effect upon employment one way or the other. The major employment gains in the STS centred around the expansion of bus and rail transport and the innovation in greening of car technology. Regulation of the rail and bus sectors through specialised regulatory bodies offers the opportunity to ensure that direct regulations are used in a manner that encourages each market to develop and expand which will bring the employment benefits described in Chapter 4. The recent use of direct regulation in California to stimulate innovation toward the use of 'Zero Emissions Vehicles' which employed a tough target but a longer than usual lead-time for compliance, is an example of how this type of policy measure can be used to realise the employment benefits described in the high technology scenario for the car industry.

Planning Approaches

Both land-use planning and transport planning will play a crucial role in developing a sustainable transport system. Transport planning measures can be used to: contain and reduce total traffic volumes; reduce traffic flows and increase reliability rather than maximise throughput of vehicles; accommodate and encourage walking and cycling; and improve public transport. Friends of the Earth has previously highlighted the effectiveness of these measures[146]. Land-use planning has a crucial role in controlling not only present but also, crucially, future transport demand. It can regulate the location and amount of particular types of development, such as out-of-town shopping centres and strongly influence the nature of certain developments. With regard to sustainable transport it has the ability to both reduce the need to travel and affect choices over the mode of transport.

The employment impact of transport planning will be related to how successful the measures are at effecting a shift of passengers from car to cycle, bus and rail. There are also direct employment impacts associated with some of the measures, such as the construction of traffic calming measures and the design and operation of priority schemes for buses and cycles. The impacts on employment of land-use planning are more long-term.Where it increases the use of cycles, bus and rail at the expense of cars, the employment gains described in chapter 4 will be more likely to be achieved. Planning can also reduce the need to travel and so reduce the transport intensity which has only briefly been touched on in this report.

Public Expenditure

Although most of the transport considered in this report is now in private ownership in the UK, there remains a key role for Government investment in the development of a sustainable transport system. Indeed the Government currently spends large sums not only on infrastructure such as the roads programme but also on supporting car manufacturers and financing research and development in the transport sector. If we are to have a sustainable transport system in the UK the pattern of spending has to change and in key areas, increase.

The chronic under-investment in public transport in the UK was noted in chapter 4. This situation together with years of over-investment in the road network and the overwhelming dominance of the car in passenger transport means that the “passenger transport market” operates on a very uneven playing field. If bus, rail and cycle are to win over passengers from the car there has to be substantial investment in these modes of transport, not all of which can be stimulated from the private sector.

Government spending on R&D in transport also has to be realigned to reflect the goal of sustainable transport. Assessing the cost-effectiveness of R&D programmes is difficult. However, there are areas of pre-competitive transport research that can be supported in order to provide the next step after the changes included in the STS. For example, there is a consensus that, in the longer term, fuel cells will be a important component of the running a transport system runnning within environmental limits. As noted in Chapter 3, the timescale within which fuel cells are likely to become commercially viable is shortening. Government support for targeted R&D will help that process.

5.5 Integrated Policies

It is clear that the goal of developing a sustainable transport system in the UK will require a range of policies that complement and reinforce each other. It is important that these policies are considered as a whole and as a means of achieving medium term change in travel behaviour, transport technology and the institution of the transport sector. Although the goals set out in this report are in a timeframe lasting more than a decade it is absolutely essential that action is taken now and “must be vigorously pursued”[147]. This point is particularly important at this moment in time, when consensus around why a sustainable transport system is needed, and what, more or less, it should consist of has been reached, but the decisions about how to deliver it have yet to be made. These decisions cannot be put them off any longer. This report has provided evidence that making progress will also create jobs. In particular it has shown that there are direct employment benefits both from increasing cycle, bus and rail travel at the expense of car use, and from technological change in the car industry oriented toward reducing the environmental impact of its product.

If the package of policy measures is to be both effective in environmental terms, and realise the employment benefits identified in this report it must draw on the wide range of policy instruments that is available. While details of the full package of measures, such as that put forward by the Royal Commission will require public debate, some of the first steps are clear and can be taken promptly.

The Budget provides an ideal starting point. There are three basic policy themes that can be advanced immediately: ecological tax reform; shifting expenditure priorities; and installing price differentials to encourage greener technologies. Friends of the Earth has long argued for eco-tax reform and, most recently, put forward a package of measures to the Chancellor before the 1996 budget[148]. The package included raising the road fuel price escalator to 8% and removing company car perks with a recommendation that a tax on company car parking be introduced as soon as possible. Detailed proposals for using taxation to establish price differentials to encourage the take-up of cleaner and more fuel-efficient car technologies have also been brought forward in a recent Friends of the Earth report[149].

Expenditure on the roads programme has been cut in the last two years but the programme still contains road building schemes that threaten valuable natural habitats and beautiful landscapes. The urgent need for investment in public transport infrastructure has been noted in this report. The initial levels of expenditure needed to clear the backlog of public investment and the scale of the improvements necessary mean that a revenue neutral shift in spending on transport infrastructure from roads to other modes will not be adequate over the next few years. Exactly how extra money is to be found is a matter for political debate. However, it is worth noting that the revenue from the proposed tax increases on road fuel and company car parking could comfortably cover such investment costs. Moreover, although the eco-tax reform package suggests using the revenue from these taxes to cut employers’ NICs as a means of stimulating employment, this report has shown that using the revenue to increase public transport should also create substantial numbers of jobs.

These measures aimed at creating the sustainable transport system that everybody desires will integrate economic and environmental objectives in a way that would strengthen environmental protection, create jobs and benefit all sections of the community.

Appendix 1: *NACE sectors included in each of the stages of the car life-cycle*

Material Input

11.10 Extraction of crude petroleum and natural gas
23.20 Manufacture of refined petroleum products
24.16 Manufacture of plastcis in primary form
26.14 Manufacture of glass fibres
26.25 Manufacture and processing of other glass
27.10 Manufacture of basic iron and steel
27.42 Aluminium and aluminium alloys
27.44 Copper production and copper alloys
40.10 Production and distribution of electricity
40.20 Public gas supply

Vehicle Component Manufacture

25.11 Manufacture, retread and repair of rubber tyres
28.74 Bolts, nuts, rivets, washers, springs and non-precision chains
31.10 Manufacure of electrical motors, generators and transformers
31.40 Manufacture of accumulators, primary cells and primary batteries
31.61 Manufacture of electrical equipment for engines and vehicles
34.30 Parts and access for motor vehicles and engines

Vehicle Assembly / Manufacture / Disassembly & Recycling

34.10 Manufacture of motor vehicles and engines
34.20 Motor vehicle bodies
34.32 Storage batteries and primary batteries (dry/wet)
34.34 Vehiclular lighting equipment
35.20 Manufacture of rail/tramway locomotives and rolling stock
37.10 Recycling of metal waste and scrap
37.20 Recycling of non-metal waste and scrap
51.57 Wholesale of waste and scrap

Vehicle Operation / Service

45.23 Construction of highways, roads, airfields and sports facilities
50.10 Retail distribution of motor vehicles and parts (incl 50.30)
50.20 Maintenance and repair of motor vehicles
50.50 Retail of automotive fuel/ fuel oil dealers
Tyre and exhaust fitters
60.22 Taxi operation
65.21 Financial leasing
71.10 Renting of automobiles
Automobile parking

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