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Reducing Greenhouse Gas Emissions from Road Transport: Baseline Report 1990 - 2007

Department for Regional Development
Transportation Policy Division
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CONTENTS

EXECUTIVE SUMMARY

i. This is the first in a series of papers which have been commissioned to inform the development of sustainable transport arrangements through the Review of the Regional Transportation Strategy. The paper sets out the 1990 baseline and 2007 position on greenhouse emissions from transport in the North and highlights a number of key trends impacting on transport emissions.

ii. Drawing on the findings of this paper, further studies will be undertaken to identify and cost options to reduce greenhouse gas emissions from road transport. These papers will take account of the legislative and policy context, anticipated technological developments, key research findings and the experience and plans of other administrations.

iii. Through the Programme for Government (PfG) the Executive have set out their commitment to ***reduce greenhouse gas emissions by 25% below 1990 levels by 2025.***

iv. By 2007, greenhouse gas emissions here had reduced by 13% on the 1990 baseline. Conversely, however, emissions from road transport increased by 47% during this period, adversely impacting on the cumulative progress realised in other areas. Had the level of emissions from road transport been maintained at or near to 1990 levels this would have contributed to a 19% reduction in greenhouse gas emissions rather than the 13% realised.

v. While the private car remains the largest contributor to road transport emissions, 50% of the increase in greenhouse gas emissions from road transport from 1990-2007 can be attributed to the freight sector. These trends reflect the significant growth in vehicle ownership and traffic since 1990 and would appear to have been driven by the unprecedented expansion of the local population and economy over that period.

vi. In the absence of significant technological developments, behavioural change or policy initiatives, emissions from road transport are likely to continue to rise. Moreover, that increase has the potential to be at a rate in excess of the cumulative reductions achieved in other areas. As such, it is highly unlikely that the Executive's PfG target can be achieved without action to reduce greenhouse gas emissions from road transport.

vii. The scale of the challenge is considerable, but it is unlikely to decrease in the absence of a concerted policy response focused on all areas of transport including freight.

viii. Any response, however, cannot be taken forward in isolation from government's wider policy agenda. The Executive's top priority is to grow the economy, with a focus on high value activities and more balanced regional development. Alongside initiatives to address poverty and exclusion, this has the potential to require higher levels of mobility in relation to people, goods and services. The challenge will be to effectively manage and appropriately respond to that demand while delivering real reductions in emissions from transport. It is also imperative, that policies across government do not unnecessarily increase the demand for transport or promote unsustainable outcomes.

1. BACKGROUND

Context

1.1 Climate Change is one of the most significant challenges facing the world today. If unaddressed, it has the potential for far reaching economic and societal impacts both locally and internationally[1].

1.2 Ultimately, addressing climate change requires action internationally, however, the Executive are determined to play their part and reduce our impact on climate change.

1.3 In line with this, the Programme for Government (PfG) sets out a target **to reduce greenhouse gas emissions by 25% below 1990 levels by 2025**. The PfG target reflected UK wide targets at that time, requiring a 50% reduction in greenhouse gas emissions by 2050. Subsequently, the Climate Change Act 2008, enacted by Parliament in November 2008, sets a UK wide target for a reduction in greenhouse gas emissions of at least 80% by 2050, and reductions in CO_2 emissions of at least 26% by 2020, against a 1990 baseline.

1.4 By 2007 road transport had emerged as the largest source of CO_2 emissions in the North, accounting for 29% of total carbon emissions. It is, therefore, unlikely that targeted reductions in greenhouse gas emissions can be achieved without action to reduce emissions from road transport.

1.5 In addition to the commitment to reduce greenhouse gas emissions, however, the Executive have also set out how growing the economy, with a focus on high value activities and more balanced regional development, is their top priority. Transport is both an enabler and a consequence of economic growth[2], with higher levels of economic growth historically associated with increased demand for transport.

1.6 Realisation of the Executive's economic goals, therefore, is likely to require increased mobility of people, goods and services. Delivering reductions in greenhouse gas emissions from road transport while ensuring the provision of transport arrangements that meet economic and social needs presents a significant challenge.

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1 *Stern Review on the Economics of Climate Change* (October 2006) discusses the effect of climate change and global warming on the world economy. Available at **http://www.hm-treasury.gov.uk/sternreview_index.htm**

2 *The Eddington Transport Study* (December 2006) sets out an analysis and discussion of the link between transport and economic productivity. Available at **http://www.dft.gov.uk/about/strategy/transportstrategy/eddingtonstudy/**

1.7 Reconciling these potentially competing priorities is a key objective of the review of the Regional Transportation Strategy (RTS) now underway.

1.8 To inform the review of the RTS, and contribute to the development of sustainable transport arrangements, this paper aims to clarify the nature of the challenge, by

- setting out the 1990 baseline and the most up-to-date figures available (2007) for greenhouse gas emissions;
- identifying key trends in transport emissions;
- highlighting key trends impacting on transport demand; and
- projecting the levels of greenhouse gas emissions from road transport to 2020-2025 based on the continuation of existing trends and identifying a trajectory for achieving the targets.

1.9 Further papers will be produced identifying and costing options to reduce transport emissions.

Greenhouse Gas Emissions Data

1.10 The data on greenhouse gas emissions set out in this report are taken from the Northern Ireland Greenhouse Gas Inventory. Calculated annually by AEA Technology on behalf of the Department of the Environment (DoE), the estimates are consistent with the United Nations Framework Convention on Climate Change (FCCC) reporting guidelines and the UK Greenhouse Gas Inventory. The results are published in a combined inventory report setting out estimates for England and the Devolved Administrations[3].

1.11 The Inventory estimates emissions of the six direct greenhouse gases: Carbon Dioxide (**CO_2**); Methane (**CH_4**); Nitrous Oxide (**N_2O**); Hydrofluorocarbons (**HFCs**); Perflouorocarbons (**PFCs**); and Sulphur Hexafluoride (**SF_6**). These are weighted to reflect the relative global warming potential (GWP) of each gas, using the effect of CO_2 over a 100 year period as a reference. This results in the following weighting:

3 Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland 1990-2007 (September 2008). Estimated and published by AEA Technology on behalf of DEFRA, The Scottish Executive, The Welsh Assembly Government and DoE. Available at **http://www.naei.org.uk/reports.php?list=GHG**

	Greenhouse Gas	GWP Weighting
1	Carbon Dioxide	1
2	Methane	21
3	Nitrous Oxide	310
4	Sulphur Hexafluoride	23,900
5	Perflouorocarbons	Varies according to individual gas
6	Hydrofluorocarbons	Varies according to individual gas

1.12 These are set out in relation to 9 main producers / sinks of greenhouse gas emissions as follows:

i Agriculture
ii Business
iii Energy Supply
iv Land Use Change
v Public
vi Residential
vii Transport
viii Waste Management

1.13 Within each of these sectors, more detailed breakdowns are available. For example, within Transport it is possible to look at road, rail, air and marine emissions, and also to focus on more specific aspects of these areas, i.e. within road transport it is possible to look at the emissions produced by various types of road transport.

1.14 There is some inherent uncertainty in the estimates, however, the reporting methodology fully conforms to FCCC reporting guidelines and as such the estimates set out in the inventory are the most robust available at a UK and devolved administration level. Not withstanding that, the methodologies and data sources used to compile the inventory are reviewed annually and revisions are made as appropriate. Revisions are also applied historically, i.e. the 1990 baseline figure may change from inventory to inventory based on these improvements.

1.15 The Inventory and local climate change targets are based on operational components. In transport this relates to the emissions associated with operating the vehicle[4] or running the engine. Although a number of studies have indicated that the majority

4 The AEA report, ***Carbon Footprinting of Policies, Programmes and Projects*** investigated the life cycle elements for public transport and concluded that for buses and trains 72% and 92% of emissions respectively were associated with running the vehicle. Research by Toyota on their vehicles found that 72% of life cycle emissions were produced from driving.

of emissions from transport are associated with the operation of vehicles, there has been some debate internationally regarding the merits of a wider focus on the carbon footprint of transport. This would require consideration of emissions associated with the construction and maintenance of travel infrastructures - i.e. street lighting, vehicle production and road construction – in addition to the operation of the vehicle.

1.16 While recognising the potential merits of such an approach, it would be difficult to provide for a robust assessment of past and future trends at NI level given the nature of both local and international reporting and monitoring frameworks. However, in assessing options on the way forward, where practical and in line with the availability of robust data, future papers will aim to consider wider life cycle emissions.

