Scottish Enterprise, Scottish Government, VisitScotland & HIAL

Evaluation of the Scottish Air Route Development Fund

Study Report

Final Report
November 2009

Scottish Enterprise, Scottish Government, VisitScotland and Highlands & Islands Airports Limited (HIAL)

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E.1 Introduction

E.1.1 The Air Route Development Fund (RDF) was established in November 2002 to improve business connectivity and inbound tourist access all year round. The RDF provided incentives through public funding to initiate new direct airline links that would benefit the overall economic development of the region. It was intended to act as a catalyst for promoting links that were either not under immediate consideration or ones thought to have marginal business cases in the short term. The RDF closed to new routes on 31st May 2007.

E.1.2 Scott Wilson, in association with Westminster University's Transport Studies Group (TSG) and Sky High Ltd, were appointed by Scottish Enterprise, the Scottish Government, VisitScotland and Highlands & Islands Airports Limited (HIAL) to evaluate the benefits and impacts of the Scottish Air RDF. This report has set out an appraisal of the impacts of the RDF programme.

E.2 Background to the Air RDF

E.2.1 A general review of the RDF in Scotland was carried out which identified the following:

- 63 services were offered RDF investment, of which 55 services went ahead with 28 of them currently operating either with support or post-support;
- over the period of the RDF, there was a steep rise in the number of domestic and international passengers carried and in the number of services operated with RDF investment;
- Scotland was the first place to use the RDF mechanism with other parts of the UK subsequently introducing similar schemes. Data from the Civil Aviation Authority (CAA) has shown the extent of the use of RDFs in other parts of the UK. Overall, the Scottish performance in establishing successful new services was markedly better than other areas of the UK. The least sustainable routes appear to be flights originating outside Scotland; and
- strict criteria had to be met before RDF funding was allocated to services. Essentially, a new direct route had to be of economic benefit to Scotland and travellers. A full economic appraisal was carried out for each prospective route.

E.3 Appraisal of the RDF Services

Passenger Flows

E.3.1 The total number of RDF passengers grew from approximately 286,000 in 2003/4 to 1.8 million in 2008/9 (based on an extrapolation of RDF invoices received at the time of this study). Since the 2008/9 figure is partly estimated, it is worth noting the total numbers of passengers in 2007/8 was about 1.9 million. While some services have stopped the majority (28 out of 55) are currently running.

E.3.2 This suggests the RDF had a significant increase in passenger levels on Scottish air services. Compared to the annual total for terminating passengers in Scotland (at 25.13 million), the 1.9 million passengers on RDF services in 2007/8 is about 7.6% of the total.

Transport Economic Efficiency (TEE) Appraisal

E.3.3 A TEE Appraisal was carried out which estimates the benefits of the RDF services against the investment made and additional costs to the public sector. These were restricted to a limited number of benefits (journey time and fare savings) and costs (RDF support and public sector costs, e.g. staff, consultants, etc) in order to measure the gain experience by the public sector from their RDF contributions.

E.3.4 The analysis showed that nearly all the RDF services return a positive net present value (NPV) and benefit-to-cost ratio (BCR) greater than 1.0 suggesting the RDF programme has been successful in improving travel conditions for business and leisure passengers. In a number of cases, the rate of return is very high. Examples of services with high returns include:

- Prestwick to Stockholm: NPV = £25,941,877 and BCR = 166.6;
- Prestwick to Rome: NPV = £18,822,817 and BCR = 114.3;
- Edinburgh to Cologne: NPV = £8,138,252 and BCR = 107.4; and
- Prestwick to Wroclaw: NPV = £18,323,557 and BCR = 79.2.

E.3.5 Only 2 services produce negative returns, namely:

- Aberdeen to Blackpool : NPV = –£371 and BCR = 0.9; and
- Inverness to Newcastle : NPV = –£19,424 and BCR = 0.8.

E.3.6 The total NPV for all RDF services is estimated to be £406 million (at 2002 prices) with a resultant BCR of 23.9.

Gross Value Added (GVA)

E.3.7 This appraisal described the wider economic impacts of the RDF services in terms of the additional aggregate Gross Value Added (GVA) to the economy. The appraisal was based on the Scottish Enterprise GVA calculator. The total GVA impact for all RDF services combined has been estimated to be between £47 million and £52 million at 2002 prices.

Total TEE and GVA Economic Benefits

E.3.8 Adding the TEE and GVA estimates together suggests the RDF produced between £453 million and £458 million of NPV (over a 10-year appraisal period) at 2002 prices.

Tourist & Business Trip Spend

E.3.9 The level of tourism expenditure[1] was obtained from the passenger surveys undertaken at different airports. The results indicated that the expenditure by Scottish tourists outside Scotland for 2008 was approximately £156.3 million. Likewise the expenditure for non-Scottish tourists gave a value of approximately £176.2 million in 2008. Scottish tourism spend in non-Scottish destinations, represents leakage to the Scottish economy. The difference between these two values, £19.9 million, represents the estimated net additional tourist expenditure accruing to the Scottish economy in 2008 as a result of the implementation of the RDF supported air services.

E.3.10 Business expenditure was estimated in a similar way to that estimated for tourists above. However, the length of business stays for both non-Scottish business trips in Scotland and Scottish business trips elsewhere were very much shorter than those for tourists for the respective direction. In addition businesses tended to make repeat visits to Scotland. For a high proportion of non-Scottish and Scottish businesses these amounted to multiple visits. Business trip expenditure was taken from the surveys. Taking into account both deadweight[2] and leakage, the additional net expenditure in Scotland is estimated at £7.8 million.

Numbers of Additional Jobs

E.3.11 In addition to providing direct monetised benefits, the surveys asked key stakeholders such as airports and airlines whether there has been any increase in job numbers during the RDF programme period. The interviews identified the total net increase in job numbers during the period of the RDF was 37 full time equivalents (FTEs).

Connectivity and Market Efficiency Issues

E.3.12 In addition to looking at the economic impacts of the RDF, the appraisal has sought to identify if the proposals have influenced business perceptions of air transport. The surveys suggested that nearly two-thirds of the non-Scottish businesses interviewed see the RDF services they use as instrumental in maintaining connectivity and competitiveness in Scotland. The importance of RDF flights to business connectivity seems to be reinforced where nearly three-quarters of non-Scottish businesses stated that the RDF supported flights have reduced the feeling that Scotland is remote from the centres of business activity.

E.3.13 The RDF was also introduced to tackle issues of risk aversion and the lack of knowledge of Scotland amongst potential airlines, both of which impact on Scotland's economic competitiveness. In this regard, the results of our airline interviews suggest that the RDF has mitigated both risk aversion on the part of airlines and their lack of knowledge of Scotland. The effect has been a raised awareness of Scotland amongst airline companies and the establishment of new key routes to international destinations which otherwise would have been unlikely to have commenced. Furthermore, the continuation of many of these services post RDF suggests that airlines consider Scotland as a viable market for flights in the long term.

[1] This section relates specifically to tourism spend in relation to assisted routes
[2] Deadweight refers to activity which would otherwise have taken place anyway in the absence of the RDF

Social Inclusion

E.3.14 The RDF services are on average 62% faster than the comparison surface journeys and also 24% shorter in distance travelled. This therefore suggests there are likely to be social inclusion benefits experienced by users of these RDF services. These benefits include reducing the perceptions of the remoteness of parts of Scotland (especially rural areas and the islands). Feedback from the surveys suggested that the perceptions of the RDF services are of in-filling and connecting parts of the country which were previously difficult to reach directly and that these perceptions are considered important by users. The study has also estimated the following numbers of passengers who have travelled in 2008 for enhancing their education or employment prospects:

- No. of Education Passengers = 51 (travel for college, training, etc in 2008); and
- No. of Unemployed Passengers = 13 (travel for job interviews, gaining additional skills, etc in 2008).

E.3.15 In terms of overseas-based people coming to Scotland to work and support their families back home, the surveys considered migrant workers who use the RDF services for exactly those reasons. The results have suggested that migrant workers accounted for about 3.2% of total passengers in 2008. While this figure might be modest, the level varied between flights and certain RDF services were of significant benefit to migrant workers.

Environmental Impacts

E.3.16 While the RDF services have produced positive impacts to the economy they have also increased the number of flights and hence the amount of air pollution emissions. In particular, the appraisal considered the implications of the RDF programme on climate change, by estimating the amount of tons of Carbon Dioxide (CO2) emissions from the services. The analysis suggests the CO2 emissions from the RDF services were just under 4.02m tons over a 10-year appraisal period. This is equal to £69m discounted to 2002 prices to match the same price base as the TEE and GVA Appraisal calculations.

E.3.17 The above monetary value of the Carbon Dioxide emissions can be compared to the total economic NPV of between £453 million and £458 million of NPV (over a 10-year appraisal period) at 2002 prices. In addition, there are further economic benefits such as additional business and tourism spend which would increase the overall economic return.

1 Introduction

1.1 Background

1.1.1 The Scottish Air Route Development Fund (RDF) was established in November 2002 to improve business connectivity and inbound tourist access all year round. Prior to the RDF scheme, the majority of international traffic to Scotland had to come through hub airports such as Heathrow. The RDF was operated on a partnership basis with the Scottish Government, Highlands and Islands Airports Limited (HIAL), VisitScotland and Scottish Enterprise, which administered the fund on behalf of the Government.

1.1.2 The fund has contributed to a dramatic increase in the Scottish direct air network by concentrating only on those routes that would help business and tourism. The total expenditure has been estimated at £22.1 million (at 2008 prices), including public sector staff time, marketing and consultancy costs. This was used for the development of new direct routes from Scottish airports. The RDF was viewed as an investment and not a subsidy in developing routes which secured the greatest economic return for Scotland. The RDF was closed to new routes on 31st May 2007.

1.1.3 Scott Wilson, in association with the aviation experts at Westminster University's Transport Studies Group (TSG) and the data collection specialists Sky High Ltd, were appointed by Scottish Enterprise, the Scottish Government, VisitScotland and Highlands & Islands Airports Limited (HIAL) to evaluate the benefits and impacts of the Scottish Air RDF. This report summarises the appraisal.

1.2 Trip Purpose Definitions

1.2.1 In order to carry out the analysis in this report, we have collected data for different trip purposes which are defined as follows:

- Scottish–based Business = business trips from Scotland;
- Scottish–based Leisure = tourist trips from Scotland;
- Non–Scottish Business = business trips to Scotland;
- Non–Scottish Leisure = tourist trips to Scotland; and
- Migrant Workers = overseas workers coming to Scotland to work for short periods.

1.2.2 The above trip purposes are mentioned throughout this report.

1.3 Structure of this Report

1.3.1 The overall structure of this report is as follows:

Chapter 2 – summarises the background to the Air RDF;

Chapter 3 – outlines the surveys carried out to collect data for the appraisal;

Chapter 4 – presents the appraisal of the impacts of the Scottish Air RDF; and

Chapter 5 – provides a summary of the findings and its conclusions.

2 Background to the Scottish Air RDF

Chapter Summary:- Background to the Scottish Air RDF

This Chapter concludes with the following:

- 63 services were offered RDF investment, of which 55 services went ahead with 28 of them currently operating either with support or post-support;
- over the period of the RDF, there was a steep rise in the number of domestic and international passengers carried and in services that were operated with RDF investment;
- Scotland was the first place to use the RDF mechanism with other parts of the UK subsequently introducing similar schemes. Data from the Civil Aviation Authority (CAA) has shown the extent of the use of RDFs in other parts of the UK. Overall, the Scottish performance in establishing successful new services is markedly better than other areas of the UK. The least sustainable routes appear to be flights originating outside Scotland; and
- strict criteria had to be met before RDF funding was allocated to services. Essentially, a new direct route was required to be of economic benefit to Scotland and travellers. A full economic appraisal was carried out for each prospective route.

A number of appraisal tests were identified which are used to assess the success of the RDF.

2.1 Literature Review

2.1.1 To set this study in the context of other initiatives to develop air services, a separate literature review report was carried out by the University of Westminster examining the context for and range of mechanisms and examples of RDF or similar schemes implemented elsewhere in the UK and Ireland[1]. This chapter is based on the literature review report and provides a summary of the RDF in Scotland and compares it to other schemes.

2.2 Historical Context of the RDF in Scotland

2.2.1 Prior to the introduction of the Route Development Fund (RDF) Scotland had fewer direct flights to other parts of Europe than other comparable regions, and concern was expressed by the Scottish Government that this might be inhibiting economic growth in the country. It was believed services were being impeded from developing in Scotland because of various market failure issues including risk aversion amongst the airlines and a lack of understanding of the Scottish market.

2.2.2 In November 2002 the RDF was implemented to address some of the market failure issues and to generate new direct airline links from Scotland to key UK and overseas destinations and, thereby, expand Scotland's airports as major tourism and business travel gateways. At the time, it was estimated that these routes would provide an economic spin-off of £300 million over a ten year period[2].

[1] A Review of the Literature on the Context for and Range of Mechanisms (including their Assessment and Impacts) to Support Air Services, University of Westminster, May 2009

[2] Estimates provided by York Aviation, December 2007

2.2.3 The purpose of the RDF was to provide incentives through public funding to initiate new direct airline links that will benefit the overall economic development of the country. It is recognised that access to air services is a key requirement for communities to preserve and enhance their economic standing[3]. Air transport also drives and facilitates wider economic activity through connectivity[4,5].

2.2.4 The purpose of the RDF was to promote the establishment of new routes by facilitating the sharing of risk between airports and airlines. It was intended to act as a catalyst for promoting links either not under immediate consideration or ones thought to have marginal business cases in the short term. 'Affordability' is an issue not only for social inclusion but is also of significance for business, in particular small businesses and tourism. A CAA report[6] showed that approximately a fifth of Low Fare Airline (LFA) passengers are business travellers, indicating that they are also taking advantage of lower fares and an increased choice of routes from regional airports[7,8]. Funds were allocated to routes that were likely to become commercially viable after the first three years.

2.2.5 Whilst the Scottish Government worked closely with its partners at Scottish Enterprise, VisitScotland and HIAL to encourage routes, it was however up to the airlines themselves to decide on new routes. A total of 63 routes were assisted or offered assistance since the inception of the RDF in November 2002. Of these 63 services, 55 services went ahead with 28 of them currently operating either with support or post-support. The remaining services however did not take up the offer of investment for a variety of reasons.

2.2.6 Table 2.1 overleaf shows the 55 air routes to and from Scotland supported by the RDF, up to and including newly launched services in 2007/8.