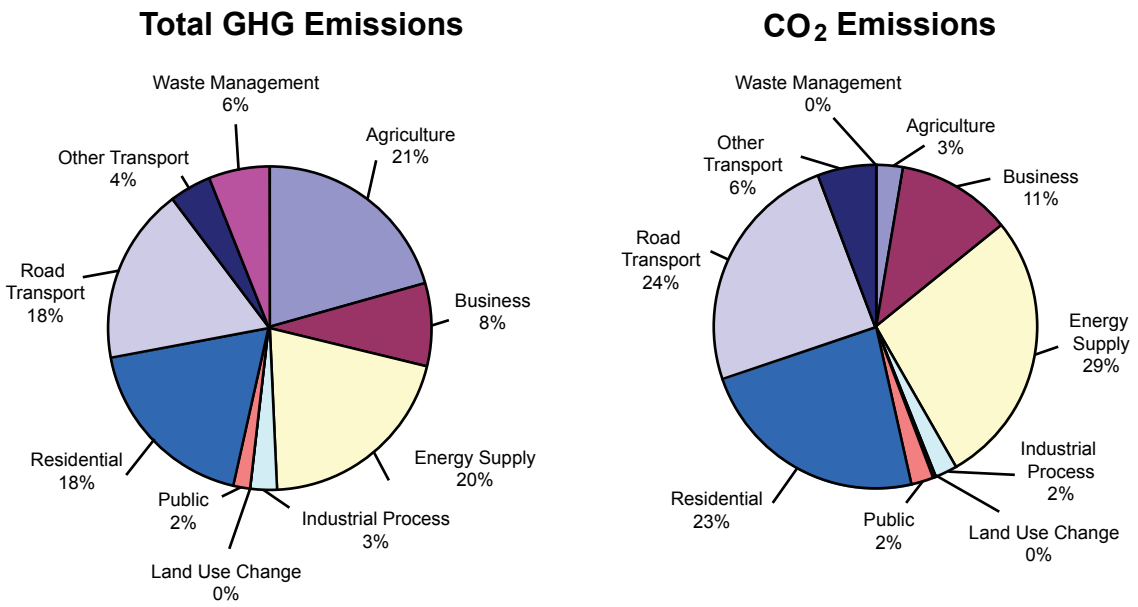
1.17 In the interim, it is noted that some aspects of these wider life-cycle elements of transport will be included elsewhere in the Inventory (i.e. energy, industrial processes) and that all capital projects, including the construction of roads, are subject to sustainability requirements.

2. GREENHOUSE GAS EMMISSIONS Baseline 1990 - 2007

1990 Baseline

2.1 The Northern Ireland Greenhouse Gas Inventory (September 09)[5] estimates that in 1990 total greenhouse gas emissions in the North were 24,885 ktCO_2 equivalent. Road transport (3,279 kt CO_2 e) is estimated to have accounted for approximately 13% of total greenhouse gas emissions in 1990 (Chart 1) and 19% (3,231 kt) of all carbon emissions.

Chart 1: 1990 Total weighted greenhouse gas emissions (kt CO_2 equivalent) and CO_2 emissions by main producers / sinks[6]



Reduction Target and Road Transport Emissions

2.2 Achievement of the PfG target will require a reduction in greenhouse gas emissions to a maximum of 18,664 ktCO_2 equivalent by 2025. Delivery of the target set out in the Climate Change Act would require a reduction in carbon emissions across all sectors to a maximum of 12,840 kt by 2020.

5 *Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland 1990-2007* (September 2008): **http://www.naei.org.uk/reports.php?list=GHG**

6 For ease of reference the data on the transport emissions have been broken down into 'road transport' and 'other transport'.

Table 1: 1990 Baseline and targets for total emissions

	1990 Baseline	Target Maximum Emissions	Required Reduction
PfG: reducing greenhouse gas emissions by 25% below 1990 levels by 2025	24,885 kt	18,664 kt	**6,221 ktCO_2 e**
Climate Change Act 2008: reductions in CO_2 emissions of at least 26% by 2020, against a 1990 baseline	17,352 kt	12,840 kt	**4,512 ktCO_2**

2.3 Where all sectors to contribute equally to the PfG target on greenhouse gas emissions, i.e. each sector reduced its GHG emissions by 25% on 1990 levels, this would require a reduction in road transport emissions from 3,279 ktCO_2e to 2,459 ktCO_2 e by 2025.

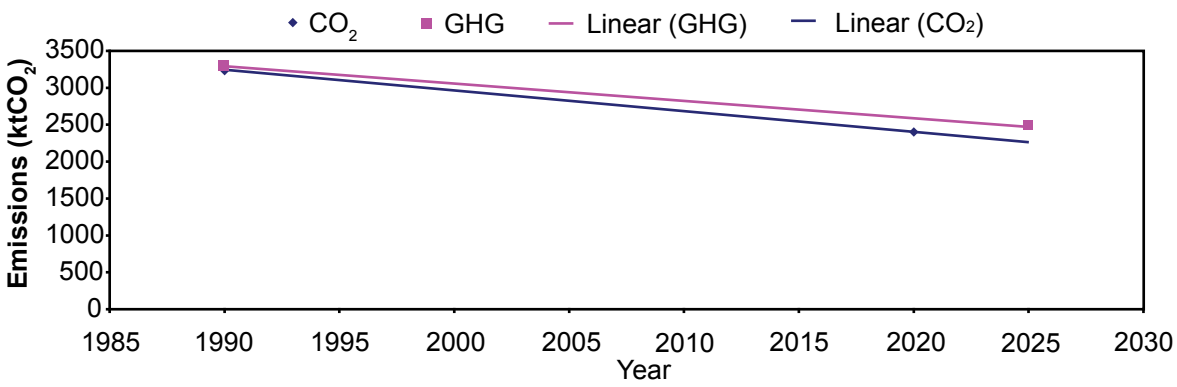
2.4 The Climate Change Act sets a target to deliver a reduction of at least 26% in carbon emissions by 2020. CO_2 accounted for some 99% of all greenhouse gas emissions from road transport in 1990. Realisation of the Climate Change Act target would, therefore require a reduction in CO_2 road transport emissions from 3,231 kt to 2,391 kt by 2020.

Table 2: 1990 Baseline and indicative targets for road transport emissions

	1990 Baseline	Target Maximum Emissions	Required Reduction
PfG: reducing greenhouse gas emissions by 25% below 1990 levels by 2025	3,279 kt	2,459 kt	**820 ktCO_2 e**
Climate Change Act 2008: reductions in CO2 emissions of at least 26% by 2020, against a 1990 baseline	3,231 kt	2,391 kt	**840 ktCO_2**

2.5 While the CO_2 reduction target set out in the Climate Change Act requires a higher level of reduction within a more condensed timeframe, the scale of the challenge, based on a linear year-on-year reduction from 1990, is broadly similar in both cases.

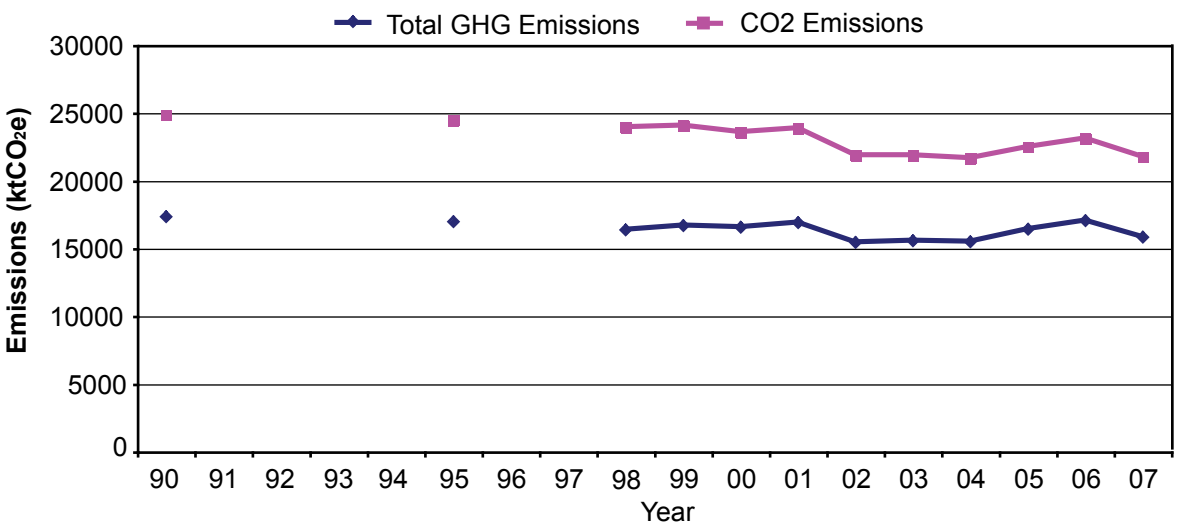
Chart 2: 1990 – 2025 trajectory for achievement of PfG and Climate Change Act targets



2007 Emissions

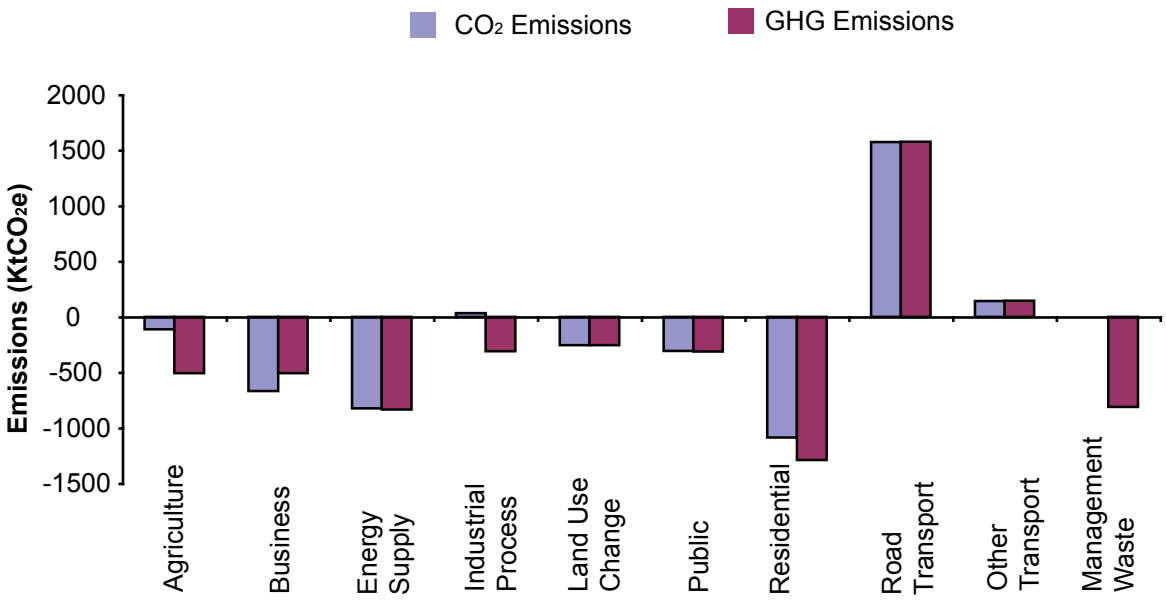
2.6 The Greenhouse Gas Inventories estimate that the North's total greenhouse gas emissions in 2007 were 21,776 kt CO_2 equivalent, a reduction of some 13% (3,109 kt CO_2 e) on the 1990 baseline. While the reduction in CO_2 emissions was lower, at 9% (1,510 Kt) on 1990 levels, as illustrated in chart 3, the overall trends are broadly similar.

Chart 3: Annual greenhouse gas (kt CO_2 equivalent) and $C0_2$ emissions



2.7 Despite the apparent progress, however, the level of reduction experienced was significantly lower than that at UK level[7], while increases in both overall greenhouse gas and CO_2 emissions were experienced in transport (chart 4).

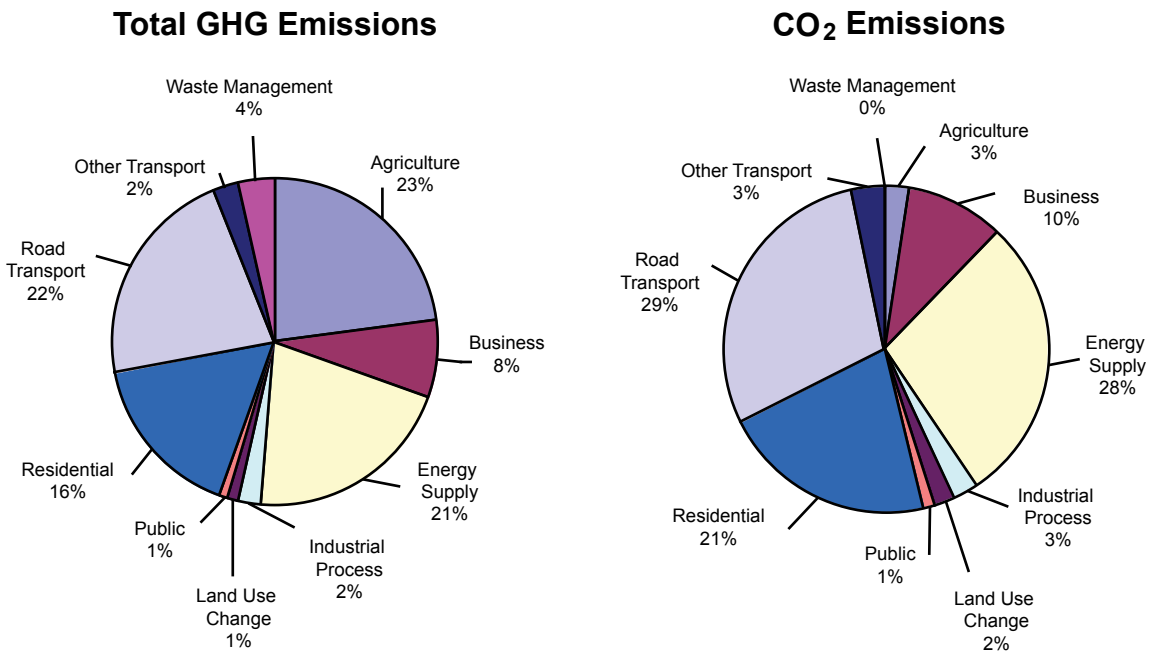
Chart 4: Change in greenhouse gas / CO_2 emissions by main producer / sink



2.8 By 2007 total greenhouse gas emissions from road transport in the North of Ireland had increased by 47% (1,576 kt CO_2 e) on the 1990 baseline, with carbon emissions from road transport increasing by 49% (1,573 kt) during the same period. As a consequence, by 2007 road transport accounted for 22% of all greenhouse gas emissions and 29% of CO_2 emissions (chart 5), compared to 13% and 19% respectively in 1990.

7 At UK level, a reduction of 18% on the 1990 baseline was recorded in GHG emissions by 2007, while CO_2 emissions reduced by 9% at UK level during the same period

Chart 5: 2007 Total weighted greenhouse gas emissions (kt CO_2 equivalent) and CO_2 emissions by main producers / sinks



2.9 As illustrated in table 2 below, the increased CO_2 emissions from road transport were marginally higher than the cumulative reductions achieved across all sectors. Had the level of emissions from road transport been maintained at or near to 1990 levels, this would have contributed to a reduction of 19% in total greenhouse gas emissions and a reduction of 18% on carbon emissions, as apposed to the 13% and 9% reductions realised.

Table 3: Change in emissions 1990-2007

	Total Greenhouse Gas Emissions	CO_2 Emissions
Total Change 1990-2007	-3109	-1510
Change in Road Transport	+1576	+1573

2.10 The significant increase in road transport emissions since 1990 similarly impacts on the level of challenge presented if road transport is to fully contribute to the targeted reductions set out in the PfG and the Climate Change Act (table 4).