[3] The economic implications of changing patterns of airline operations for airports and communities. Airport Policy and Planning: Meeting future needs. University of Westminster, London, N. O. Small, 2007
[4] Social benefits of low fares airlines in Europe. In European Low Fares Airline Association (Ed.), York Aviation, 2007
[5] Managing airport positioning dynamics in the private sector. Journal of Airport Management, 1, 21, Bradley, N., Clayton, E. & Fairbanks, M., 2006
[6] CAP 770 No-frill carriers: revolution or evolution? Civil Aviation Authority. London, CAA 2006
[7] Social benefits of low fares airlines in Europe. In European Low Fares Airline Association (Ed.), York Aviation, 2007
[8] The propensity of business travellers to use low cost airlines. Journal of Transport Geography, 8, 107-119., Mason, K. J., 2000

Table 2.1: RDF Services, 2003/4 to date

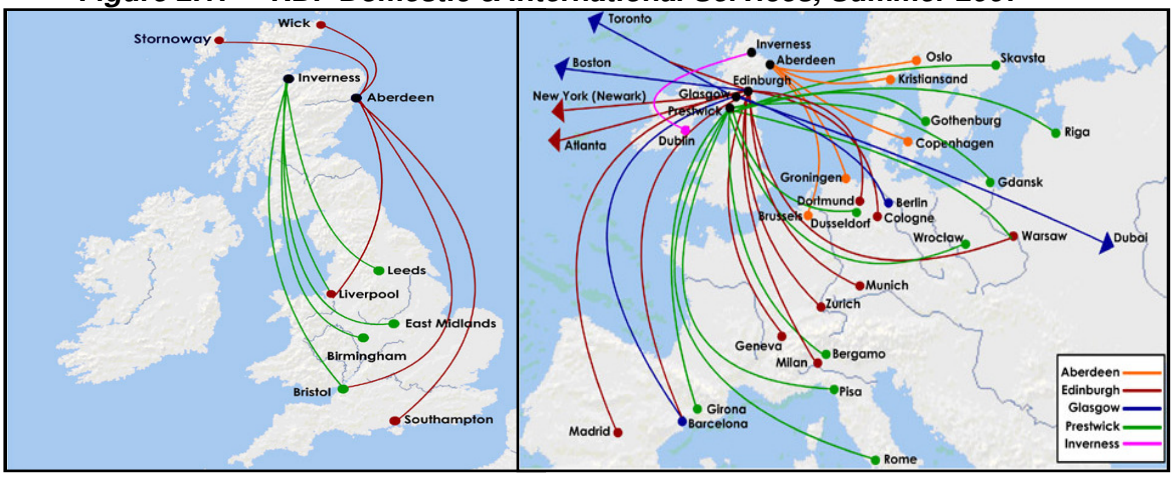
Service	Airport	Operator	Date Started	Status
Dundee to Belfast City	DND	Loganair	Jun 2008	Current RDF
Dundee to Birmingham	DND	Loganair	Jun 2008	Current RDF
Edinburgh to Milan	EDI	EasyJet	May 2007	Current RDF
Edinburgh to Munich	EDI	EasyJet	Apr 2007	Current RDF
Edinburgh to Zurich	EDI	bmi	Mar 2007	Current RDF
Edinburgh to Madrid	EDI	EasyJet	Feb 2007	Current RDF
Inverness to Belfast City	INV	Flybe	Dec 2006	Operating post RDF
Prestwick to Riga	PIK	Ryanair	Nov 2006	Operating post RDF
Glasgow to Berlin	GLA	EasyJet	May 2006	Operating post RDF
Prestwick to Warsaw	PIK	Wizz Air	May 2006	Operating post RDF
Prestwick to Wroclaw	PIK	Ryanair	May 2006	Operating post RDF
Prestwick to Gdansk	PIK	Wizz Air	Mar 2006	Operating post RDF
Edinburgh to Geneva	EDI	EasyJet	Dec 2005	Operating post RDF
Aberdeen to Stornoway	ABZ	Eastern	Nov 2005	Operating post RDF
Inverness to Bristol	INV	EasyJet	Nov 2005	Operating post RDF
Edinburgh to Barcelona	EDI	FlyGlobespan	May 2005	Operating post RDF
Glasgow to Barcelona	GLA	FlyGlobespan	Apr 2005	Operating post RDF
Aberdeen to Southampton	ABZ	Eastern	Mar 2005	Operating post RDF
Aberdeen to Bristol	ABZ	Eastern	Nov 2004	Operating post RDF
Aberdeen to Copenhagen	ABZ	SAS	Oct 2004	Operating post RDF
Edinburgh to New York	EDI	Continental	Jun 2004	Operating post RDF
Aberdeen to Groningen	ABZ	bmi	Apr 2004	Operating post RDF
Glasgow to Dubai	GLA	Emirates	Apr 2004	Operating post RDF
Prestwick to Bergamo	PIK	Ryanair	Jan 2004	Operating post RDF
Inverness to Birmingham	INV	Eastern	Oct 2003	Operating post RDF
Prestwick to Gothenburg	PIK	Ryanair	Oct 2003	Operating post RDF
Prestwick to Girona	PIK	Ryanair	May 2003	Operating post RDF
Edinburgh to Cologne	EDI	Germanwings	Mar 2003	Operating post RDF
Prestwick to Pisa	PIK	Ryanair	Mar 2005	Operating post RDF (stopping at end of October 2009)
Prestwick to Rome	PIK	Ryanair	Apr 2004	Operating post RDF (stopping at end of October 2009)
Prestwick to Stockholm (Skavsta)	PIK	Ryanair	Apr 2003	Operating post RDF (stopping at end of October 2009)
Inverness to Dublin	INV	Aer Arann	Jul 2005	Stopped
Inverness to East Midlands	INV	Ryanair	Jul 2006	Stopped
Inverness to Leeds/Bradford	INV	Eastern	Apr 2006	Stopped
Sumburgh to Stansted	LSI	Atlantic Airways	Jul 2007	Stopped
Aberdeen to Kristiansand	ABZ	bmi	Mar 2007	Stopped (no funding received for this route)
Aberdeen to Liverpool	ABZ	Ryanair	Oct 2006	Stopped
Inverness to Liverpool	INV	Ryanair	Oct 2006	Stopped
Inverness to Newcastle	INV	Eastern	Jun 2006	Stopped
Sumburgh to Oslo	LSI	Wideroe	Jun 2006	Stopped
Edinburgh to Atlanta	EDI	Delta	May 2006	Stopped
Edinburgh to Warsaw	EDI	Central Wings	Jan 2006	Stopped
Aberdeen to Blackpool	ABZ	CityStar	Jul 2005	Stopped
Prestwick to Lubeck	PIK	Ryanair	Mar 2005	Stopped
Aberdeen to Oslo	ABZ	CityStar	Jan 2005	Stopped
Prestwick to Dusseldorf	PIK	Ryanair	Nov 2004	Stopped
Glasgow to Prague	GLA	CSA	Oct 2004	Stopped

Table 2.1 (Continued): RDF Services, 2003/4 to date

Service	Airport	Operator	Date Started	Status
Inverness to Stockholm	INV	Snowflake	May 2004	Stopped
Edinburgh to Munich	EDI	Duo	Mar 2004	Stopped
Edinburgh to Geneva	EDI	Duo	Nov 2003	Stopped
Edinburgh to Jersey	EDI	Bmi	Nov 2003	Stopped
Edinburgh to Milan	EDI	Duo	Nov 2003	Stopped
Edinburgh to Oslo	EDI	Duo	Nov 2003	Stopped
Edinburgh to Zurich	EDI	Duo	Nov 2003	Stopped
Kirkwall to Bergen	KOI	Loganair	Nov 2003	Stopped

2.2.7 Figure 2.1 shows the confirmed domestic and international year round services for summer 2007 respectively. The Figure illustrates that historically the emphasis of the RDF has been on major international destinations, but there have been a number of new services to other UK airports, including those in the H&I region.

Figure 2.1: RDF Domestic & International Services, Summer 2007



2.3 Method of Funding Allocation

2.3.1 Strict criteria needed to be met before RDF funding was allocated to services. Essentially, a new direct route had to be of economic benefit to Scotland and predominantly of long-term benefit to business travellers, although the appraisal criteria also allowed for the benefits of strong inbound tourism routes. It was also a requirement that these services were not to compete with or displace an existing service.

2.3.2 A full economic appraisal was carried out for each prospective route, scored on factors including, benefit-to-cost ratio (BCR) based on journey time and fare savings, additional Gross Value Added (GVA) to Scotland and total additional contribution to business and tourism in Scotland. The main economic appraisal criteria was for a prospective route to have a BCR of greater than 1.0.

2.3.3 RDF funding is limited to the first three years of operation of the new routes. Beyond that period it is expected that the routes will be self-supporting. The investment is disbursed on a per-passenger basis per flight, restricted to 75% of the passengers carried on that route (i.e. a load factor of 75%).

2.3.4 Although airports have the power to discount the landing charges, for each service ultimately airlines will make commercial decisions based on their respective hard financial case. If this does not stand up, the airlines will not operate the service (although, it is worth noting there are differences to the evaluation process of both rural and lifeline services compared to those operating from the main centres of population).

2.3.5 While the RDF focused on international destinations serving in-bound tourism and business markets, it operated slightly differently for routes serving airports outside the central belt. For these areas the RDF supported domestic as well as international services (e.g. the Eastern Airways route from Inverness to Birmingham). This is due to the fact that in these parts of the country internal flights are important due to there being no fast alternative mode of transport, and to the economically marginal circumstances of the areas.

2.3.6 Between 2003 and 2007 the fund provided support for new air routes, initially to International destinations such as Barcelona, Berlin and Prague. It also helped investment in direct flights between Glasgow Airport and Dubai, from Edinburgh to Atlanta, Madrid and Munich, from Aberdeen to Oslo, Brussels and Copenhagen and from Prestwick to Gdansk, Dusseldorf and Pisa. Inverness, Sumburgh and Dundee airports have also benefited from the fund. Investment was paid out retrospectively on the basis of passenger numbers, limited to up to 75% load factor, and was available for the first three years of a route commencing.

2.3.7 Northern Ireland was the second area within the UK to adopt the RDF concept and drew heavily on the Scottish experience in developing its approach. The Northern Ireland Route Development Fund was implemented in September 2003. As with Scotland's RDF funding, the investment is limited to the first three years of operation of the new routes, beyond which it is expected that the routes will be self-supporting. The investment is also disbursed on a per-passenger basis and limited to load factor of up to 75% per flight.

2.3.8 The first English region to fund route developments was the North West in November 2004. In June 2006, the UK Route Development Fund protocol was established to provide an overarching framework for RDFs in Wales and North East England, which commenced activities during the financial year 2006-07. Under the original protocol RDF offers could be made up to 50% of the cumulative aeronautical and marketing costs. This protocol followed and reinforced the EU guidelines on funding.

2.4 Aims and Objectives of the RDF Scheme

2.4.1 The RDF programme was intended to provide a range of benefits to Scotland, and also help to correct market imperfections.

2.4.2 At the outset of the RDF programme there was a recognition that new air services can facilitate a number of economic benefits. Not least, they may improve travel costs and time savings for businesses, thereby improving Scotland's competitiveness. These time and costs savings also benefit leisure passengers if the new service is direct and hence allows them to avoid the need to interline at other airports.

2.4.3 In addition, the RDF scheme was also intended to help attract both business and leisure visitors, and hence inbound tourism, to the country, thereby generating income to the country. Additional employment in the airline/airport industry might also have been

created as a by-product of the additional passenger numbers, although this was not an objective of the RDF.

2.4.4 Social improvements were a further aim of the RDF programme, especially with regards to new direct services for rural parts of Scotland where air travel can be a lifeline necessity. Improved accessibility is not only crucial for economic growth[9] but also the quality of life for those living in the small communities[10]. Hence, there was a slight enhancement to the evaluation process of prospective RDF routes for both rural and lifeline services compared to those operating from the main centres of population, in order to evaluate the wider social benefits of these services.

2.5 Immediate Effects of the Scottish Air RDF

2.5.1 In the case of the Scottish RDF the key characteristics of the policy offers some potentially useful insights into its immediate effects. These are summarised below.

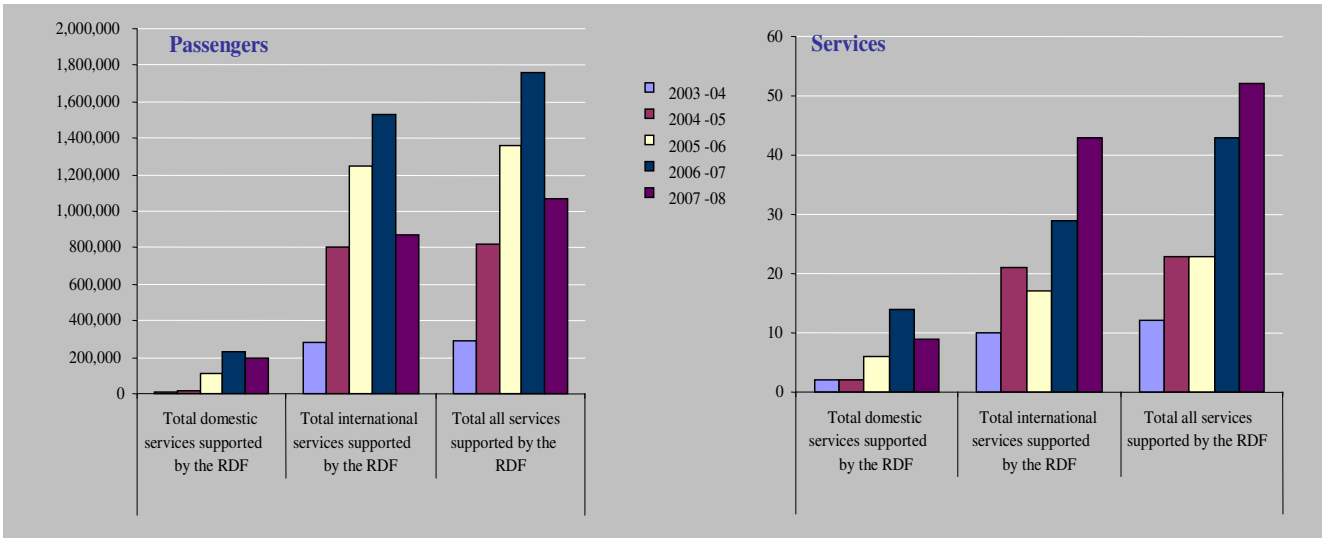
Passenger Flows and Services

2.5.2 Over the period of the RDF, there has mainly been a steep rise in the number of domestic and international passengers carried and in services that were operated with RDF investment between 2003/4 and 2006/7. The growth peaked in 2006/07, linked to the three year timescale for funding, and also closure of the RDF to new routes at this time, leading to reduced passenger and service numbers the following year. This needs to be set against the background of growing passenger numbers experienced by both Scottish and UK airports, which posted an increase in passengers between 2003 and 2008 of 15.3% and 18.1% respectively[11]. However it should be noted that these figures will include passengers on RDF supported flights, both with respect to Scotland and other parts of the UK and also routes which are predominately outbound leisure.

2.5.3 Figure 2.2 overleaf clearly illustrates the importance that has been put on the international dimension of support, although domestic services have also attracted significant attention.

[9] European and American approaches to air transport liberalisation: Some implications for small communities. Transportation Research Part A: Policy and Practice, 29, 467-483, A. J. Reynolds-Feighan, 1995
[10] Social Benefits of Low Fares Airlines in Europe, European Low Fares Airline Association (Ed.), York Aviation, 2007
[11] Annual UK Airport Statistics, CAA, 2008

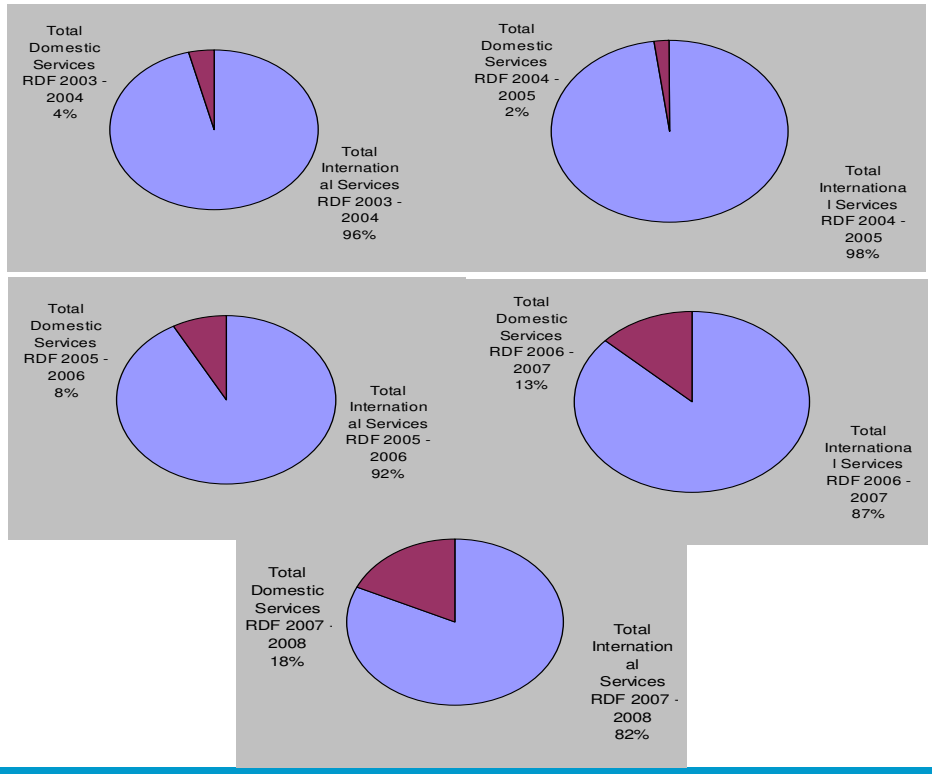
Figure 2.2: RDF Passengers & Services (2003/04 – 2007/08)



2.5.4 Although the gradual increase in the proportion of domestic services supported by the RDF between 2003/4 and 2007/8 is demonstrated in Figure 2.3 overleaf, the Figure serves to emphasise the continued importance of international services in terms of the RDF programme.

2.5.5 The fall in the numbers of passengers recorded in 2007/08 appears to partly reflect the stopping of a number of services, including from Aberdeen to Liverpool, Oslo, Kristiansand, and from Edinburgh to Atlanta. However, there was also a drop in demand for services too, most notably on a number of routes from Prestwick.

Figure 2.3: Breakdown of Passengers by Service Type, 2003/04 to 2007/08



Comparisons of Numbers of Services against Other Areas

2.5.6 Scotland was the first place to use the RDF mechanism with other parts of the UK subsequently introducing similar schemes. Data from the Civil Aviation Authority (CAA)[12] can be used to show the extent of the use of RDFs in other parts of the UK, as illustrated in Table 2.2 below.