Table 4: Impact of 2007 position on targets

	1990 Baseline	Target Emissions	2007 Position	Required Reduction
PfG: reducing greenhouse gas emissions by 25% below 1990 levels by 2025	3,279 kt	2,459 kt	4,851 kt	**2,392 kt**
Climate Change Act 2008: reductions in CO_2 emissions of at least 26% by 2020, against a 1990 baseline	3,231 kt	2,391 kt	4,799 kt	**2,408 kt**

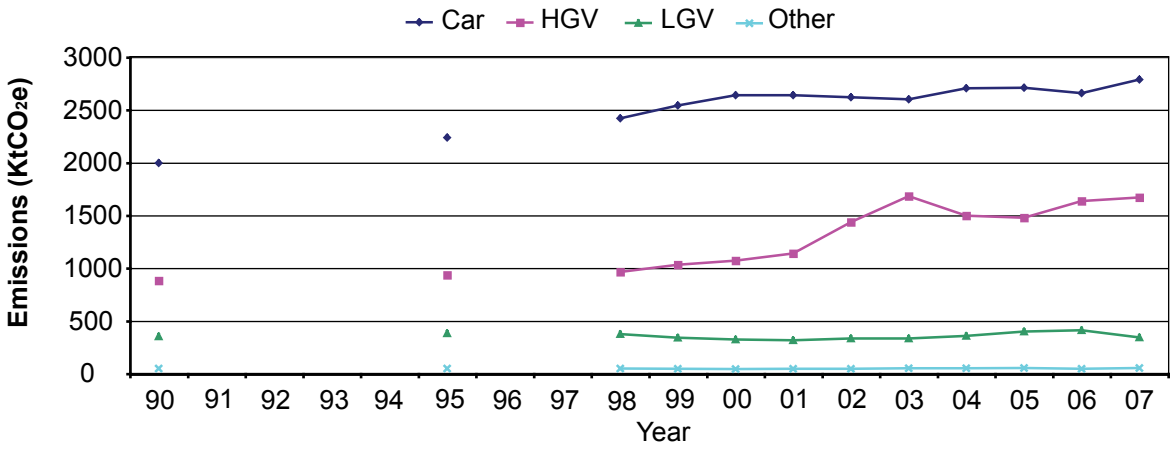
2.11 In that context, to fully contribute to the PfG target, a 49% reduction is required on 2007 greenhouse gas emissions from road transport by 2025. Similarly, realisation of the target set out in the Climate Change Act will require a 50% reduction in CO_2 emissions by 2020, with both targets to be achieved within significantly constrained timeframes.

2.12 Achievement of the PfG target in this context would require an average reduction in annual emissions from road transport of 126 Kt CO_2 e each year from 2007-2025. Between 1990-2007, however, the total reductions achieved in emissions across all sectors here, excluding transport, averaged 276 kt CO_2 e per annum (reducing to 182 kt CO_2 e if transport emissions are factored in). The scale of the challenge is, therefore, considerable, particularly in light of the current upward trends in transport emissions.

3. KEY TRENDS IN TRANSPORT EMISSIONS

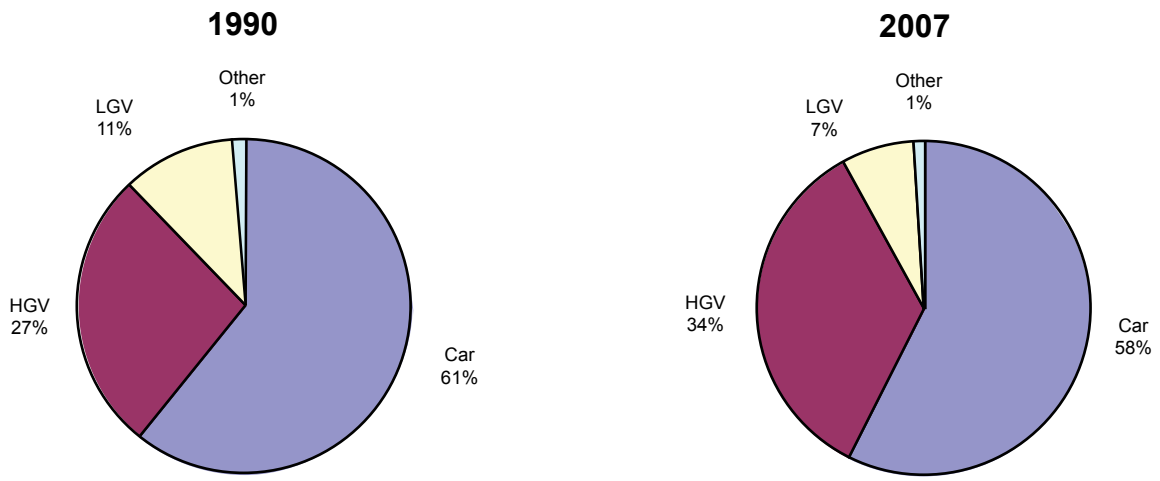
3.1 It is perhaps unsurprising that in relation to modes of transport or vehicle type, the car continues to be the largest contributor to road transport emissions (chart 7).

Chart 6: Road transport emissions by vehicle type 1990-2007 (ktCO$_2$e)



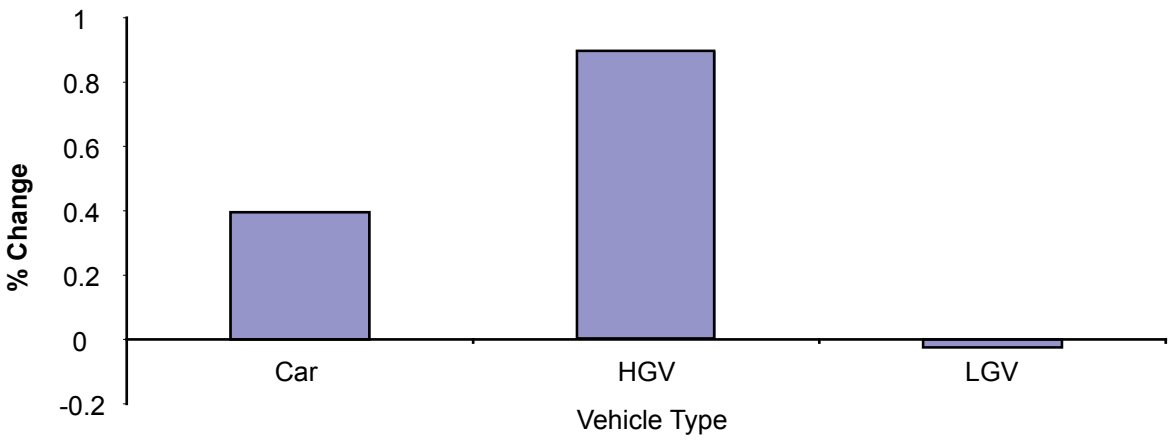
3.2 In 2007, cars produced 2,787 ktCO$_2$ equivalent, which equates to 58% of all road transport emissions in that year. In 1990, cars produced fewer emissions (1,997 ktCO$_2$e), but, as illustrated in chart 7, this equated to a slightly higher percentage of the total road transport emissions (61%).

Chart 7: Road transport emissions share by vehicle type 1990/2007



3.3 As illustrated in chart 8 below, since 1990, emissions from cars have increased by 40%. The most significant rate of increase in road transport emissions in recent years, however, has been in relation to the movement of freight. By 2007, GHG emissions from HGV had increased by 90% on 1990 levels. While the inventory records a small decrease in LGV emissions on the 1990 baseline, this must be treated with a degree of caution given the significant increase in the number of registered LGVs in recent years.

Chart 8: Rate of increase in road transport emissions by vehicle type 1990 and 2007



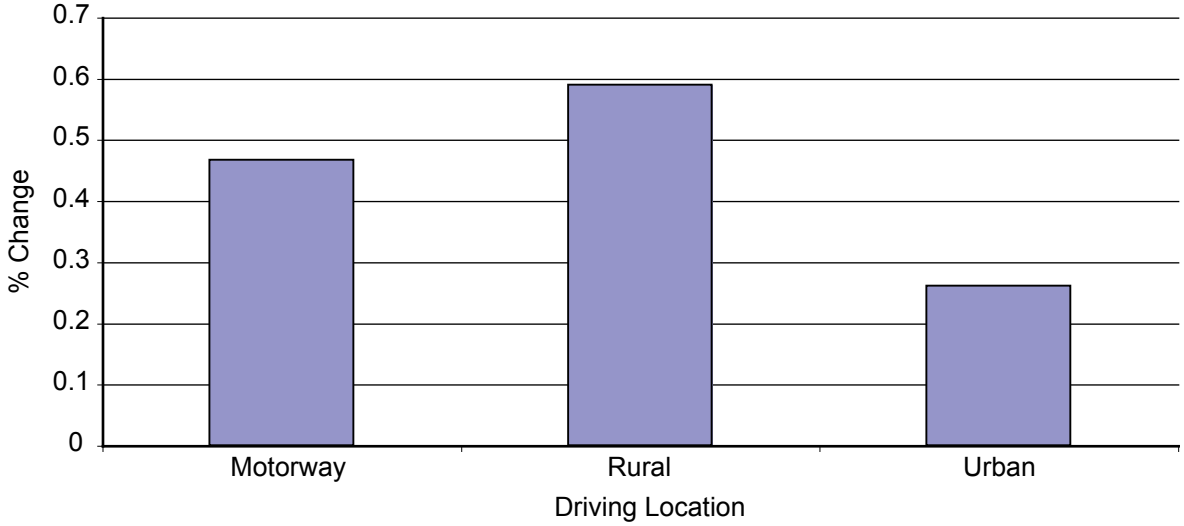
3.4 The Greenhouse Gas Inventory estimates also provide a breakdown of emissions between motorway, urban and rural driving (see table 5).

Table 5: Road transport GHG emissions by mode of transport and driving location, 1990 & 2007

		Cars	HGV	LGV	Other	Total	% Increase
1990	Motorway	128.9	111.0	28.4	2.0	270.3	-
	Rural	1215.8	557.1	231.3	17.4	2021.6	-
	Urban	652.1	212.6	93.1	22.2	979.9	-
2007	Motorway	196.4	168.1	27.5	4.4	396.4	47%
	Rural	1808.6	1166.6	220.8	18.5	3214.4	59%
	Urban	782.3	336.1	95.9	21.2	1235.6	26%

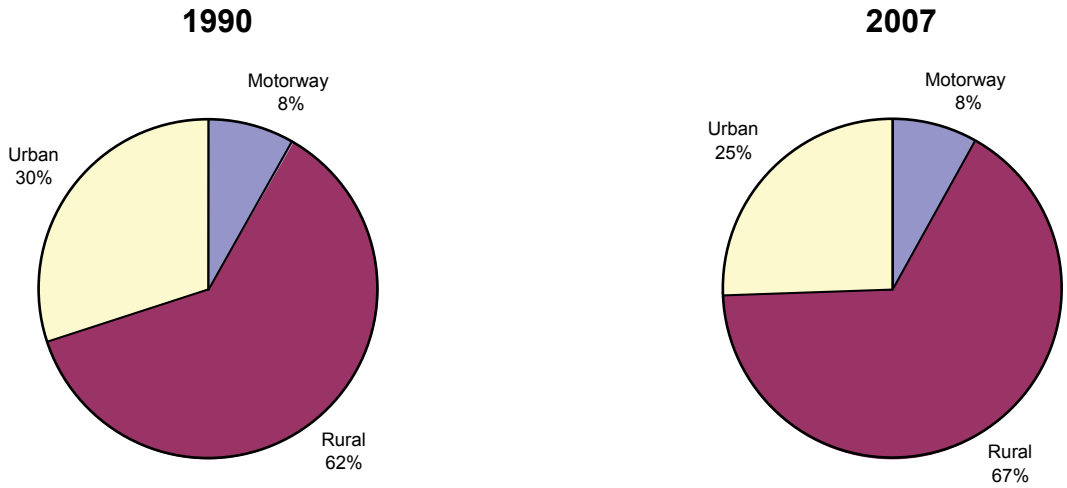
3.5 Since 1990, emissions from rural driving have increased by 59%, urban driving 26% and motorway driving 47% (chart 9).

Chart 9: Increase in road transport GHG emissions by driving location, 1990-2007



3.6 This represents a significant increase in GHG emissions across all areas. However, as a consequence of the differential rates of increase set out above, the proportion of greenhouse gas emissions attributable to urban driving has decreased significantly, from 30% in 1990 to 25% in 2007 (chart 10).

Chart 10: Road transport GHG emissions by driving location, 1990 & 2007

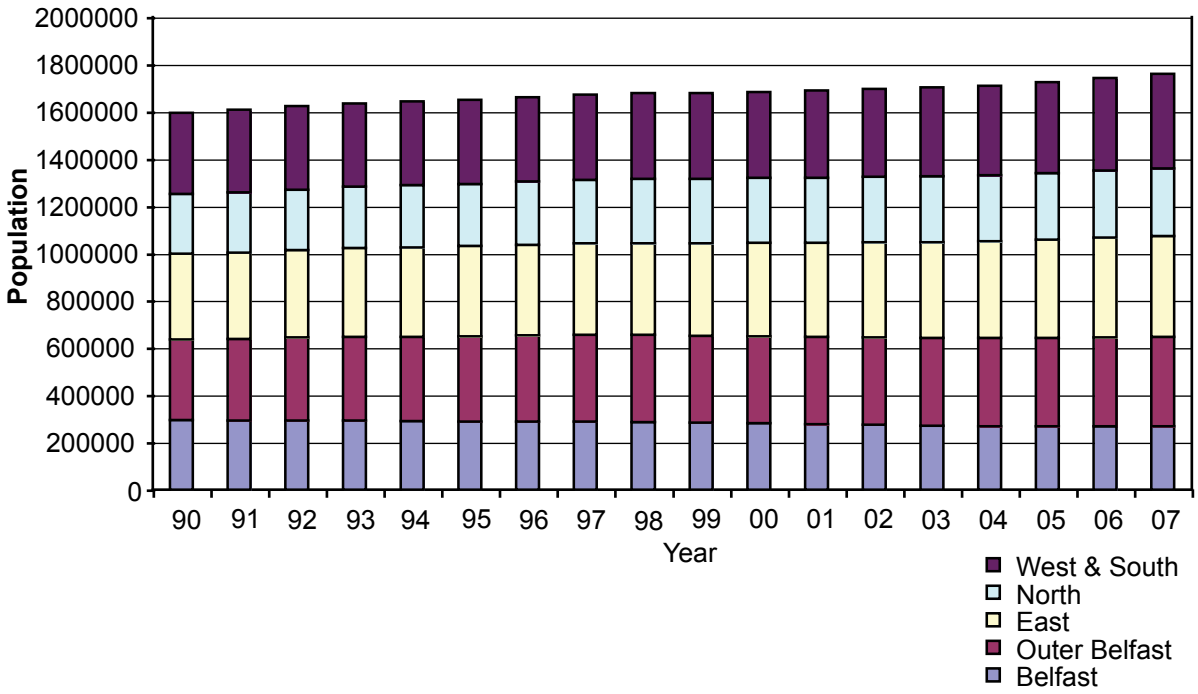


4. Trends Impacting on the Demand for Transport and Emission Levels

4.1 Transport is recognised as a derived demand, it is not undertaken for its own sake, but rather is an intermediate function which provides for the movement of goods and people from one location to another. As such the demand for transport, in relation to goods, services and people, will be impacted upon by a number of factors, including population and settlement trends, economic growth and levels of prosperity.

4.2 Against the backdrop of an emergence from a period of conflict and division, the North has undergone significant transformation since 1990, experiencing economic and demographic growth unprecedented in recent years. By 2007, the local population had increased by 10% on 1990 levels, though there was little change in the distribution of the population as illustrated below.

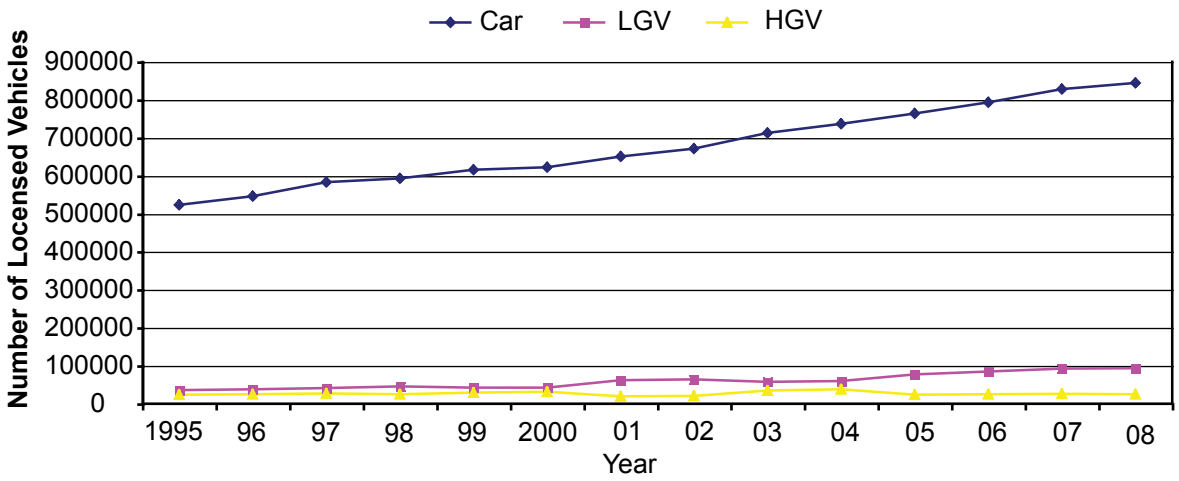
Chart 11: Northern Ireland population by NUTS III classification, 1990-2007



4.3 During the same period, the local economy experienced levels of growth above the UK average, as a consequence of which it emerged as one of the fastest growing regions. Crucially, unlike previous periods of growth in the local economy, this was led by the private sector with particularly strong growth in the service sector.