Table 2.2: Comparison of RDF Services Verses Elsewhere

Location / Area		Total Services	Number Still Operating	RDF Services Stopped	
				N	%
Scotland	Domestic	16	8	8	50%
	International	39	20	19	49%
	Total	55	28	27	49%
Northern Ireland	Domestic	3	0	3	100%
	International	6	4	2	33%
	Total	9	4	5	56%
Wales	Domestic	1	0	1	100%
	International	4	2	2	50%
	Total	5	2	3	60%
North East	Domestic	1	0	1	100%
	International	5	4	1	20%
	Total	6	4	2	33%
UK Total		***75***	***38***	***37***	***49%***

2.5.7 The level of services stopping ranges from approximately a third of the services (North East), to approximately three-fifths of the service (Northern Ireland and Wales). The Table suggests that Scotland has been more successful in sustaining new services, particularly as the country has seen the establishment of more flights than some other parts of the UK. This reflects the success of the RDF in releasing nascent demand for air services between Scotland and the rest of the UK, Europe, and beyond, even with a background of growing air traffic between Scotland and destinations outside the country.

2.5.8 Furthermore, of the routes which stopped, 6 of those were as a result of two airlines failing for reasons completely separate from their involvement with the RDF, and also 6 of those routes are now operated by a different airline. The original investment helped to establish the case for those destinations being served. In addition as the RDF payment was paid retrospectively, benefits were delivered even from those routes which stopped.

2.5.9 Table 2.3 overleaf shows a comparison of the growth in flight numbers between the main airports in Scotland with those in the rest of the UK[13].

[12] CAP 771 : Connecting the Continents – Long Haul Passenger Operations from the UK, Economic Regulation Group, Civil Aviation Authority, London 2007 (www.caa.co.uk/publications)
[13] Adapted from Table 3: Annual UK Airport Statistics, CAA, 2008

Table 2.3: Comparison of Growth in Air Services between Scotland and a Selection of other UK Airports, 2003 to 2008

Region	Airport	Average Growth	Weighted Average Growth
Scottish Airports	Aberdeen	3.7%	1.0%
	Edinburgh	0.9%	0.3%
	Glasgow	-0.9%	-0.2%
	Inverness	5.0%	0.5%
	Prestwick	-4.2%	-0.4%
	Average	***0.9%***	***1.2%***
Other UK Airports	Gatwick	1.4%	0.4%
	Heathrow	0.5%	0.2%
	Birmingham	-2.1%	-0.2%
	Leeds Bradford	0.3%	0.0%
	Belfast City (George Best)	4.1%	0.2%
	Belfast International	-0.3%	0.0%
	Cardiff Wales	-3.9%	-0.1%
	Average	***0.0%***	***0.4%***

2.5.10 The Table clearly demonstrates that the average growth in aircraft movements (taken as a proxy for air services) in Scottish airports have outstripped the rest of the UK, even when weighted for size of airport in terms of comparative number of air movements. This is against a backdrop of falling levels of RDF-per-passenger in the latter years of the programme, as shown in Table 2.4.

Table 2.4: Comparison of Yearly Investments per Passenger on Scottish RDF Routes**

Year	Criteria	Total
2003	Passenger numbers	190,429
	Investment (£)	158,360
	Investment per passenger (£)	**0.83**
2004	Passenger numbers	674,875
	Investment (£)	902,555
	Investment per passenger (£)	**1.34**
2005	Passenger numbers	1,301,975
	Investment (£)	1,711,023
	Investment per passenger (£)	**1.31**
2006	Passenger numbers	1,323,506
	Investment (£)	2,025,568
	Investment per passenger (£)	**1.53**
2007	Passenger numbers	1,183,424
	Investment (£)	1,529,832
	Investment per passenger (£)	**1.29**
2008	Passenger numbers	177,550
	Investment (£)	209,825
	Investment per passenger (£)	**1.18**

**Figures were obtained from Avia Solutions Limited, July 2008

2.6 Method of Appraisal of the RDF Programme

2.6.1 Given the aims of the RDF programme set out in Section 2.3, the evaluation process used to assess the services awarded RDF investment included tests on all of the stated criteria. However, a thorough examination of the actual costs and benefits of the RDF programme on a route-by-route basis has not to date been carried out, and thus is the subject of this study. The tests carried out in this study include the following assessments:

- Economic Impacts, consisting of:
  - restricted Transport Economic Efficiency (TEE) Appraisal testing the quantified monetary equivalents of journey time reductions and fare savings as passenger benefits versus the level of RDF investment made and additional costs by the public sector (e.g. staff costs, consultancy fees, etc). This involved identifying the markets served by the new routes, which were further subdivided by categories of journey purpose; how these passengers would have behaved without the new route and the scale of benefits they have derived from its existence;
  - the change in aggregate Gross Value Added (GVA) in the economy, based on the net present value produced by the RDF services and suitable economic multiplier effects for different sectors of the economy;
  - the total expenditure added to the economy as a result of additional numbers of business and leisure trips into Scotland and their average duration/spend while in the country. This is net of leakage and trips out of Scotland, thereby providing an estimate of the total additional income to Scotland; and
  - the number of additional jobs created over the period of the RDF programme.
- Social Inclusion, namely:
  - a qualitative appraisal of the potential benefits of improving connectivity or accessibility. This is a simplified analysis based on the STAG process for highlighting the social inclusion benefits of transport schemes[14].
- Environmental Impacts, in particular:
  - the case for route development of the type considered in this study is largely based on boosting the economy and enhancing the social inclusion of remote areas. Inevitably, however, boosting air travel has significant environmental consequences both locally and, more controversially, globally. Increasingly, the issue of air transport and its impact on CO2 emissions is being prioritised and hence a further appraisal was carried out to compare the benefits identified above against any negative impacts from emissions due to the additional RDF flights.
- Adjustments to the Market, such as:
  - a potential benefit of a RDF is that it could contribute to raising the profile of the country; encourage airports to be more dynamic in their marketing and generally attract interest from non-Scottish businesses (especially those that view Scotland as a growth opportunity)[15]. Hence, a final appraisal to examine the potential degree to which non-Scottish businesses have had their

[14] At the time of this appraisal, the version of STAG being used was version 1.0, September 2003
[15] CAP 754: UK Regional Air Services, Civil Aviation Authority, London, 2005 (www.caa.co.uk/publications)

perceptions changed by the RDF was considered appropriate and was also carried out.

2.6.2 The details of the above evaluations were set out in the final Inception Report, which was discussed and agreed with the study Steering Group. Consequently, we do not propose to repeat the study methodology here as details can be obtained from the Final Inception Report[16].

2.6.3 The RDF was required to assist the development of air services in a cost-effective manner, presenting value for money. In addition, the RDF was required to have an additional impact on route development, not a substitution impact. In other words, the RDF was required to not have simply replaced existing plans by airlines to open new commercial routes independent of the availability of the RDF.

2.6.4 The above led to a detailed data collection programme which was flexible enough to collate a variety of data needed to undertake the appraisal tests identified above. The following Chapter describes the data collected and also highlights some key headline indicators identified in the subsequent analysis.

[16] Scottish Air RDF Evaluation – Inception Report (Final Version), Scott Wilson, December 2007

3 Data Collection & Headline Findings of Key Issues

Chapter Summary:- Data Collection & Headline Findings

This Chapter concludes with the following:

- visiting friends and relatives is the most common reason for the holiday trip. Non-Scottish tourists stay an average of 10.8 nights, longer than Scottish tourists who stay away for an average of 7.9 nights;
- the ultimate origin and destination of most Scottish and non-Scottish tourists are the SESTRAN and SPT areas, with the SESTRAN area receiving the most non-Scottish tourists, but the SPT area the source of most Scottish tourists;
- there is a wide range of non-Scottish businesses using the RDF services. The sector that is most represented is Academia, however a significant proportion of non-Scottish businesses are technology centred, either in the energy, aerospace, optics or electronics markets;
- circa 141,000 Scottish business trips were made abroad in 2008 compared to circa 95,000 non-Scottish business trips to Scotland using both RDF supported flights and post-RDF supported services. Business trips composed approximately 22% of the total passenger trips on RDF services currently operating, the remaining 78% were tourist trips; and
- migrant workers are heavily dependent on RDF supported flights to access jobs in Scotland.

3.1 Introduction

3.1.1 A key element of the study was data collection, particularly passenger information with which to estimate benefits and carry out a comparison with investment and associated spend. This Chapter summarises the data gathered and also presents an interpretation of some of the headline indicators and key issues identified from the analysis.

3.1.2 A significant element of the data collected is commercially sensitive and hence, as per our study approach, the surveys were carried out in accordance with the Market Research Society Code of Conduct (MRSCC) and the Interviewer Quality Control Scheme (IQCS), which stated all information provided by stakeholders would be treated in strict confidence. This is important since it facilitated a free and candid exchange of information and views from stakeholders, including operators and end-users, which would otherwise not have been available. Consequently, the information cannot be presented at a very detailed level, but it is possible to present information in an outline format and aggregated for areas across Scotland.

3.2 Survey Process

Background

3.2.1 A number of surveys were carried out to collect up-to-date information on the currently operating RDF services. This data was collected in three tranches over different months throughout 2008 (March, June and July/August) in order to capture the effects of seasonal variations.

Overview

3.2.2 There were 4 types of surveys carried out, namely:

- passenger surveys;
- surveys at retail outlets in airports;
- surveys at airports of their operations and business staff; and
- airline surveys.

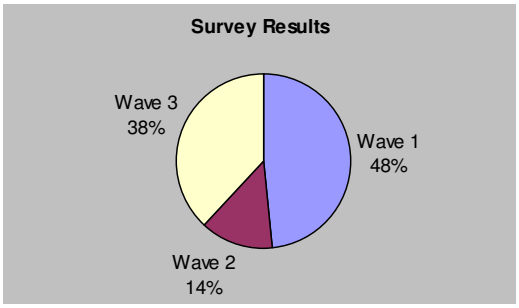
3.2.3 Various questionnaires were used in the above surveys, tailored for the types of stakeholders being interviewed. They contain various questions on trip purposes, the characteristics of the traveller being interviewed, details of their business/employment or leisure/holiday trip, retail spend, business turnover, staff employed, perceptions of their flights and other relevant information. At over 100 pages in size collectively, we have not included them in an appendix to this report but they have been previously separately submitted to the study Steering Group.

Samples Obtained – Passenger Interviews

3.2.4 The passenger surveys were arguably the most important as they are the largest group of stakeholders using the RDF services and deriving the benefits from them. Special care and attention was therefore taken to ensure we obtained a statistically significant sample. All passenger surveys were carried out at the airports, on a face-to-face basis in their respective passenger waiting lounges, with appropriate airport security staff in attendance.

3.2.5 Figure 3.1 shows the proportions of passenger interviews obtained from the 3 tranches of seasonal surveys.

Figure 3.1: Passenger Interview Returns by Survey Wave



3.2.6 As discussed with the Steering Group, the research strategy was based on the segmentation of the air passenger market into 5 groups:

- Scottish – based business;
- Scottish – based leisure;
- Non – Scottish business;
- Non – Scottish leisure; and
- Migrant Workers.

3.2.7 The above allowed for a more refined analysis of the impacts made by different types of passengers who will have different characteristics. In addition, separating out economic migrants (e.g. Eastern European workers who visit Scotland for short periods of work, and fly 'home' to their families) also allowed for a more detailed evaluation, albeit the numbers were much lower than the other trip purposes. Table 3.1 shows the number of

passengers interviewed, with the last column (%sample) showing the total number of interviews as a percentage of the total number of passengers who travelled.

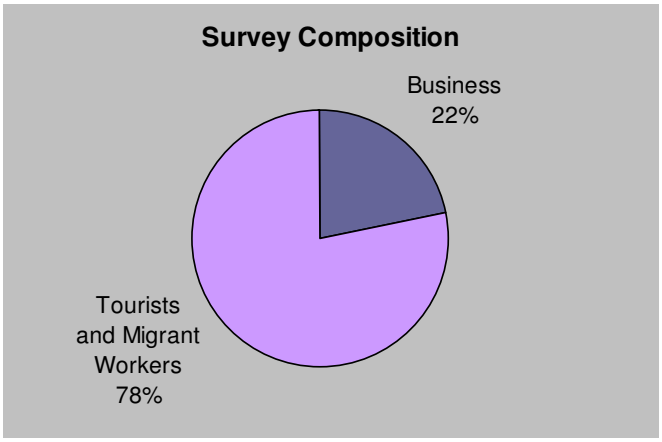
Table 3.1: Passenger Surveys and Samples Sizes

Service	Non-Scottish Business	Scottish Business	Non-Scottish Leisure	Scottish Leisure	Migrant Worker	Totals	% Sample
Aberdeen-Bristol (Eastern)	0	12	3	3	0	18	23%
Aberdeen-Copenhagen (SAS)	9	14	6	24	2	55	28%
Aberdeen-Groningen (The Netherlands) (bmi)	7	23	2	3	0	35	24%
Aberdeen-Southampton (Eastern)	2	29	0	10	0	41	28%
Dundee-Belfast City (Loganair/Flybe)	1	2	1	4	0	8	27%
Dundee-Birmingham (Loganair/Flybe)	3	8	2	3	0	16	15%
Edinburgh-Barcelona (Flyglobespan)	2	2	1	23	0	28	10%
Edinburgh-Gdansk (Centralwings)	0	0	2	0	2	4	11%
Edinburgh-Geneva (easyjet)	0	2	2	17	0	21	3%
Edinburgh-Madrid (easyjet)	1	0	27	26	1	55	17%
Edinburgh-Milan (easyjet)	1	3	18	29	0	51	16%
Edinburgh-Munich (easyjet)	1	2	2	15	0	20	5%
Edinburgh-New York (Continental)	8	4	23	18	0	53	13%
Edinburgh-Warsaw (Centralwings)	0	0	6	10	11	27	5%
Edinburgh-Zurich (bmi)	1	1	1	7	0	10	16%
Glasgow International- Berlin (Schonefeld) (easyjet)	2	10	8	17	0	37	4%
Glasgow International-Barcelona (Flyglobespan)	0	1	2	21	0	24	8%
Glasgow International-Dubai (Emirates)	5	10	16	52	0	83	25%
Glasgow Prestwick- Gothenburg (Ryanair)	0	1	12	2	0	15	3%
Glasgow Prestwick- Skavsta (Stockholm) (Ryanair)	4	0	21	8	0	33	11%
Glasgow Prestwick-Bergamo (Milan) (Ryanair)	0	1	10	19	0	30	6%
Glasgow Prestwick-Ciampino (Rome) (Ryanair)	3	5	1	17	0	26	3%
Glasgow Prestwick-Gdansk (Wizz Air)	0	0	1	2	2	5	2%
Glasgow Prestwick-Girona (Barcelona) (Ryanair)	1	1	7	42	3	54	15%
Glasgow Prestwick-Niederrhein (Dusseldorf) (Ryanair)	1	1	19	4	1	26	9%
Glasgow Prestwick-Pisa (Ryanair)	0	1	6	16	0	23	5%
Glasgow Prestwick-Riga (Ryanair)	1	0	3	1	2	7	4%
Glasgow Prestwick-Warsaw (Wizz Air)	0	0	4	2	3	9	3%
Glasgow Prestwick-Wroclaw (Ryanair)	3	0	6	2	2	13	5%
Inverness-Birmingham (Eastern)	0	0	3	2	0	5	35%
Inverness-Bristol (easyjet)	4	5	6	32	0	47	6%
Inverness-Dublin (Aer Arann)	2	0	1	3	0	6	3%
Inverness-Nottingham East Midlands (Ryanair)	4	7	3	9	0	23	4%
Totals	***66***	***145***	***225***	***443***	***29***	***908***	

3.2.8 As can be seen from Table 3.1, 908 completed surveys represent a reasonably good sample of 12% of those travelling. Our overall aim was to achieve at least 300 interviews so the total of 908 interviews is significantly above our minimum target. However, the sample for non-Scottish businesses travellers, at 66, was comparatively small, and this needs to be borne in mind for some of the results.

3.2.9 Figure 3.2 shows the split between business and non-business interviews.

Figure 3.2: Proportions of Business and Non-Business Interviews



Samples Obtained – Other Interviews

3.2.10 For the other 3 types of surveys, the following was obtained:

- 5 out of all 6 airports were interviewed. The airport which was not interviewed was Aberdeen. However officials advised that they follow the same BAA business planning policies as at Edinburgh and Glasgow airports, which were surveyed;
- 30 out of 37 retail outlets were surveyed, including all major retail franchises; and
- 4 airlines (Ryanair, EasyJet, Eastern and Aer Arann) out of a total of 9 airlines were interviewed. While this ratio is lower than would have been preferred, Ryanair and EasyJet are the two largest RDF operators in terms of passenger volumes. The information obtained from all these surveys was sufficient to carry out a qualitative appraisal of the impacts of RDF on airlines and hence it should be read in that context in this report.

3.2.11 The information collected from the above surveys included data on increased staff numbers, impacts of the RDF on their businesses, additional incomes, business perceptions of the RDF and other relevant feedback.

3.3 Key Findings from the Tourism & Leisure Surveys

Overview

3.3.1 This section summarises some of the key headline indicators identified from the various surveys. Wherever possible, the information has been presented in figures and tables to make them easier to follow. Further charts and tables for other responses obtained from the surveys are shown in Appendix A.

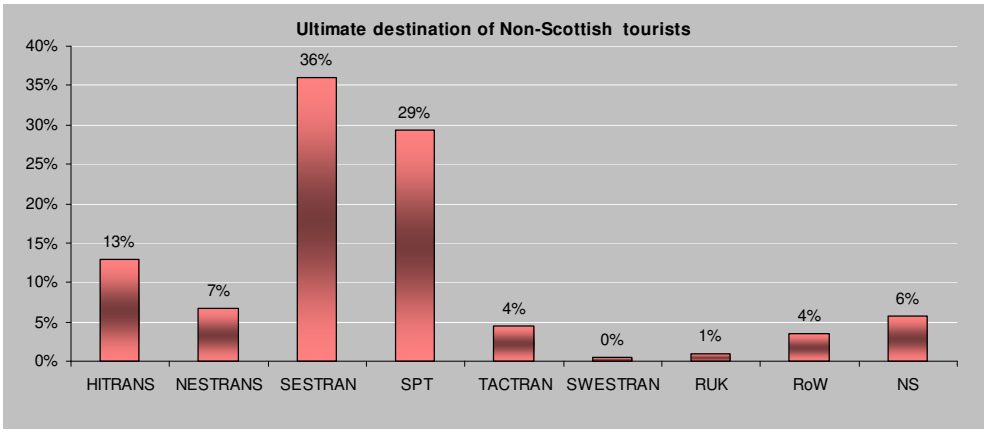
Origin and Destination

3.3.2 The locations of journeys have been presented at the geographical levels of regional transport partnership (RTP) areas. These are:

- SESTRAN (South East Scotland Transport Partnership), comprising of the following local authorities:
  - Edinburgh City, Midlothian, East Lothian, West Lothian, Fife, Falkirk, Borders and Clackmannanshire;
- SPT (Strathclyde Partnership for Transport), comprising of the following local authorities:
  - Glasgow City, North Ayrshire, South Ayrshire, East Ayrshire, North Lanarkshire, South Lanarkshire, West Dunbartonshire, East Dunbartonshire, Argyll and Bute, Renfrewshire, East Renfrewshire and Inverclyde;
- NESTRAN (North East Scotland Transport Partnership), comprising of the following local authorities:
  - Aberdeen City and Aberdeenshire;
- HITRANS (Highlands and Islands Transport Partnership), comprising of the following local authorities:
  - Highland, Moray, Orkney and Western Isles;
- TACTRAN (Tayside and Central Transport Partnership), comprising of the following local authorities:
  - Angus, Perth and Kinross, Dundee City and Stirling;
- SWESTRAN (South West Scotland Transport Partnership), comprising of the following local authorities:
  - Dumfries and Galloway;
- RUK (Rest of the UK); and
- RoW (Rest of the World).

3.3.3 The analysis presented here focuses on the Scottish-leg of trips. As can be seen in the Figure 3.3, the SESTRAN and SPT areas are the main recipient areas of most non-Scottish tourists which between them receive 65% of these. However the HITRANS area also receives approximately one in eight tourists coming to Scotland. This suggests the largest beneficiaries of any additional tourism expenditure by potential non-Scottish leisure trips would be in these areas.

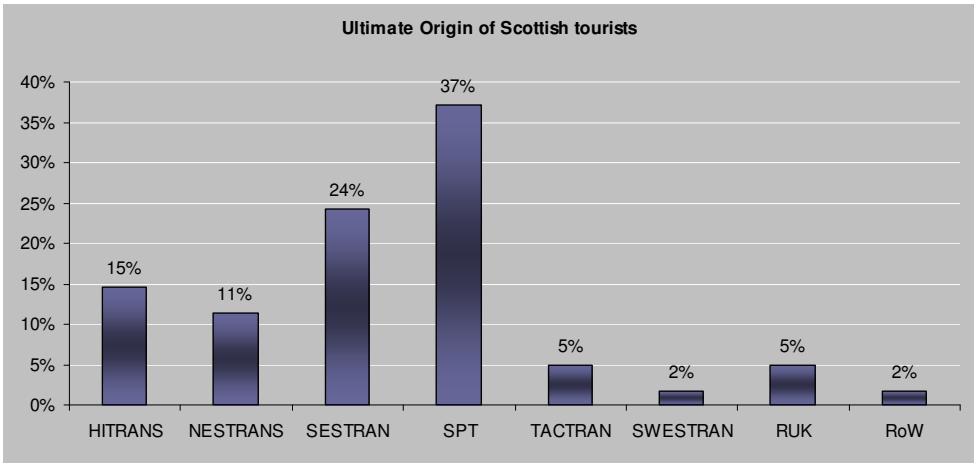
Figure 3.3: Non-Scottish Tourist Destinations



3.3.4 These results were adjusted for the main destination specified when more than one destination was identified in the response. It should be noted that approximately 5% of those surveyed were in effect transit passengers who were using the airport to link between other airports in the UK (rest of UK), Europe or further afield (RoW) with flights overseas. A further 6% of the sample was either unable or unwilling to give any information (NS – not specified).

3.3.5 These same areas also provide most of the Scottish tourist trips out of Scotland, seen in Figure 3.4, although the proportions have reversed with most Scottish tourists originating from the SPT area (37%), followed by SEStran (24%).

Figure 3.4: Scottish Tourist Destinations



3.3.6 Looking at the Scotland-end of the trips, Tables 3.2 and 3.3 overleaf provide a breakdown of the most popular origins/destinations and the tourist destinations by key airports respectively.

Table 3.2: Origin of Non-Scottish Tourists & Scottish Tourists Destination

Origin of Non-Scottish Tourists	Proportion	Destination of Scottish Tourists	Proportion
Scandinavia	17%	Spain	25%
Rest of World	17%	Italy	18%
Spain	16%	Rest of World	16%
Italy	16%	Other UK	14%
Germany	13%	Germany	8%
Poland	8%	Scandinavia	8%
Other UK	8%	Switzerland	5%
Switzerland	1%	Poland	4%
Baltic States	1%	Ireland	1%
Netherlands	1%	Netherlands	1%
Ireland	0%	Baltic States	0%

Table 3.3: Scottish Tourist Destinations by Key Airports in Scotland

	Scandinavia	Netherlands	Spain	Switzerland	Italy	Germany	Poland & Baltic States	Ireland	Other UK	Rest of World
Aberdeen	59%	8%	-	-	-	-	-	-	33%	-
Edinburgh	-	-	34%	17%	20%	10%	7%		-	12%
Glasgow	-	-	23%	-	-	19%	-	-	-	58%
Inverness	-	-	-	-	-	-	-	7%	93%	-
Prestwick	9%	-	37%	-	45%	3%	6%	-	-	-
Dundee	-	-	-	-	-	-	-	-	100%	-

3.3.7 7% of the Scottish tourist sample interviewed pointed out that they were in transit from another airport in the UK or elsewhere, (e.g. journeys from Orkney to Dubai via Glasgow).

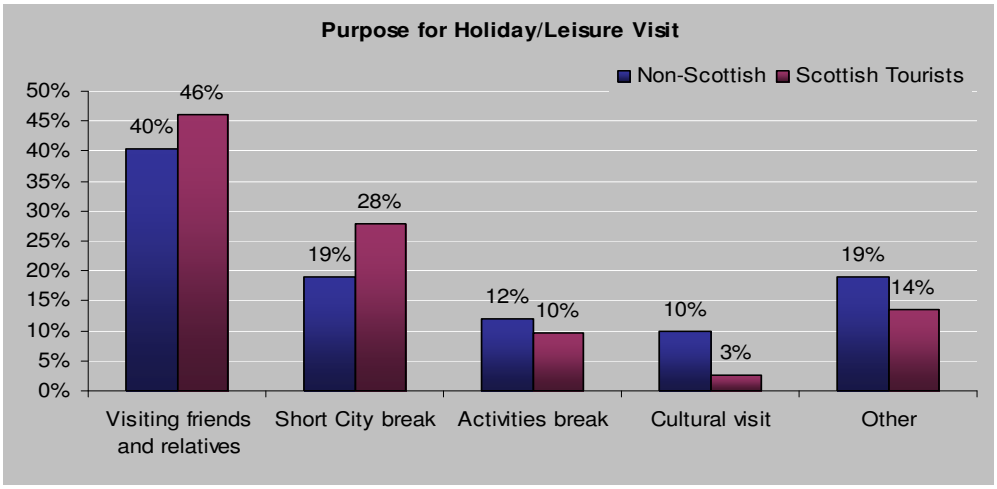
3.3.8 The implication of the origin and destination data is that:

- the greatest additional spend in Scotland is likely to be in the SESTRAN area, where more non-Scottish tourists visit than originate; and
- the SPT area is likely to see the largest net outflow of expenditure with significantly greater proportion of tourists leaving than arriving.

Trip Purpose and Duration

3.3.9 As can be seen in Figure 3.5 more Scottish tourists visit family and friends abroad than non-Scottish tourists do in Scotland. This will have implications on spend where a relatively greater proportion of non-Scottish tourists would be expected to pay for accommodation whilst visiting Scotland. This is tempered somewhat by the relatively smaller proportion of non-Scottish tourists on city breaks, albeit they tend to be of shorter duration.

Figure 3.5: Trip Purpose

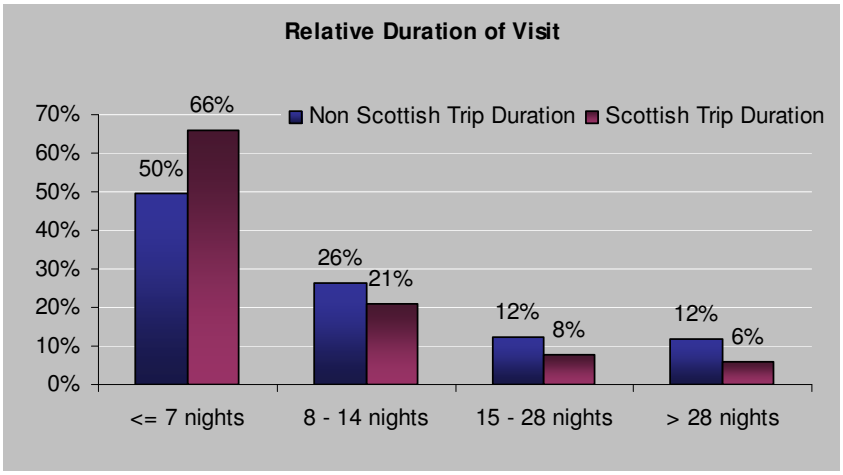


3.3.10 It should be noted that in terms of the Table, a city break may be for cultural reasons,

but the two may entail different characteristics in terms of length of stay, spend and location which, for the purposes of this study, is why they have been kept separate in the above figure.

3.3.11 Non-Scottish tourists tend to spend longer in Scotland than Scottish tourists do away (see Figure 3.6). Not only are non-Scottish tourists likely to spend more on accommodation of all kinds, but are also more likely to spend relatively longer in Scotland than Scottish tourists abroad (this was borne out from the spend details by visitor type derived directly from the questionnaires). Non-Scottish tourists spent an average of 10.8 nights in Scotland whereas Scottish tourists spent 7.9 nights on average in non-Scottish destinations. This will also have implications on relative expenditure, with non-Scottish tourists expected to spend more in Scotland than Scottish tourists spend elsewhere.

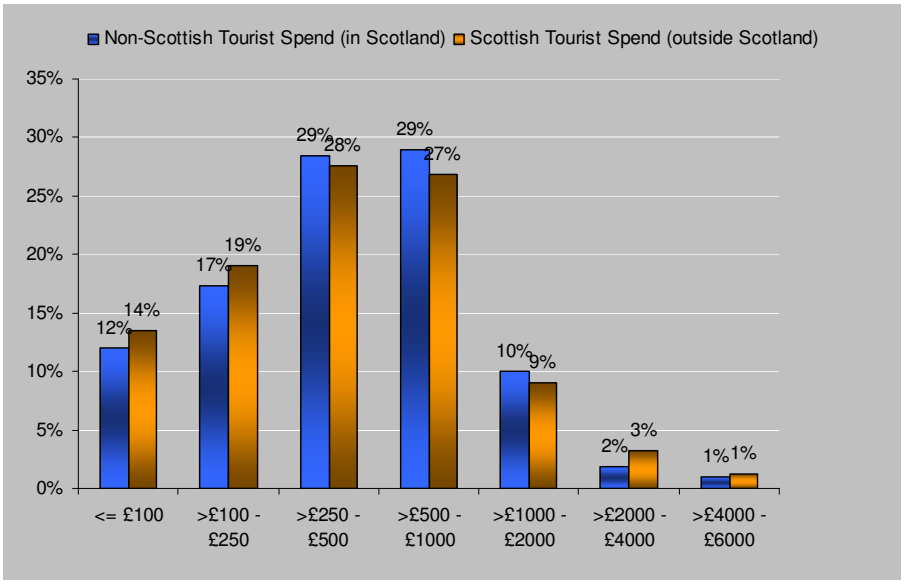
Figure 3.6: Duration of Visit



Tourism Expenditure

3.3.12 The net result is that non-Scottish tourists tend to spend higher amounts when visiting Scotland than Scottish tourists abroad. This is illustrated in Figure 3.7 overleaf which shows the proportion of incremental non-Scottish spend in Scotland compared with Scottish spend elsewhere.

Figure 3.7: Relative Non-Scottish and Scottish Tourist Spend



3.3.13 As can be seen a larger proportion of non-Scottish tourists spend more in Scotland than Scottish tourists spend outside the country, especially between the values of £250 and £2,000.

3.3.14 The above figures are used later on in this report to estimate the total Non-Scottish tourist spend in 2008 (see Chapter 4).

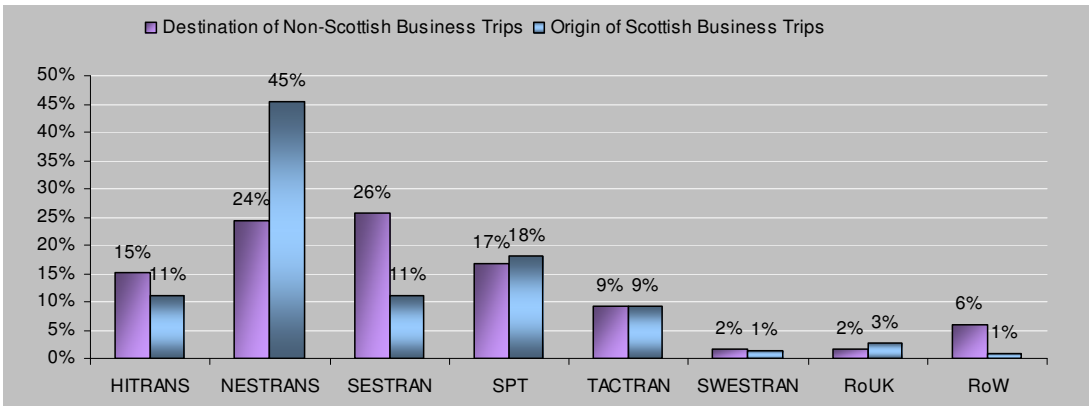
3.4 Key Findings from the Business & Migrants Surveys

Origin and Destination

3.4.1 It is the SEStran RTP area followed closely by the NESTRAN RTP area, which are receiving the greatest proportion of non-Scottish business trips, displayed in Figure 3.8.

3.4.2 In contrast the source of most business trips is the NESTRAN RTP alone. Nearly half of business trips originated in the NESTRAN RTP area.

Figure 3.8: Scottish & Non-Scottish Business Trips Destinations by RTP



3.4.3 This could be due to the fact that a sizeable amount of commuting by air is related to the North Sea oil industry or the financial sectors which are largely based in the east of Scotland, suggesting the continued importance of the oil and oil related industry. In terms of business spend, considering the impact of additionality, it is possible that both the HITRANS and SESTRAN areas are likely to gain from net business spend in contrast with the NESTRAN area, where the reverse is likely to be true.

3.4.4 Looking at the Scotland-end of the trips, Table 3.4 provides a breakdown of the most popular origins/destinations. It should be noted however that the sample of non-Scottish business travellers was, at 66, quite small.