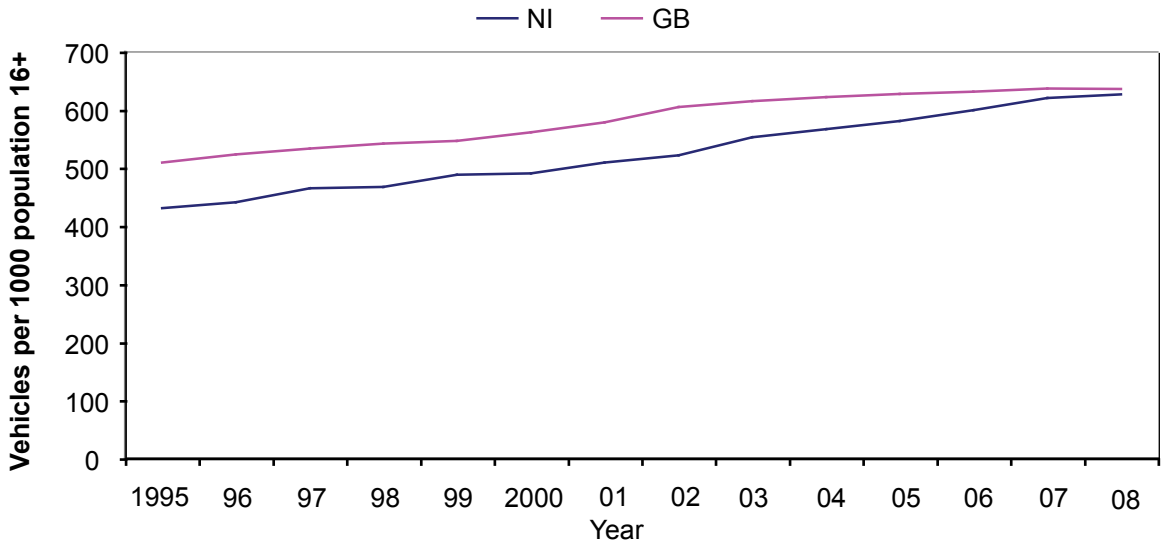
4.4 The increase in population and the expansion of the local economy were mirrored by a significant increase in the number of licensed vehicles, almost doubling from 543,000 in 1990 to 1,008,000 in 2007. As illustrated in Chart 12, from 2000 to 2007 the number of private cars licensed increased by 33%. While private cars continue to make up the vast majority of licensed vehicles (85.2%) the number of LGVs licensed during the same period increased by 119%.

Chart 12: Number of licensed vehicles by body type, 2000 - 2007



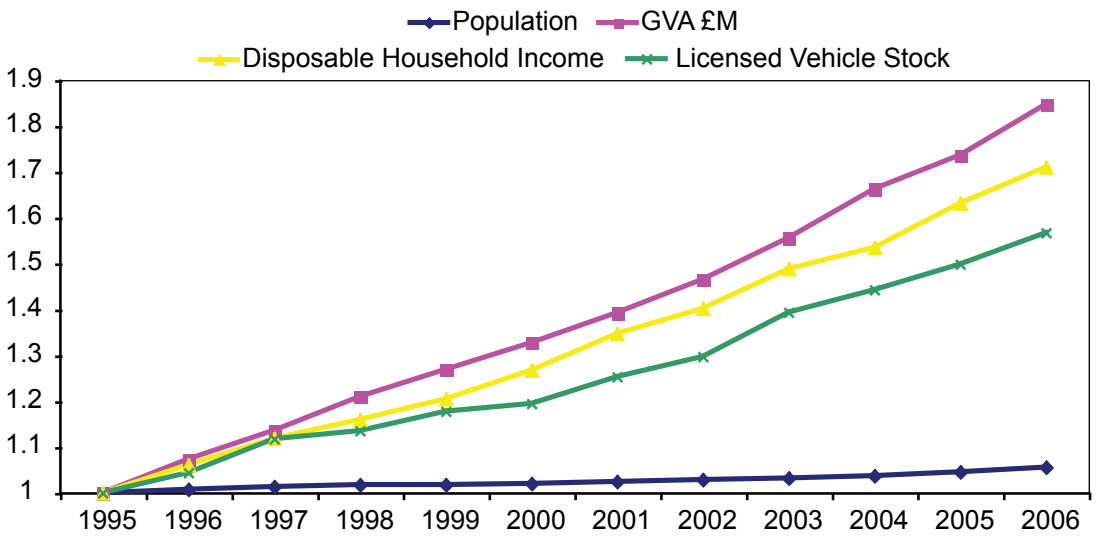
4.5 Not withstanding the trends set out above, the level of car ownership in the North remains below that for GB. While that differential has narrowed over recent years, there is continued potential for significant growth in vehicle ownership levels.

Chart 13: Vehicles per 1,000 population aged 16+, 1995 - 2007



4.6 As illustrated in chart 14 below, the trend in vehicle registrations would appear to be particularly closely related to increased productivity and prosperity. This is in line with the findings of the Stern Review[9] which concluded that income was a key driver behind growth in transport emissions.

Chart 14: Population, GVA, disposable household incomes and licensed vehicles growth, 1995 - 2006 (1995=100)



4.7 Reflecting that position, there has been a significant increase in traffic from 17, 210 VKT (million vehicle kilometres) in 2001 to 20,002 VKT in 2007. During this same period, the total length of road across the North increased by less than 2% to 25,120km. Given the imbalance in vehicle and road growth it may not be unexpected that traffic speeds decreased by 12% from 2001 to 2007, with a 7% decrease on the 5 strategic corridors. However, such a conclusion would fail to take account of the extensive nature of the local road network and measures to enhance the effective operation of the network. Moreover, there is also clear evidence that the provision of extra road capacity in conditions of actual or expected congestion has consistently lead to greater volumes of traffic and cannot be provided in line with rates of traffic growth[10].

9 *Stern Review on the Economics of Climate Change* (October 2006)

10 SACTRA (The Standing Advisory Committee on Trunk Road Assessment), Trunk Roads and the Generation of Traffic December 1994 from Phil Goodwin *The Economic Factors that will Affect Future Transport Modes: Conjectures on the dynamic functional transformation of intelligent infrastructure* Intelligent Transport Systems, December 2006

4.8 Increased journey times have a significant economic and environmental impact, reducing productivity as workers and goods spend more time travelling, and increasing the costs and environmental impacts of travel as more fuel is consumed. The Eddington Transport Study[11] estimated that congestion costs the UK £7-8 billion of GDP per annum rising to £22 billion by 2025 if left unchecked. Similarly, studies have suggested that road congestion costs approximately 1% of EU GDP per year[12].

4.9 Addressing congestion is, therefore, of critical importance from both an economic and environmental perspective. Moreover, evidence would suggest that this is an issue which cannot be resolved through investment in roads in isolation from measures to restrict demand or promote alternative or more sustainable transport choices.

4.10 While recognising the overall growth in traffic, data from the Northern Ireland Travel Survey would indicate that individual behaviours and travel patterns have remained relatively stable over the period 1999-2008 as illustrated below in table 7, with continuing high levels of dependence on the private car (chart 15).

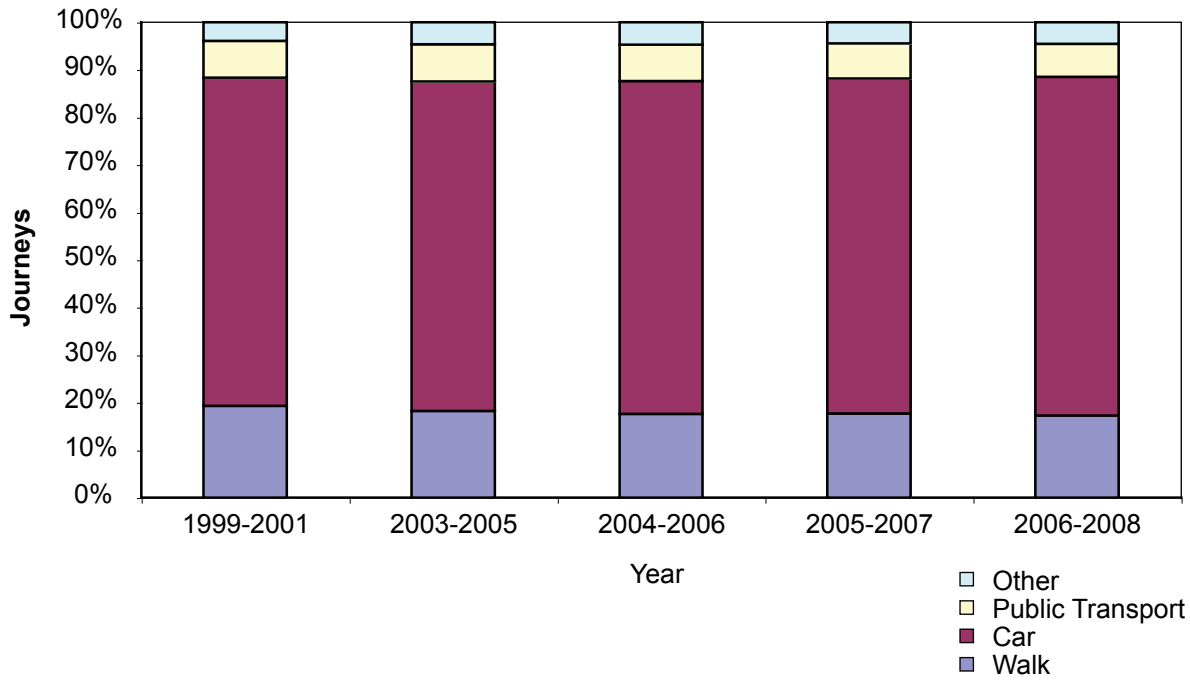
Table 7: Average travel behaviours, 1999-2001 & 2005-2007