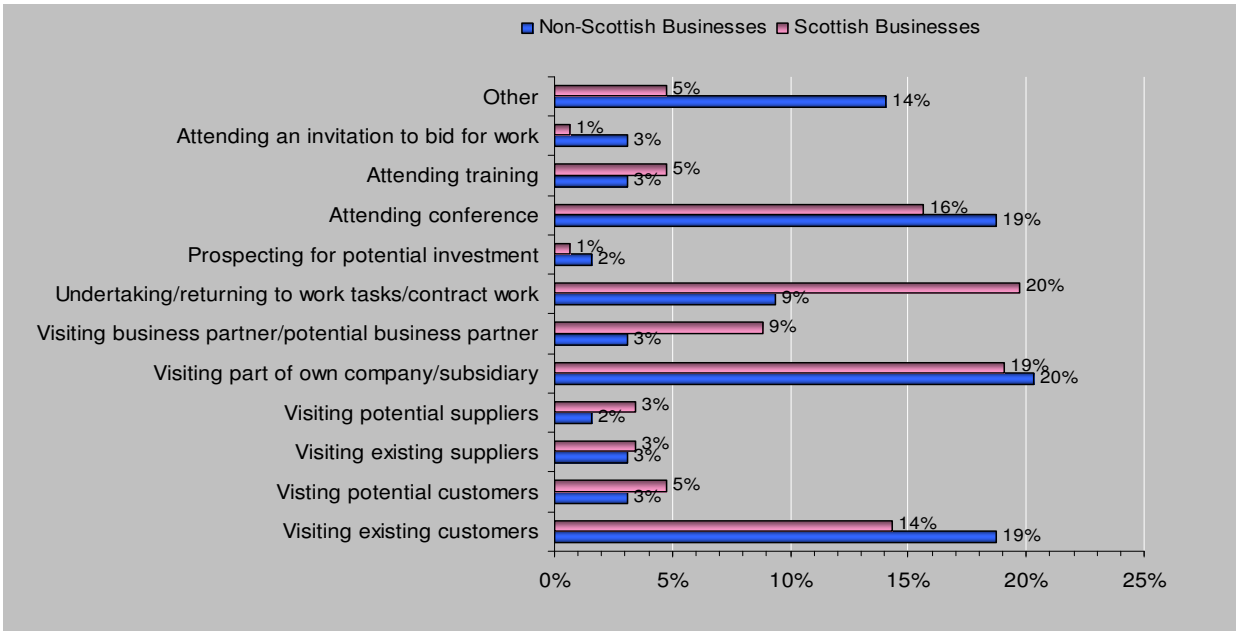
Table 3.4: Origins of Scottish & Non-Scottish Business Destinations

Origin of Non-Scottish Business Trips	Proportion	Destination of Scottish Business Trips	Proportion
Other UK	21%	Other UK	43%
Scandinavia	20%	Netherlands	16%
Rest of World	20%	Scandinavia	10%
Netherlands	11%	Rest of World	10%
Spain	6%	Germany	9%
Italy	6%	Italy	7%
Germany	6%	Spain	3%
Poland	5%	Switzerland	2%
Ireland	3%		
Switzerland	2%		
Baltic States	2%		

Trip Purpose and Duration

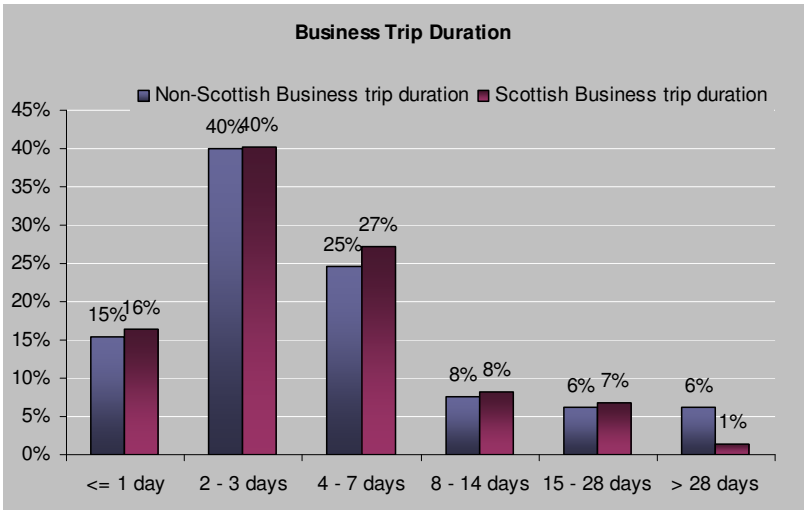
3.4.5 The main purpose for both non-Scottish business visits to Scotland and for Scottish business trips elsewhere are broadly similar, as can be seen in Figure 3.9 below.

Figure 3.9: Scottish & Non-Scottish Business Trips Purposes



3.4.6 However, it is notable that rather more Scottish businesses said that they were returning to work, or were travelling to undertake contract work and other work than non-Scottish businesses (20% as opposed to 9%). This suggests that a smaller proportion of non-Scottish businesses are engaged in on-going work or begun new work in Scotland than Scottish businesses elsewhere.

Figure 3.10: Scottish & Non-Scottish Business Trips Durations

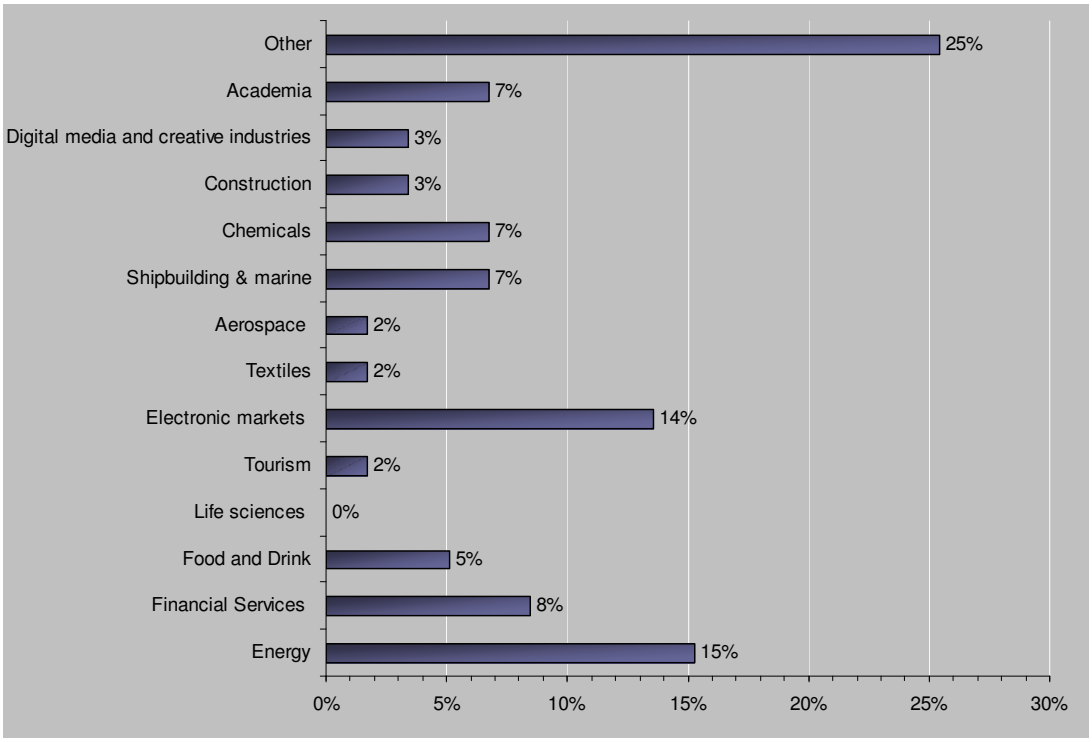


3.4.7 In terms of business trip spend, trip duration (Figure 3.10) would be expected to have a significant impact. Although the trip duration for both inbound Non-Scottish businesses and outbound Scottish businesses are broadly similar, as is illustrated in the Figure, a significantly larger proportion of inbound Non-Scottish visits last for a month or more. This will be expected to reduce the element of leakage by increasing the overall spend per non-Scottish business in Scotland compared to the spend of Scottish businesses elsewhere.

Business Trips & Migrant Workers Expenditure

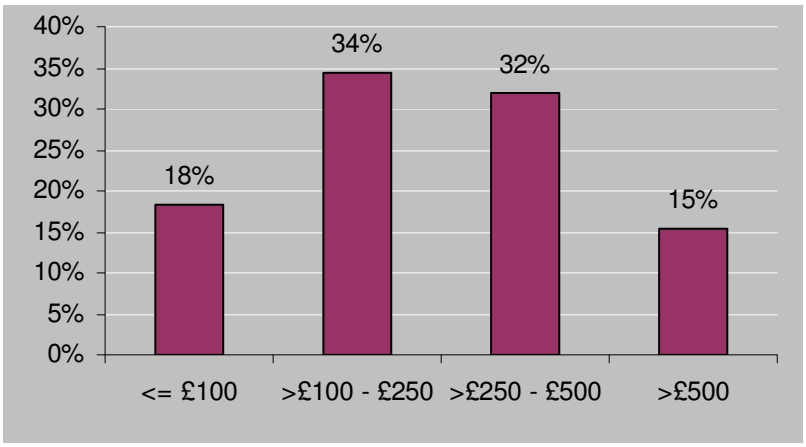
3.4.8 There is a wide range of non-Scottish businesses using the RDF services, as can be seen in Figure 3.11 overleaf. Of those respondents that offered an answer, the sector that is most represented is Energy, 15% of the sample, which would be expected given the importance of the oil, gas and related industries. However a significant proportion of non-Scottish businesses are in other areas of technology, such as electronic markets, or in heavy industry such as shipbuilding and chemicals, which contribute another 28% of the sample population between them. However, some caution should be noted with these findings where the sample, at 66, was comparatively small.

Figure 3.11: Non-Scottish Businesses Composition



3.4.9 Rather more Scottish business trips (circa 141,000) were made abroad in 2008 than Non-Scottish business trips to Scotland (circa 95,000) using both RDF supported flights and post-RDF supported services. This equates to approximately 22% of the total passengers on RDF services currently operating. Figure 3.12 shows the average business expenditure for non-Scottish Business visitors.

Figure 3.12: Non-Scottish Businesses Trip Expenditure



3.4.10 Although the sample sizes for migrant workers are lower than would be expected to derive firm figures, it is possible to gain a meaningful insight with the data obtained. Our surveys indicated that migrants make up a comparatively modest proportion of

passenger flows on RDF supported flights, with less than 3% of our sample being interviews with migrant workers. The majority of those interviewed (71%) were Polish in origin, and the vast majority of migrant workers, 82%, have visited the UK before.

3.4.11 Migrant workers indicated that they were dependent on RDF supported flights to access work in Scotland. 61% of the sample said that they were very or fairly unlikely to make the trip if the flight was unavailable. Most (three-quarters) said that it was very or fairly unlikely that they would go to any other part of the UK to work if the flight was unavailable.

3.4.12 The survey results suggest that over three-quarters of migrant workers are either skilled (manual) or semi-skilled/unskilled, and the majority of these are in the latter category, suggesting relatively low wages in comparison to business trip representatives. Migrant workers in the agriculture and construction sectors are often provided with free or subsidised housing, and most migrant income is likely to be remitted home. It is therefore unlikely that migrant expenditure in Scotland is significant.

3.5 Key Findings from the Airlines & Airports Surveys

3.5.1 The main findings from the airline/airport interviews were:

- some operators (both airports and airlines) confirmed the RDF was critical for getting routes up and running over the early years of operation, and gave operators confidence. Some also confirmed that without the RDF there would not have been routes from Europe to Scotland;
- the main effect of the RDF has been to raise the status of Scotland as a destination in its own right. This has affected mainly business and inbound leisure travellers;
- in the case of airline operators, all their RDF services are completely new since the RDF evaluation criteria did not allow competition with existing services;
- the RDF has been critical to a number of routes, and many would have arguably not been viable in the longer term without initial support; and
- RDF services have also helped the core flights network by feeding passengers into the network, although it should be noted that this view is based on the small number of airlines we were able to speak to.

3.6 Summary of Main Findings

3.6.1 The main findings of the surveys of RDF supported flights are as follows:

Tourism & Leisure Trips

- most Scottish and non-Scottish tourists arrive at or make use of airports in the SESTRAN and SPT areas, with the airports in the SESTRAN area being used by most of the non-Scottish tourists and the airports in the SPT area being used by most of the Scottish tourists;
- visiting friends and relatives is the most common reason for the holiday trips, but Scottish tourist are more likely to take short city breaks, and non-Scottish tourists are more likely to undertake an activities or cultural visit; and

- non-Scottish tourists are more likely to stay longer in Scotland, with an average of 10.8 nights than Scottish tourists elsewhere, who stay away for an average of 7.9 nights.

Business & Migrant Workers

- there is a wide range of Non-Scottish businesses using the RDF services. However, a significant proportion of non-Scottish businesses are in the technology sectors, particularly energy and the electronics markets;

- more Scottish business trips (circa 141,000) were made abroad in 2008 than non-Scottish business trips to Scotland (circa 95,000) using both RDF supported flights and post-RDF supported services. This equates to approximately 22% of the total passengers on RDF services currently operating; and

- migrant workers are heavily dependent on RDF supported flights to access jobs in Scotland, but the expenditure impacts as a result of this are expected to be small, partly because it is likely that migrant expenditure in Scotland is relatively insignificant, but also the benefits would probably be outweighed by high rates of leakage represented by the general level of migrant wage remittances.

3.6.2 The following Chapter seeks to quantify the impacts of the RDF using the appraisal tests set out in Chapter 2.

4 Appraisal of the RDF Services

Chapter Summary:- Appraisal of the RDF Services

This Chapter concludes with the following:

- total number of passengers on RDF services was 1.9 million in 2007/8, which represents about 7.6% of the Scottish total;
- total NPV for all RDF services is estimated to be £406 million (at 2002 prices) with a resultant BCR of 23.9. The total GVA impact for all RDF services combined has been estimated to be between £47 million to £52 million at 2002 prices. These have been estimated over a 10-year appraisal period using standard economic procedures and assumptions;
- in 2008 net tourist gain to Scotland in 2008 was £19.9m and business spend was £7.8m;
- three-quarters of non-Scottish businesses stated that the RDF supported flights have reduced the feeling of Scotland's remoteness from business activity;
- RDF services have brought about a number of social inclusion benefits to different people; and
- CO2 emissions from the RDF services were 4.02m tonnes over the appraisal period.

4.1 Introduction

4.1.1 This Chapter presents the results of the appraisal of the impacts of the RDF services, based on the following tests:

- Economic Impacts:
  - restricted Transport Economic Efficiency (TEE) Appraisal;
  - change in aggregate Gross Value Added (GVA) in the economy;
  - total expenditure added due to business and leisure trips; and
  - number of additional jobs over the period of the RDF programme.
- Adjustments to the Market:
  - potential degree to which non-Scottish businesses have had their perceptions changed by the RDF.
- Social Inclusion:
  - qualitative review of the potential benefits of improved connectivity.
- Environmental Impacts:
  - estimation of the increase in carbon emissions.

4.1.2 The social inclusion appraisal is a simplified analysis based on the STAG process for highlighting the social inclusion benefits of transport schemes. At the time of this appraisal, the version of STAG being used was version 1.0, September 2003.

4.2 RDF Services Passenger Flows

4.2.1 The profile of passenger demand for each RDF service has changed over the RDF programme. This is shown in Table 4.1 overleaf, which presents the annual passenger flows (one-way journeys) for each RDF service from 2003/4 to 2008/9. RDF is provided for financial years, so this table gives figures for financial years. At the time of writing this report, the data supplied to us for 2008/9 was for only approximately half of the financial year, and hence we have extrapolated those figures to their full year so as to allow for a comparison with the preceding years. This means that the figures for 2008/9 are partly estimated.