	Miles per year	Number of journeys per day	Average journey length (miles)	Time taken (hours)	Proportion travelled by car (% of distance travelled)
1999-2001	5,985	2.7	6.1	304	82%
2005-2007	5,999	2.5	6.5	306	81%

11 Sir Rod Eddington: *The Eddington Transport Study: Transport's role in sustaining the UK's productivity and competitiveness*, HM Treasury, December 2006

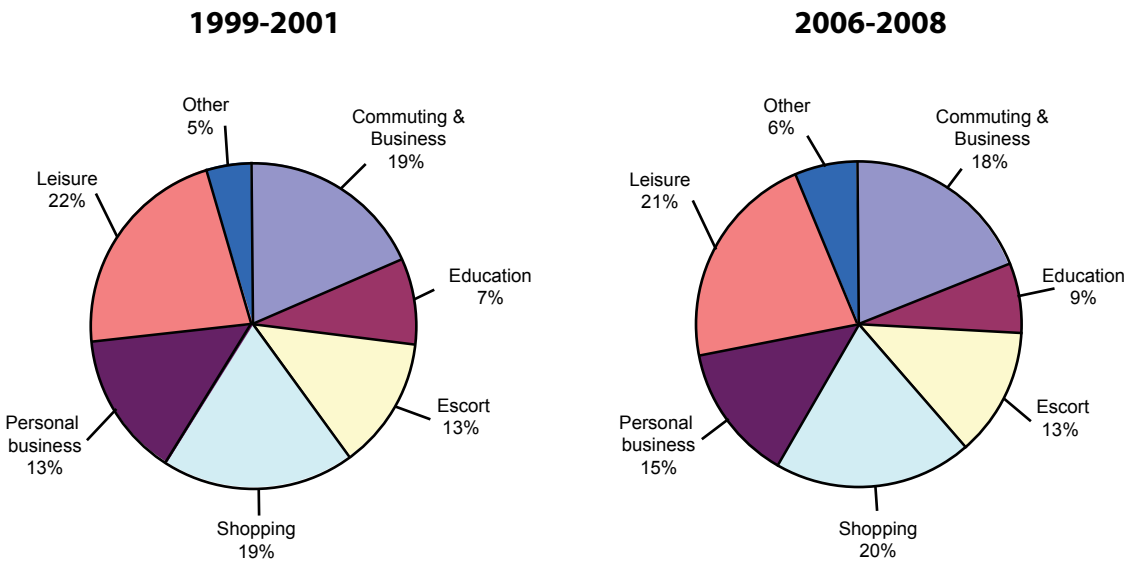
12 Chris Nash, with contributions from partners: UNITE (UNIfication of accounts and marginal costs for Transport Efficiency) Final Report for publication, Funded by 5th Framework RTD Programme.

Chart 15: % of journeys made per person by vehicle type 1999-2008



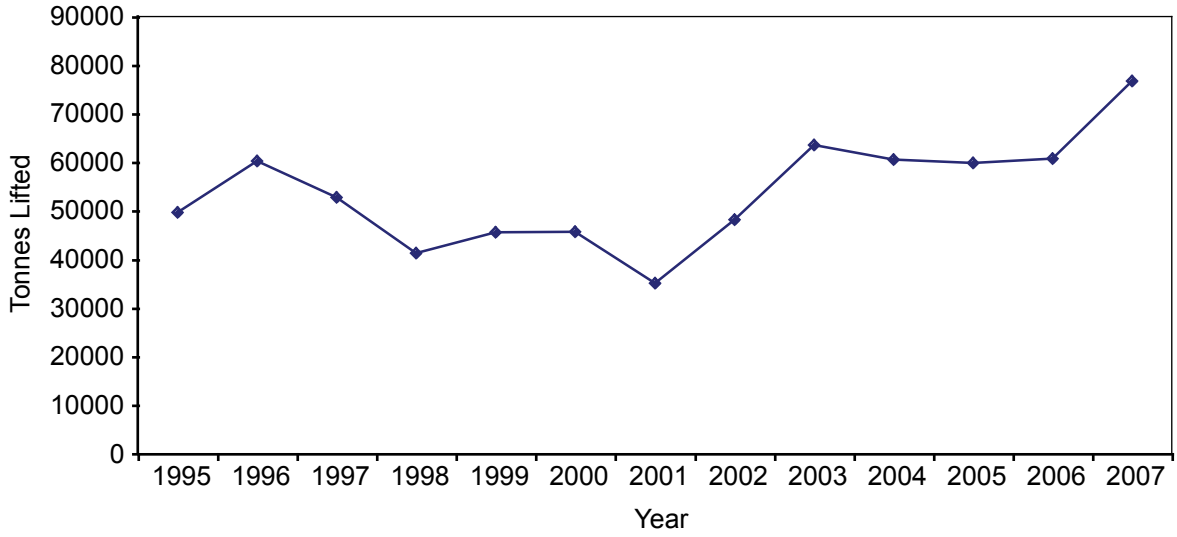
4.11 Similarly, the reasons why people travel have changed little, with leisure, shopping and travel to work remaining the main purpose for travel (chart 16).

Chart 16: Number of journeys per person per year 2006-2008: proportion in each journey purpose group



4.12 Since 2003, all freight within the North has been transported by road. The demographic and economic growth experienced in recent years is mirrored in the significant increase in freight (chart 17).

Chart 17: Total tonnes lifted within NI by goods vehicles over 3.5 tonnes, 1995-2007



4.13 The recent Freight Transport study published by Intertrade Ireland[13] provides an in-depth overview of the key trends and anticipated developments in relation to freight on the island of Ireland. That report indicates that the high growth in freight tonnes lifted is strongly related to the transport of construction materials. Indeed, by 2006 construction materials accounted for almost half of all tonnes lifted.

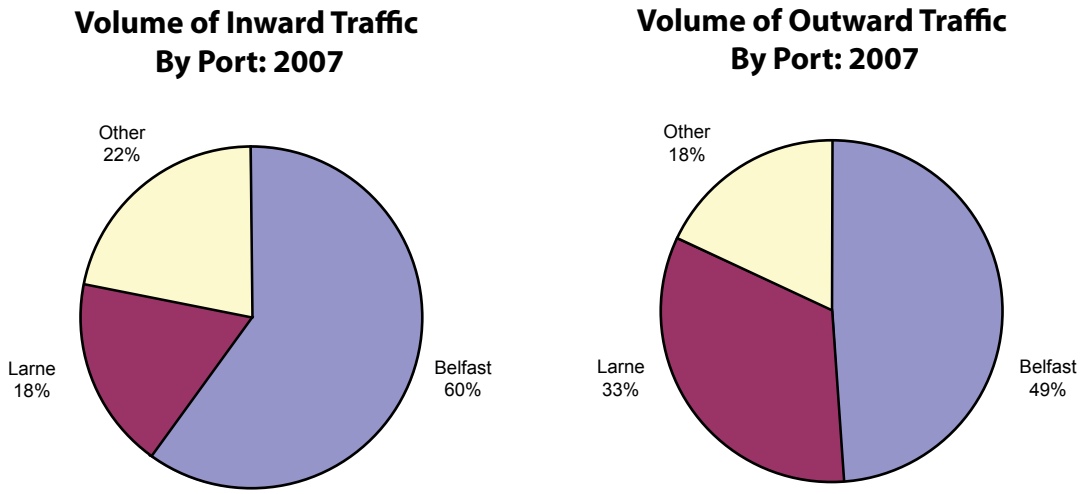
4.14 This would appear to have important implications as the construction sector is one of the most intensive users of freight services in all developed countries. However, in general most of the inputs to construction are only moved over short distances. Conversely, while higher value goods may involve less tonnage, they tend to have longer average lengths of haul. This has important future implications, given the Executive's goal to restructure the local economy with a focus on growth in high value sectors and exports.

4.15 Moreover, given the open nature of the local economy, our peripheral location and small internal market, a move towards high value economic activities, will require the maintenance of efficient and effective external transport links. With the exception of a very small tonnage of air freight, all international freight movements to and from the

13 Intertrade Ireland, *Freight Transport Report for the Island of Ireland*, March 2008

island of Ireland are by sea. In relation to NI ports, the significant majority of inward and outward movement is through the ports of Belfast and Larne (chart 18).

Chart 18: Volume of traffic by port, 2007



4.16 Air freight has long been concentrated in Belfast International Airport as illustrated below. As such, the key external links are largely concentrated in or in close proximity to the Belfast Metropolitan Area (BMA). If the export potential of locally based businesses is to be enhanced, therefore, it is of critical importance, that the transport infrastructure at the regional and BMA level, facilitates the effective and efficient movement of goods to and from the ports of Belfast and Larne and the Belfast International Airport.

Chart 19: Cargo handled at Northern Ireland airports, 1998-2007

5. PROJECTED EMISSIONS TO 2025

5.1 A study commissioned by the Scotland and Northern Ireland Forum for Environmental Research (SNIFFER), on behalf of DOE, in July 2007, set out to monitor and project the North's greenhouse gas and carbon dioxide emissions. The modelling tool subsequently developed looked at projected emissions from electricity generation, industry, domestic combustion, commercial & public, road transport, aviation, agriculture (cattle & soils), waste, Land use, Land use change & Forestry (LULUCF) and other sources.

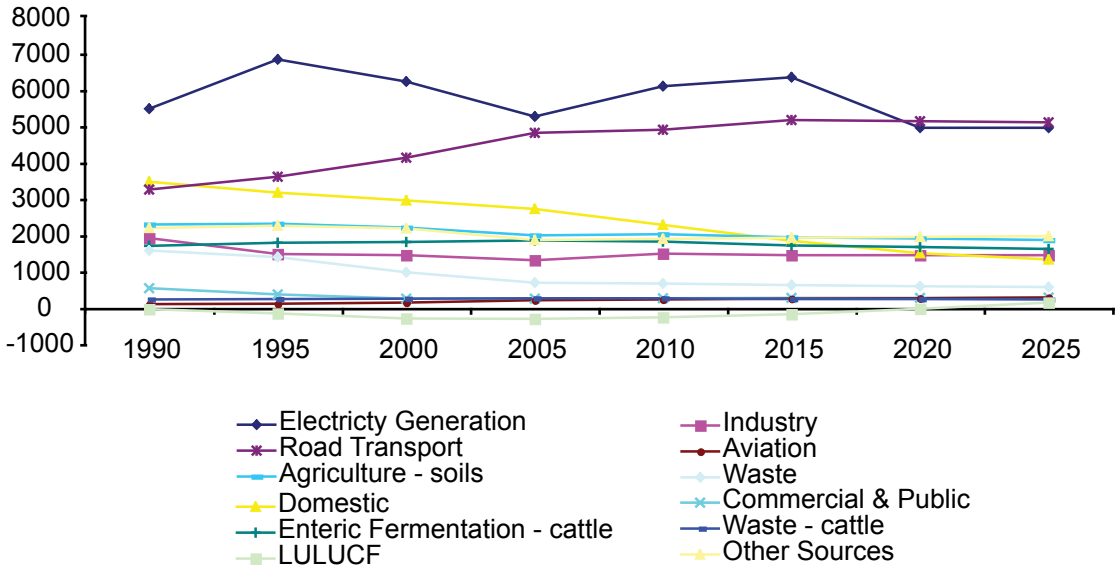
5.2 The report concluded that by 2025, using current policy impacts and sector forecasts, greenhouse gas emissions here would have decreased by 13% on 1990 levels, and that CO_2 emissions would have decreased by 9% on 1990 levels (table 8).

Table 8: Summary of greenhouse gas emissions & projections, 1990-2025 ($ktCO_2e$)

Gas	Sector Name	1990	1995	2000	2005	2010	2015	2020	2025
CO_2	Electricity Generation	5493	6850	6243	5287	6112	6360	4973	4973
CO_2	Industry	1927	1491	1457	1325	1509	1463	1464	1464
CO_2	Domestic	3480	3183	2966	2737	2299	1855	1514	1339
CO_2	Commercial & Public	548	384	260	259	270	279	287	294
CO_2	Road Transport	3271	3618	4149	4828	4915	5189	5157	5125
CO_2	Aviation	114	122	158	222	239	261	277	295
CH_4	Enteric Fermentation - cattle	1713	1804	1826	1872	1838	1724	1691	1634
CH_4	Waste - cattle	245	253	262	277	270	257	255	246
N_2O	Agriculture - soils	2307	2330	2219	2002	2043	1954	1919	1878
CH_4	Waste	1588	1410	989	701	678	640	608	585
CO_2	LULUCF	-30	-142	-278	-296	-248	-170	-15	155
	Other Sources	2210	2278	2201	1883	1916	1941	1965	1985
	Total	**22865**	**23584**	**22452**	**21097**	**21840**	**21754**	**20095**	**19975**
	% change		**3%**	**-2%**	**-8%**	**-4%**	**-5%**	**-12%**	**-13%**

5.3 The projections also indicate, however, that emissions from road transport will continue to rise through to 2025, increasing by 57% (1,854 ktCO_2) on 1990 levels. As a consequence, by 2025, road transport is projected to account for 26% of all greenhouse gas emissions to become the single largest source of GHG emissions.

Chart 20: Summary of greenhouse gas emissions & projections, 1990-2025 (ktCO_2e)



5.4 That projected increase of 1,854 ktCO_2e on the 1990 baseline for road transport emissions is equivalent to 64% of the total projected reductions (2,890 ktCO_2e) across all sectors. As such, where emissions from road transport by 2025 to be maintained at the 1990 baseline, total emissions would be projected to decrease by 21%.

5.5 Transport emissions and the level of demand for transport will be impacted upon by a number of factors, including wider socio-economic trends, political initiatives and developments in the policy environment at the local, national, European and international level. This is not a static environment and projections must be treated with a certain degree of caution. While acknowledging this, it is clear that given past trends and taking account of the current policy environment, emissions from road transport are likely to continue to increase in the absence of significant technological developments, behavioural change or policy initiatives.

6. CONCLUSION

6.1 The Programme for Government in line with the Sustainable Development Strategy, has set an ambitious target for a reduction in local emissions of greenhouse gases. The scale of the challenge, particularly given progress to date should not be under estimated. While progress has been made across a number of sectors, emissions from transport have increased significantly since 1990, adversely impacting on the cumulative progress realised in other areas.

6.2 Given the nature of transport and the costs associated with a move towards more sustainable arrangements, the Stern Review recognised that deep cuts in emissions from the transport sector are likely to be more difficult in the shorter term, but the Stern also concluded that such cuts will ultimately be needed. While, it may be possible to pursue more ambitious reductions in other sectors to address potential shortfalls in transport, the fact remains that further increases in road transport emissions will significantly undermine the potential to successfully realise the Executive's targets and commitments in this area. Transport must, therefore, play its part. Indeed the outworking of the Climate Change Act, the Renewable Energy Directive and related legislation are likely to require action to reduce emissions from road transport.

6.3 As set out in section 2 of this paper, to fully contribute to realisation of the PfG target, a 49% reduction is required on 2007 greenhouse gas emissions from road transport by 2025. Similarly, realisation of the target set out in the Climate Change Act will require a 50% reduction in CO_2 emissions by 2020. This would require from 2007 an average year on year reduction in CO_2 emissions from road transport of 126 Kt CO_2. The scale of the challenge is considerable, but it is unlikely to decrease in magnitude in the absence of a concerted policy response. Moreover, it will require a focus on all areas of transport including freight.

6.4 That response, however, cannot be taken forward in isolation from government's wider policy agenda. The move towards a high value economy, more balanced growth at the sub-regional level and promoting inclusion in line with the Executive's economic and social priorities has the potential to require increased levels of mobility of people, goods and services. The challenge is to effectively manage and appropriately respond to demand while delivering real reductions in emissions from transport. It is also imperative, that policies across government do not unnecessarily increase the demand for transport, promote unsustainable outcomes or mitigate efforts to reduce emissions in this area.