Table 4.1: Passenger Levels on RDF Services, 2003/4 to date (One-Way Trips)

Service	Passenger Flows Per Financial Year					
	2003/4	2004/5	2005/6	2006/7	2007/8	2008/9
Dundee to Belfast						15,481
Dundee to Birmingham						32,597
Edinburgh to Milan						43,985
Edinburgh to Munich					38,796	49,688
Edinburgh to Zurich					8,414	8,355
Edinburgh to Madrid						50,470
Prestwick to Riga				18,107	44,394	33,480
Glasgow to Berlin				78,731	92,603	90,814
Prestwick to Warsaw				41,962	53,003	52,814
Prestwick to Wroclaw				30,521	42,280	41,592
Prestwick to Gdansk				35,221	41,472	39,809
Edinburgh to Geneva	8,800	2,263				
Aberdeen to Stornoway			1,198	5,632	7,030	7,471
Inverness to Bristol			59,985	81,069	78,055	73,036
Edinburgh to Barcelona			54,899	66,803	62,184	64,237
Glasgow to Barcelona			90,540	92,864	71,622	
Aberdeen to Southampton			9,931	9,426	11,562	11,737
Aberdeen to Bristol		6,118	21,696	28,510	26,812	26,798
Aberdeen to Copenhagen		6,319	23,503	27,452	27,836	30,929
Edinburgh to New York		78,908	121,208	130,482	154,354	172,593
Aberdeen to Groningen		9,801	11,507	11,416	10,147	10,072
Glasgow to Dubai		142,315	168,024	200,690	238,966	254,542
Prestwick to Bergamo	18,526	91,906	98,712	91,733	83,925	83,726
Prestwick to Gothenburg	31,300	81,344	78,894	61,265	57,389	49,422
Prestwick to Girona	78,241	97,053	110,748	109,144	115,611	120,461
Edinburgh to Cologne	41,000	52,432	50,794	43,249	50,105	51,307
Prestwick to Pisa		7,583	84,967	61,427	59,732	56,145
Prestwick to Rome		84,537	97,690	83,906	66,144	64,373
Prestwick to Stockholm	88,444	86,775	84,674	71,464	68,316	64,012
Inverness to Dublin				13,179	12,960	12,745
Inverness to East Midlands				3,056	39,423	25,920
Inverness to Leeds/Bradford				6,171	897	3,534
Sumburgh to Stansted				2,302	2,493	2,684
Aberdeen to Kristiansand				744		
Aberdeen to Liverpool				31,894	30,489	
Inverness to Newcastle				1,178		
Sumburgh to Oslo		1,083				
Edinburgh to Atlanta				76,952	58,648	
Edinburgh to Warsaw				44,111	54,073	
Aberdeen to Blackpool			1,707			
Prestwick to Lubeck		38,002	14,076			
Aberdeen to Oslo			11,434	11,597	10,609	
Prestwick to Dusseldorf		23,085	75,370	59,375	53,606	50,622
Glasgow to Prague		22,000	19,674			
Inverness to Stockholm		2,861				
Edinburgh to Munich		1,246				
Edinburgh to Geneva				61,519	78,848	81,293
Edinburgh to Jersey	8,000					
Edinburgh to Milan	3,200	1,309				
Edinburgh to Oslo	4,400	1,353				
Edinburgh to Zurich	4,000	1,550				
Kirkwall to Bergen	300					
Totals	***286,211***	***801,841***	***1,277,155***	***1,692,408***	***1,852,798***	***1,776,744***

4.2.2 As can be seen from Table 4.1, the total number of passengers has grown from approximately 286,000 in 2003/4 to 1.8 million in 2008/09 (based on an extrapolation of RDF invoices received to date). Since the 2008/9 figure is partly estimated, it is worth noting the total numbers of passengers in 2007/8 was about 1.9 million. The table contains information on 52 (out of 55) RDF services since this was the data supplied at the time of the analysis. Therefore the analysis presented in the rest of this report is based on 52 services. Adding a further 3 services would increase the estimated benefits of the RDF.

4.2.3 The table also shows the longevity of the RDF services. While some services have stopped, the majority (33 out of 52) are currently still running. Furthermore, of those services which stopped, 6 of those were as a result of two airlines failing for reasons completely separate from their involvement with the RDF, and 6 of those routes are now operated by a different airline. The original investment from the RDF helped to establish the case for those destinations being served.

4.2.4 The conclusion from this data is that RDF support has significantly increased passenger levels on Scottish air services. This can be compared to the total air passenger demand levels, sourced from 2007 data in the Scottish Transport Statistics (the most recent year available[17]). The annual total for terminating passengers was 25.13 million and hence the 1.9 million passengers on RDF services in 2007/8 are about 7.6% of the total.

4.3 Economic Impacts

Restricted Transport Economic Efficiency (TEE) Appraisal

4.3.1 The Transport Economic Efficiency (TEE) Appraisal estimates the benefits of the RDF services against the investment made and additional costs to the public sector. These are restricted to a limited number of benefits and costs in order to measure the gain experienced by the public sector from their RDF contributions.

4.3.2 A restricted TEE appraisal was undertaken as this only takes social benefits into account and compares these with the public costs of the services. On the other hand, a full TEE appraisal would take on board other benefits such as those accruing to operators in terms of revenues etc. representing information that is not available to the consultants.

4.3.3 This Chapter presents the results of the appraisal into the impacts of the RDF services, based on the following tests:

- Benefits:
  - journey time reductions per service; and
  - fare savings per service.
- Costs:
  - RDF investment per service; and
  - public sector staff costs, consultancy fees, RDF marketing costs, etc.

4.3.4 It should be clear that the benefits are being compared to investment costs – which do not include the full costs of the RDF programme.

4.3.5 The above benefits were used as they were the original two benefit streams applied in the evaluation of the RDF services, and hence this maintains consistency with previous work. In addition, since the function of the appraisal is to measure the value-for-money of the public sector investment, the revenues gained from the additional RDF services would fall to the airline operators as would the operating costs. Savings were against

[17] Scottish Transport Statistics – No 27, Scottish Government, Dec 2008

competitive surface travel or "multiple" flights. This was the same as the original TEE appraisals at the time of the RDF awards.

4.3.6 Travel time savings were estimated for each RDF service by multiplying the annual numbers of passengers against the journey time reductions brought about by the new service. As mentioned in Chapter 3, the surveys were carried out for 5 different passenger types (Scottish Business, non-Scottish Business, Scottish Leisure, non-Scottish Leisure and Migrant Workers). This is because different types of passengers have different values-of-time, and hence the estimates were prepared for each journey purpose separately and then aggregated to give the total annual monetised value of the journey time savings. It should be noted that the statistical sample for non-Scottish businesses was comparatively small, but large enough to give statistically robust results.

4.3.7 Migrant workers were assumed to have the same value-of-time as non-Scottish Business. Values-of-time were sourced from the Department for Transport's WebTAG[18]. Fare savings were estimated the same way as time benefits, except actual fares were used, again for different passenger types.

4.3.8 It should be noted that the time savings for RDF services were compared with the nearest competitive non-RDF air services with the same Origin/Destination (OD) pattern, (which usually involved more than one leg). Where these services were not available, the comparison was with the equivalent journey undertaken by the (quickest) surface mode, usually road.

4.3.9 The above calculations were incorporated into a spreadsheet-based TEE model which used the following parameters:

- a 10-year appraisal period;
- all values are discounted to a Base Price of 2002; and
- an annual discount rate of 3.5%.

4.3.10 As with the previous assumptions, the above were based on Government values and the period of appraisal was the same as that used in the original RDF evaluations to maintain consistency with previous appraisals. Where a service is no longer running there are no more benefits and costs accrued in the TEE timeline.

4.3.11 Appendix B includes an extract from WebTAG which explains the calculation process in more detail. The individual calculations for each RDF service and each year of their appraisal period is also included in Appendix B. Table 4.2 summarises the key headline TEE indicators.

Table 4.2: TEE Appraisal Results

Service	Status	Present Value Benefits (PVB)	Present Value Costs (PVC)	Net Present Value (NPV)	Benefit-to-Cost Ratio (BCR)
Dundee to Belfast	Current RDF	£1,250,724	£138,959	£1,111,766	9.0
Dundee to Birmingham	Current RDF	£2,137,580	£305,709	£1,831,871	7.0
Edinburgh to Milan	Current RDF	£27,702,782	£519,106	£27,183,676	53.4
Edinburgh to Munich	Current RDF	£30,817,819	£803,416	£30,014,403	38.4
Edinburgh to Zurich	Current RDF	£3,134,387	£345,927	£2,788,460	9.1
Edinburgh to Madrid	Current RDF	£14,348,466	£800,272	£13,548,194	17.9
Prestwick to Riga	Operating	£8,161,926	£390,210	£7,771,715	20.9
Glasgow to Berlin	Operating	£27,313,377	£824,830	£26,488,547	33.1
Prestwick to Warsaw	Operating	£10,533,845	£437,515	£10,096,330	24.1

[18] Web-based Transport Appraisal Guidance (webTAG), Unit 3.5.4, Department for Transport, February 2006

Table 4.2 (Continued): TEE Appraisal Results

Service	Status	Present Value Benefits (PVB)	Present Value Costs (PVC)	Net Present Value (NPV)	Benefit-to-Cost Ratio (BCR)
Prestwick to Wroclaw	Operating	£18,557,911	£234,355	£18,323,557	79.2
Prestwick to Gdansk	Operating	£13,793,200	£365,061	£13,428,139	37.8
Edinburgh to Geneva	Operating	£16,414,824	£435,671	£15,979,154	37.7
Aberdeen to Stornoway	Operating	£11,960,953	£275,662	£11,685,291	43.4
Inverness to Bristol	Operating	£30,462,486	£2,843,530	£27,618,956	10.7
Edinburgh to Barcelona	Operating	£7,468,480	£638,090	£6,830,390	11.7
Glasgow to Barcelona	Operating	£3,412,347	£275,403	£3,136,944	12.4
Aberdeen to Southampton	Operating	£2,982,628	£219,510	£2,763,118	13.6
Aberdeen to Bristol	Operating	£1,519,128	£97,697	£1,421,431	15.5
Aberdeen to Copenhagen	Operating	£5,307,659	£191,205	£5,116,454	27.8
Edinburgh to New York	Operating	£21,795,507	£1,111,572	£20,683,935	19.6
Aberdeen to Groningen	Operating	£2,627,284	£89,616	£2,537,668	29.3
Glasgow to Dubai	Operating	£32,116,017	£1,751,090	£30,364,927	18.3
Prestwick to Bergamo	Operating	£5,630,219	£172,530	£5,457,689	32.6
Prestwick to Gothenburg	Operating	£4,626,918	£137,310	£4,489,608	33.7
Prestwick to Girona	Operating	£13,849,759	£178,756	£13,671,003	77.5
Edinburgh to Cologne	Operating	£8,214,759	£76,507	£8,138,252	107.4
Prestwick to Pisa	Stopped	£18,000,352	£392,417	£17,607,935	45.9
Prestwick to Rome	Stopped	£18,988,885	£166,068	£18,822,817	114.3
Prestwick to Stockholm	Stopped	£26,098,509	£156,632	£25,941,877	166.6
Inverness to Dublin	Stopped	£1,869,472	£447,059	£1,422,413	4.2
Inverness to East Midlands	Stopped	£6,513,146	£1,322,909	£5,190,237	4.9
Inverness to Leeds/Bradford	Stopped	£1,075,851	£133,312	£942,539	8.1
Sumburgh to Stansted	Stopped	£1,087,297	£116,791	£970,506	9.3
Aberdeen to Kristiansand	Stopped	£86,003	£3,161	£82,842	27.2
Aberdeen to Liverpool	Stopped	£704,064	£75,245	£628,819	9.4
Inverness to Newcastle	Stopped	£58,715	£78,139	-£19,424	0.8
Sumburgh to Oslo	Stopped	£200,033	£5,336	£194,697	37.5
Edinburgh to Atlanta	Stopped	£3,784,090	£444,842	£3,339,248	8.5
Edinburgh to Warsaw	Stopped	£7,075,735	£139,265	£6,936,469	50.8
Aberdeen to Blackpool	Stopped	£4,341	£4,712	-£371	0.9
Prestwick to Lubeck	Stopped	£3,122,251	£52,990	£3,069,261	58.9
Aberdeen to Oslo	Stopped	£2,389,157	£159,365	£2,229,792	15.0
Prestwick to Dusseldorf	Stopped	£4,450,437	£110,968	£4,339,470	40.1
Glasgow to Prague	Stopped	£725,564	£46,873	£678,691	15.5
Inverness to Stockholm	Stopped	£182,086	£117,668	£64,418	1.5
Edinburgh to Munich	Stopped	£23,609	£4,244	£19,365	5.6
Edinburgh to Geneva	Stopped	£262,353	£30,784	£231,568	8.5
Edinburgh to Jersey	Stopped	£502,352	£39,097	£463,255	12.8
Edinburgh to Milan	Stopped	£186,485	£13,353	£173,132	14.0
Edinburgh to Oslo	Stopped	£488,605	£17,631	£470,974	27.7
Edinburgh to Zurich	Stopped	£165,433	£16,560	£148,873	10.0
Kirkwall to Bergen	Stopped	£19,759	£1,478	£18,281	13.4
Totals		***£424,205,567***	***£17,756,406***	***£406,449,160***	***23.9***

4.3.12 The present value of the benefits (PVB) is the monetised estimate of the total societal benefits (i.e. time plus fare savings) discounted back to 2002 prices and summed over the period of the appraisal.

4.3.13 The present value of the costs (PVC) is the monetised estimate of the total public sector costs (i.e. RDF investment plus other costs such as staff resources), again discounted back to 2002 prices and summed over the period of the appraisal.

4.3.14 The net present value (NPV) is the difference of the PVB minus the PVC. If this is positive then there is an overall net gain to society due to the RDF service. The benefit-to-cost ratio (BCR) is the ratio of the PVB to PVC. The BCR indicates the scale of positive return to public investment, e.g. a BCR of 3.7 means the RDF service is providing benefits which are 3.7 times the cost of investment.

4.3.15 As can be seen from Table 4.2, nearly all the RDF services return a positive NPV and a BCR greater than 1.0 suggesting the RDF programme has been successful in improving travel conditions for business and leisure passengers. In a number of cases, the rate of return is very high. Examples of services with high returns include:

- Prestwick to Stockholm: NPV = £25,941,877 and BCR = 166.6;
- Prestwick to Rome: NPV = £18,822,817 and BCR = 114.3;
- Edinburgh to Cologne: NPV = £8,138,252 and BCR = 107.4; and
- Prestwick to Wroclaw: NPV = £18,323,557 and BCR = 79.2.

4.3.16 Only 2 services produce negative NPVs:

- Aberdeen to Blackpool : NPV = –£371 and BCR = 0.9; and
- Inverness to Newcastle : NPV = –£19,424 and BCR = 0.8.

4.3.17 Both of the above services are no longer running.

4.3.18 The total NPV for all RDF services is estimated to be £406 million (at 2002 prices) with a resultant BCR of 23.9.

4.3.19 There is a significant body of research which has shown the key transport factors influencing the wider economic benefits are journey time and fare savings. This includes recent market research carried out by Scott Wilson[19] which also included reviewing various case studies throughout the UK, and also research work carried out by various academics and consultants[20,21,22].

Gross Value Added (GVA)

4.3.20 This appraisal describes the wider economic impacts of the RDF services in terms of the additional aggregate Gross Value Added (GVA) to the economy. As discussed with the study Steering Group this is based on the net present value produced by the RDF services, with a suitable Type I economic multiplier used to estimate direct expenditure[23].

4.3.21 The assessment considered the linkages between the RDF services and the rest of the economy. The outputs from the identified investments were tested in terms of the economic effects and differences at the Scottish level only, as this study is concerned with the economic competitiveness of Scotland as a whole arising from any improvements. The Scottish Enterprise's Guide Note provides a spreadsheet-based

[19] A9 Perth to Inverness – Economic Appraisal Study, Strategic Impact Assessment Final Report, October 2007
[20] Low-cost airlines, secondary airports, and state aid: An economic assessment of the Ryanair-Charleroi Airport agreement, Journal of Air Transport Management, 12, 197-203, C. Barbot, 2006
[21] CAP 638 - The economic impact of new air services: a study of long haul services at UK regional airports, Civil Aviation Authority, London, 1994
[22] The economic contribution of the aviation industry in the UK, Oxford Economic Forecasting, 2006
[23] Steering Group Meeting, 16 January 2009

GVA calculator as follows, and this was used for all the appraisals of the various options tested[24,25]:

$$AI = [GI \times (1-L) \times (1-Dp) \times (1-S) \times M] - [GI^* \times (1-L^*) \times (1-Dp^*) \times (1-S^*) \times M^*]$$

AI =	Net additional impact	Dp =	Displacement
G I =	Gross impact	S =	Substitution
L =	Leakage	M =	Multiplier

4.3.22 In order to measure the additionality of the investment in terms of GVA benefits, the Scottish Enterprise GVA model was adjusted by converting the estimated gross impacts into net impacts, by taking into account the following:

- gross impact (GI) – these were the monetary values of NPV and were sourced from the TEE Appraisal results. The total across the network was applied and breakdowns by RDF service were estimated using a pro-rata of the individual NPVs;
- 'deadweight' – this is effectively the Reference Case (i.e. what would happen without the services being implemented). Since the appraisal is required at the Scottish level, we have used the average value obtained from all the records obtained in the business and leisure surveys, which was 40%;
- 'substitution' (S) – the market research surveys suggested that substitution was found to be a significant factor in providing sufficient labour resources for the RDF services. In the main, survey respondents said that they used existing staff resources (an average of 72% based on all the surveys). Accordingly, we have applied this percentage as a substitution factor;
- 'displacement' (Dp) and 'leakage'[26] (L); displacement refers to non-Scottish business investment in Scotland, arising from the availability of RDF services, drawing on existing domestic employment from Scottish businesses. This reduces the scale of additional job opportunities arising from this investment. It is estimated from the business surveys that displacement reduces the level of additional employment by approximately 14%. Leakage refers to the flow of tourist expenditure associated with Scottish tourists visiting (and spending) in non Scottish destinations, reducing the aggregate tourist level of expenditure resulting from the availability of RDF supported flights. It is estimated from the leisure surveys that this aggregate expenditure is reduced by approximately 44%. The different proportions of passenger types are reflected in these figures when applying them to the appraisal; and
- GVA multipliers (M) – economic multipliers are used to calculate the wider local, regional and national employment and income impacts resulting from the initial first round investment effect on these. Data was sourced from the Scottish Government Input-Output (I/O) Table Multipliers at 2004 levels, which was the most recent year found. The passengers from the surveys advised us which sectors of the economy they worked in and hence we used multipliers for these key industries which were cross-referenced with the economic sector groupings in the Standard Index Classifications (SIC) codes. Because the GVA model uses an average multiplier, the relevant multipliers for each sector were weighted by the associated proportion

[24] Additionality Calculator A, version: AMcP/SEL/Jun07/5.1, Scottish Enterprise, 2007
[25] Additionality & Economic Impact Assessment Guidance Note, Scottish Enterprise, November 2008
[26] It is worth noting that 'leakage' does not apply to all Scottish tourists/businesses trips on RDF flights out of Scotland – some of these would have happened anyway via a different route

of passengers based on the surveys carried out. The total of these adjusted multipliers gave the weighted-average multiplier used in the appraisal. Table 4.3 below shows the calculation of the average multiplier.

Table 4.3: Calculation of GVA Multiplier

Sector	Proportion of the economy [source: from passenger surveys]	Type I GVA multiplier at 2004 levels [from Scottish Government I/O Tables]	Sample Weighted Type I GVA multiplier (at 2004 levels)
	(a)	(b)	(c) = (a) * (b)
Other	25%	1.1	0.28
Energy	15%	2.9	0.44
Electronic markets (including micro-electronics)	14%	1.3	0.18
Financial Services	8%	1.2	0.10
Aerospace	7%	1.4	0.09
Shipbuilding & marine	7%	1.3	0.09
Digital media and creative industries	7%	1.3	0.09
Academia	7%	1.3	0.09
Food and Drink	5%	1.3	0.07
Chemicals	3%	1.2	0.04
Construction	3%	1.7	0.06
Tourism	2%	1.1	0.02
Optical technologies	2%	1.1	0.02
Textiles	2%	1.6	0.03
		Weighted Average Multiplier =	***1.50***

4.3.23 The Scottish Enterprise GVA calculator allows for changes in the above factors for the Reference Case, but uses as a default the same factors as there is rarely justification to apply different assumptions to different scenarios. From the surveys carried out, we have seen little evidence to suggest the likely levels of leakage, displacement and multiplier impacts that would have applied under the Reference Case would be any different from those outlined above. Hence, we have kept the above factors the same in the Reference Case.

4.3.24 The results of the GVA appraisal are summarised in Table 4.4 below. This includes the results under the two ranges in the GVA calculator (Upper and Lower) to gauge the effects of variations in the data sample confidence interval. The range between the Upper and Lower boundaries was 5% as our surveys were designed to capture a 95% confidence level[27]. Appendix C contains the GVA model output table for more detailed review.

[27] The margin of error achieved was calculated based on the following steps:
(a) 2500 based on the squared of a minimum sample target of 50%
(b) 908 is the sample obtained
(c) = (a) / (b) = 2.753
(d) = Sqrt (c) = 1.659
(e) = 1.96 * (d) = 3.25
Hence, since the margin of error is 3% we can be comfortable we have 95% Confidence Levels

Table 4.4: GVA Appraisal Results (estimates over 10 years)

Service	Status	GVA at 2002 Prices (Lower	GVA at 2002 Prices (Upper Estimate)
Dundee to Belfast	Current RDF	£128,181	£141,674
Dundee to Birmingham	Current RDF	£211,206	£233,438
Edinburgh to Milan	Current RDF	£3,134,143	£3,464,053
Edinburgh to Munich	Current RDF	£3,460,512	£3,824,776
Edinburgh to Zurich	Current RDF	£321,496	£355,337
Edinburgh to Madrid	Current RDF	£1,562,040	£1,726,465
Prestwick to Riga	Operating post RDF	£896,040	£990,360
Glasgow to Berlin	Operating post RDF	£3,053,998	£3,375,472
Prestwick to Warsaw	Operating post RDF	£1,164,057	£1,286,589
Prestwick to Wroclaw	Operating post RDF	£2,112,615	£2,334,996
Prestwick to Gdansk	Operating post RDF	£1,548,198	£1,711,166
Edinburgh to Geneva	Operating post RDF	£1,842,317	£2,036,245
Aberdeen to Stornoway	Operating post RDF	£1,347,256	£1,489,073
Inverness to Bristol	Operating post RDF	£3,184,329	£3,519,521
Edinburgh to Barcelona	Operating post RDF	£787,510	£870,406
Glasgow to Barcelona	Operating post RDF	£361,674	£399,745
Aberdeen to Southampton	Operating post RDF	£318,574	£352,108
Aberdeen to Bristol	Operating post RDF	£163,884	£181,135
Aberdeen to Copenhagen	Operating post RDF	£589,902	£651,997
Edinburgh to New York	Operating post RDF	£2,384,755	£2,635,782
Aberdeen to Groningen	Operating post RDF	£292,581	£323,379
Glasgow to Dubai	Operating post RDF	£3,500,925	£3,869,444
Prestwick to Bergamo	Operating post RDF	£629,244	£695,481
Prestwick to Gothenburg	Operating post RDF	£517,630	£572,117
Prestwick to Girona	Operating post RDF	£1,576,199	£1,742,115
Edinburgh to Cologne	Operating post RDF	£938,300	£1,037,068
Prestwick to Pisa	Operating post RDF	£2,030,108	£2,243,803
Prestwick to Rome	Operating post RDF	£2,170,177	£2,398,617
Prestwick to Stockholm	Operating post RDF	£2,990,970	£3,305,809
Inverness to Dublin	Stopped	£163,997	£181,260
Inverness to East Midlands	Stopped	£598,409	£661,399
Inverness to Leeds/Bradford	Stopped	£108,670	£120,109
Sumburgh to Stansted	Stopped	£111,894	£123,673
Aberdeen to Kristiansand	Stopped	£9,551	£10,557
Aberdeen to Liverpool	Stopped	£72,500	£80,131
Inverness to Newcastle	Stopped	-£2,240	-£2,475
Sumburgh to Oslo	Stopped	£22,448	£24,810
Edinburgh to Atlanta	Stopped	£384,999	£425,525
Edinburgh to Warsaw	Stopped	£799,740	£883,924
Aberdeen to Blackpool	Stopped	-£43	-£47
Prestwick to Lubeck	Stopped	£353,871	£391,120
Aberdeen to Oslo	Stopped	£257,084	£284,145
Prestwick to Dusseldorf	Stopped	£500,319	£552,985
Glasgow to Prague	Stopped	£78,250	£86,486
Inverness to Stockholm	Stopped	£7,427	£8,209
Edinburgh to Munich	Stopped	£2,233	£2,468
Edinburgh to Geneva	Stopped	£26,699	£29,509

Table 4.4 (Continued): GVA Appraisal Results (estimates over 10 years)

Service	Status	GVA at 2002 Prices (Lower Estimate)	GVA at 2002 Prices (Upper Estimate)
Edinburgh to Jersey	Stopped	£53,411	£59,033
Edinburgh to Milan	Stopped	£19,961	£22,062
Edinburgh to Oslo	Stopped	£54,301	£60,017
Edinburgh to Zurich	Stopped	£17,164	£18,971
Kirkwall to Bergen	Stopped	£2,108	£2,330
Totals		***£46,861,572***	***£51,794,369***

4.3.25 As shown in Table 4.4, the total GVA impact for all RDF services combined has been estimated to be between £47 million and £52 million at 2002 prices. As with the Restricted TEE Appraisal, the GVA estimates are over a 10-year period.

4.3.26 It is worth noting that the GVA estimate as calculated in the Scottish Enterprise Calculator is not supposed to represent the NPV from a standard TEE model. There is no reason for them to be identical since they capture different parts of the economic impacts.

Total TEE and GVA Economic Benefits

4.3.27 Combining the TEE and GVA estimates provides an indication of the total economic NPV, as shown in Table 4.5.

Table 4.5: Total TEE and GVA Economic NPV

Impact	Low Growth Scenario	High Growth Scenario
GVA	£46,861,572	£51,794,369
TEE	£406,449,160	£406,449,160
Total	***£453,310,732***	***£458,243,529***

4.3.28 Adding the TEE and GVA estimates together suggests the RDF produced between £453 million and £458 million of NPV (over a 10-year appraisal period) at 2002 prices.

Tourist & Business Trip Spend

4.3.29 The analysis here represents a snapshot of tourist and business spend in 2008 and is therefore quoted in 2008 prices, rather than a trend over a number of years. The results may therefore change somewhat year-on-year, and will be sensitive to factors such as relative exchange rates (for tourist flows especially), fare costs and availability and the general relative economic performance of the countries concerned. Appendix D sets out the calculations in more detail.

Tourism Expenditure

4.3.30 The level of tourism expenditure was obtained from the passenger surveys undertaken in three waves at different airports to capture seasonal variation. There were more Scottish leisure and tourist trips going abroad than non-Scottish tourists arriving in Scotland using RDF supported air services recorded in 2008.

4.3.31 The surveys were carried out on departing passengers, so quoted estimates of spend by non-Scottish tourists on their way home are likely to be more accurate. The

estimated spend by type of tourist, whether non-Scottish passengers or Scottish tourists, were adjusted for factors such as discrepancies in length and type of stay. The result was that estimated spend for non-Scottish tourists in Scotland is somewhat higher at £622 per visit than for Scottish tourists abroad, which was estimated at £517 per visit.

4.3.32 These expenditure figures are very close to the VisitScotland values for visits by non-Scottish tourists[28]. VisitScotland record a spend estimate of £779 per overseas visit to Scotland adjusted for differences in trip length (VisitScotland visit lengths were shorter than those recorded in our surveys). Factor in the equivalent expenditure from visitors from other parts of the UK (£585), the weighted value for non-Scottish tourist visits from VisitScotland data is £612 per visit.

4.3.33 Given the expenditure per head and the number of respective visitors, expenditure by non-Scottish tourists in Scotland is broadly similar, at £204.9 million in 2008, when compared with expenditure by Scottish tourists abroad, which was estimated at £233.3 million in 2008. However, only those passengers who depended on the use of the flight to make their specific trip is of interest, as passenger who would have either gone abroad or come to Scotland irrespective of whether the flight was operating represents "deadweight loss", and net expenditure should be adjusted for this element.

4.3.34 The results of the surveys indicate that approximately 33% of Scottish tourists would have made the trip to non-Scottish destinations irrespective of the RDF supported flights. In other words, RDF supported flights were responsible for 66% of the number of Scottish trips elsewhere. Therefore expenditure by Scottish tourists outside Scotland needs to be adjusted by this amount. This gives a value for 2008 of approximately £156.3 million.

4.3.35 Likewise approximately 14% of non-Scottish tourists suggested that they would have come to Scotland whether the RDF supported service was operating or not. The expenditure for non-Scottish tourists in Scotland will need to be adjusted for this, which gives a value of approximately £176.2 million in 2008.

4.3.36 Scottish tourist spend in non-Scottish destinations, represents leakage to the Scottish economy. The difference between these two values, £19.9 million, represents the estimated net additional tourist expenditure accruing to the Scottish economy in 2008 as a result of the implementation of the RDF supported air services. This net additional benefit due to tourism spend in Scotland can be compared to the costs of RDF support in 2008 which was £1.6 million (at 2008 prices) and falling from the previous year (2007 support was £2.3 million at 2007 prices).

Business Expenditure

4.3.37 Business expenditure was estimated in a similar way to that estimated for tourists above. However, the length of business stays for both non-Scottish business trips in Scotland and Scottish business trips elsewhere were very much shorter than those for tourists for the respective direction. In addition business tended to make repeat visits to Scotland. For a high proportion of non-Scottish and Scottish businesses these amounted to multiple visits.

[28] Visit Scotland Website www.visitscotland.org, Tourism in Scotland 2007, Table 1: Volume and Value of Tourism in Scotland

4.3.38 Approximately 141,000 Scottish business trips were made outside Scotland in 2008, and 95,500 non-Scottish business visits made to Scotland in the same year. Business trip expenditure associated with the trip rates (taken from the surveys) was estimated to be approximately £634 per trip for Scottish businesses and £859 for non-Scottish businesses. The values obtained gave an unadjusted total expenditure of £89.5 million for Scottish businesses at non-Scottish destinations, and £82.0 million for non-Scottish businesses in Scotland. The value of expenditure per visit is a very close value to the VisitScotland figure of £864 expenditure per non-Scottish business trip to Scotland, when adjusted for differences in length of visit, (as with tourist data, VisitScotland visit lengths were shorter than those recorded in our surveys).

4.3.39 However, as with the tourist estimates above, account needs to be taken of deadweight activity, in this case the likelihood that non-Scottish businesses would have made the trip to Scotland and the likelihood that Scottish businesses would have travelled the other way in the absence of the RDF supported air services. 74% of Scottish businesses reported that they would have been likely to have made the trip to the same destination irrespective of the availability of the RDF service used. The equivalent proportion for non-Scottish businesses, who said that they would have made the trip, is 64%. As expected these values are higher than for tourists, as the latter would be expected to more sensitive to service availability as well as transport costs.

4.3.40 Taking into account both deadweight trip movements and the estimated impact of the RDF services on Scottish and non-Scottish annual travel cost savings, where it is assumed that the benefits of Scottish savings would accrue to Scotland, the additional net expenditure in Scotland is estimated at £7.8 million. It should be noted that this expenditure is associated with trip spend on hotels, car hire, etc. commensurate with tourist expenditure rather than business investment. Again it is worth comparing this net additional benefit due to business spend in Scotland to the £1.6 million given in RDF support in 2008 (at 2008 prices) which was lower than the level of support in 2007 (£2.3 million at 2007 prices).

Numbers of Additional Jobs

4.3.41 In addition to providing direct monetised benefits, the surveys asked key stakeholders such as airports and airlines whether there has been any increase in job numbers during the RDF programme period.

4.3.42 The interviews identified the total net increase in job numbers during the period of the RDF (see Table 4.6).

Table 4.6: Increase in Net Jobs

Description	No. Additional Jobs	Comments
Average increase in retail jobs	12 FTE**	Jobs at airport retail units
Airport-related jobs	5 FTE	Includes additional baggage-handling staff and customer support at check-ins
Airlines-related jobs*	20 FTE	Includes flight crews, administrators, etc
Total Net Increase	***37 FTE***	

Note: * only represents Ryanair figures
** FTE = full-time equivalents

4.3.43 The only airline to provide sufficient feedback to estimate additional staff was Ryanair. The other airlines interviewed (EasyJet, Eastern and Aer Arran) advised that they were able to absorb the extra passenger demands within their existing resources and operating capacity (i.e. there was substitution and/or displacement of resources). As explained earlier in Chapter 2, these were the only airlines who responded to our

request for interviews as the others seemed reluctant to contribute to the study. Hence, it is possible that the above figures could be higher.

4.4 Connectivity and Market Efficiency Issues

4.4.1 In addition to looking at the economic impacts of the RDF, the appraisal has sought to identify if the proposals have influenced business perceptions of air transport. This section outlines the results of the appraisal. Before presenting the findings from our own surveys, we begin by showing a comparison of air services before and after the RDF in other regions/countries which are similar in size to Scotland to demonstrate the changes brought about by the RDF programme.

Market Correction Issues

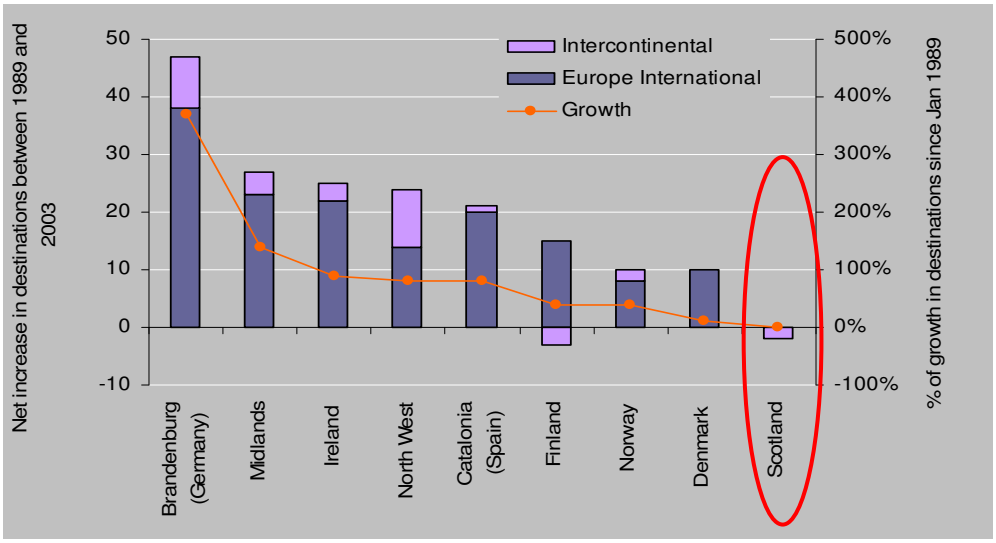
4.4.2 Prior to the introduction of the RDF, Scotland had fewer direct flights to other parts of Europe than other comparable regions, which was believed might be inhibiting economic growth. The RDF was implemented to generate new direct airline links from Scotland to key UK and overseas destinations and, thereby, expand Scotland's airports as major tourism and business travel gateways. Therefore the RDF was intended to tackle the inconsistencies in the market in terms of air service provision, and support airlines in setting up new services.

4.4.3 In order to get an idea on how the RDF has influenced the development of services, the time periods before its introduction and after were compared. Similarly, by benchmarking the performance of Scotland against other regions with similar sized populations this gives an idea of how Scotland began to perform after the introduction of the RDF. A short list of peer regions with similar populations and GDP were used to benchmark Scotland (population 5.1 million) against, namely:

- Denmark (population 5.4 million);
- North West England (population 6.8 million);
- Brandenburg, Germany (population 6 million);
- Republic of Ireland (population 4.2 million);
- Catalonia, Spain (population 7 million);
- Midlands, England (population 9.6 million);
- Finland (population 5.2 million); and
- Norway (population 4.7 million).

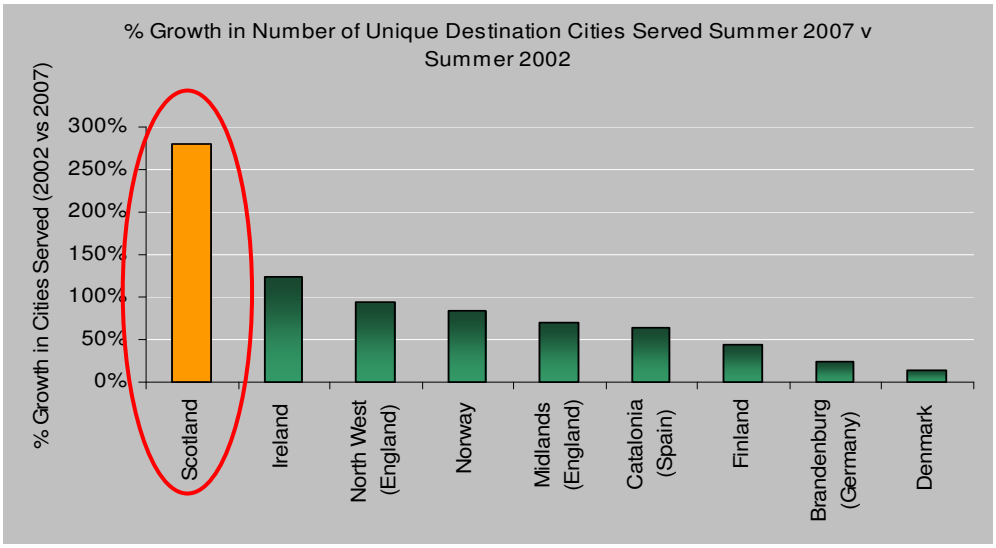
4.4.4 Data was supplied by Scottish Enterprise from 1989 to 2003 and this period was used to compare the above regions against Scotland. The findings show that Scotland was performing poorly compared to the other peer-regions in terms of the net increase in destinations available from Scottish airports and percentage growth in destinations. Scotland was showing no increase in International destinations and negative growth for inter-continental, as can be seen in Figure 4.1 overleaf.

Figure 4.1: Comparison between Growth in Destinations Served by Scottish Airports with Comparable European Airports (1989 – 2003)



4.4.5 With the introduction of the RDF, the development of Scottish services can be benchmarked against the regions this time to determine its impact. Figure 4.2, shows the percentage increase in destinations served by Scottish airports in 2007 compared to 2002.

Figure 4.2: Comparison between Growth in Destinations Served by Scottish Airports with Comparable European Airports (2002 – 2007)[29]



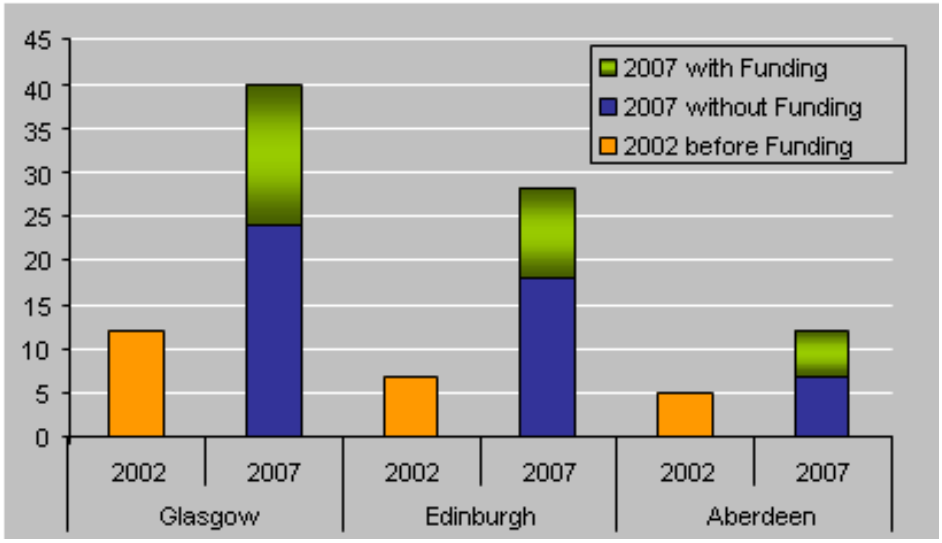
Source: Avia Solutions via Scottish Enterprise

[29] OAG for Non-Stop Services with Minimum Frequency of 3 times/week, Avia Solution via Scottish Enterprise

4.4.6 Clearly, over the time period between 2002 and 2007, there has been a significant increase in the number of destinations served (280%) and also greater development of air services in Scotland compared to the other regions.

4.4.7 To relate this to the number of services directly procured with RDF support, it is necessary to identify which services have been introduced under this incentive. Figure 4.3 shows the split between those services that have started with funding and those that started without.

Figure 4.3: Comparison between Growth in Destinations Served by Scottish Airports with Comparable European Airports (2002 – 2007)



Source: OAG Summer 2002 and 2007, Avia Solutions and Scottish Enterprise

4.4.8 This shows that a substantial proportion of new flights started with RDF support. The RDF scheme was designed from the start to facilitate a number of economic benefits resulting from attracting additional business and leisure visitors. In terms of businesses this results from improvements to travel costs and time savings, so improving Scotland's competitiveness.

Market Correction – Airlines

4.4.9 The RDF was partly introduced to address the issues of risk aversion and a lack of knowledge on Scotland amongst potential airlines, impeding Scotland's economic competitiveness. However, the benchmarking and growth in number of destinations and services resulting from RDF investment has clearly shown that this intervention has been successful in meeting these issues. From our interviews with the 4 airlines who responded to our surveys, the following points were raised in support of the RDF:

- the RDF was critical for getting routes started up and operating over the first few years, which gave the operators confidence to set up new routes;
- the use of the RDF to support air services to Scotland has reduced the risk to participating airlines by sharing the risk between the airlines and the Scottish Government. Reducing the risks in this way has lowered the anticipated costs compared to expected benefits;
- without the RDF support a number of key routes would not have commenced operations, especially direct flights to Europe;

- RDF support has been critical to building up a base market for all the new routes and it is likely that many would have failed without the initial support; and
- An additional effect of the RDF was to raise the status of Scotland as a destination in its own right which was also a good selling point to the airlines.

4.4.10 Therefore from these airline interviews we can conclude that the RDF has addressed the issues of risk aversion and a lack of knowledge of Scotland amongst airlines. The RDF has raised awareness of Scotland amongst airline companies and has also brought about new key routes to international destinations which would otherwise not have commenced. From this and the forecast continuation of many flights post RDF the surveys have suggested the airlines should continue to consider Scotland as a viable market for flights in the long term.

Market Correction – Businesses

4.4.11 It is the impacts of the RDF on business connectivity and performance that we now turn to look at below. An under-developed air service market to and from Scotland has led to the a certain degree of risk aversion on behalf of businesses operating in Scotland partly brought about by the lack of information on opportunities, markets and services in the country. RDF supported services were established partly to address these problems. Information obtained from our business, airport and airline surveys have produced the following results:

- 68% of non-Scottish business travellers are either certain or very likely to visit Scotland more frequently in future on business as a result of the RDF supported air service used;
- 64% of non-Scottish business and 55% of Scottish business travellers indicated that RDF supported air services have improved access to other parts of the company and to business interests;
- 70% of non-Scottish business travellers responded that RDF supported flights reduced the impression of Scotland's remoteness in terms of business activity;
- 66% of Scottish business travellers felt that RDF supported flights improved the likelihood of their company investing in business activities at their destination; and
- the majority of the small sample of airlines and airports interviewed have commented that RDF supported flights has raised attractiveness and awareness of Scotland as a destination for inbound tourism and leisure passengers.

4.4.12 By encouraging business travellers to undertake a greater number of trips, and reducing the impression of Scotland's peripherality in terms of business activity, these survey results infer that the RDF supported flights have assisted in removing some of the risk adversity shown by businesses. This has been achieved by encouraging greater information flows between different parts of the business and on markets and suppliers at the destination of the visit, both to Scotland by non-Scottish businesses, and other parts of Europe (and beyond) by Scottish businesses.

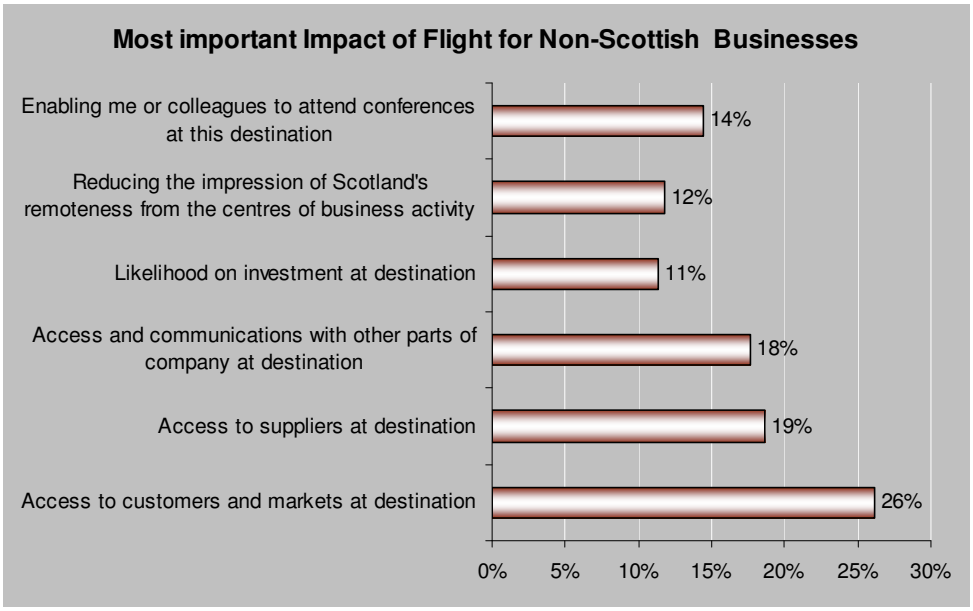
4.4.13 Likewise, both airlines and airports report that these flights have increased awareness of Scotland as a destination to non-Scottish leisure travellers, although the benefits of this in terms of information are more likely to be retrospective, i.e. by spreading information on Scotland after these visitors have returned to their home countries.

Business Impacts and Connectivity

4.4.14 Non-Scottish business travellers were interviewed at the airports, to find out what the most important impact of the RDF flight had been on their business and business

activities. The largest proportion (26%) of non-Scottish business travellers quoted that maintaining access to customers and markets in Scotland was the most important impact, and a further 19% said maintaining good access to suppliers in Scotland (see Figure 4.4).

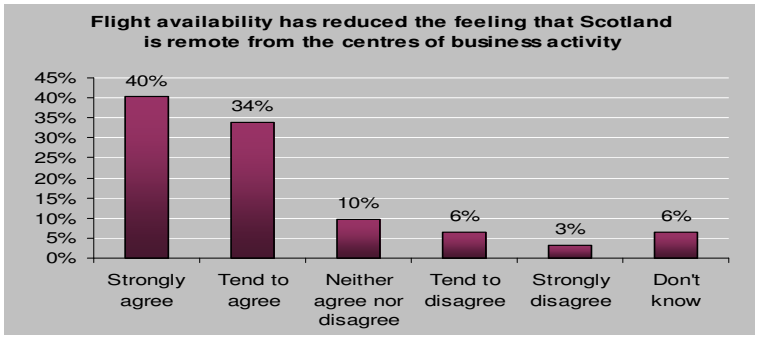
Figure 4.4: Key Business Impacts



4.4.15 As Figure 4.4 shows, nearly half of the non-Scottish business travellers replied that the RDF flight was instrumental in helping to articulate business activity both upstream (suppliers) and downstream (customers and markets). In addition to this proportion, a further 18% of non-Scottish businesses replied the most important impact was that the flight supported access to other parts of the company in Scotland. This suggests that 63%, or nearly two-thirds of the non-Scottish businesses interviewed, see the RDF services they use as instrumental in maintaining connectivity and competitiveness in Scotland.

4.4.16 The importance of RDF flights to business connectivity seems to be reinforced where nearly three-quarters of non-Scottish businesses (74%) stated that they either strongly agree or tended to agree that the availability of the RDF supported flights has reduced the feeling that Scotland is remote from the centres of business activity (see Figure 4.5 overleaf).

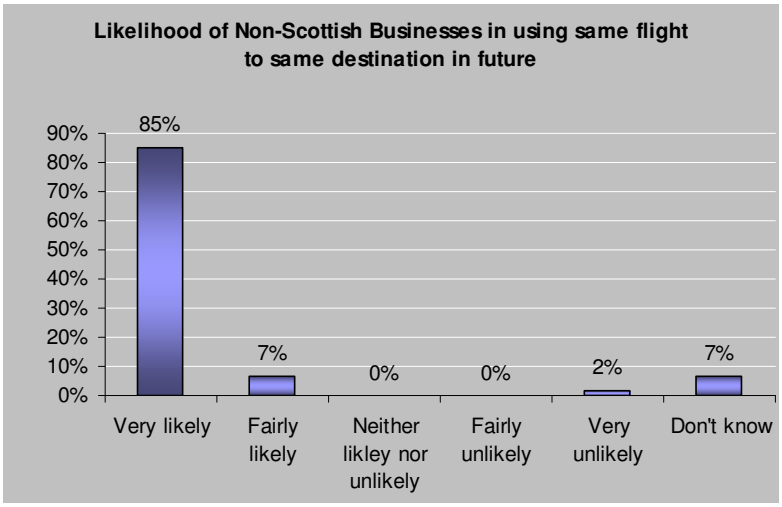
Figure 4.5: Business Perceptions of Improved Business Activity



4.4.17 Nearly a third of non-Scottish business people (32%) interviewed said that had the flight been unavailable they were unlikely, very unlikely or were not sure if they would have made the trip to Scotland on business at all. Although the business people in question may have used telecommunications to continue business, this survey result appears to underscore the importance of the availability of RDF services to maintaining business links in person.

4.4.18 The importance of the RDF supported services to business activity in Scotland is further illustrated where 85% of non-Scottish business respondents indicated that they would "very likely" use the same flight again (see Figure 4.6). This proportion increases to 92% when those replying "fairly likely" are included. Only 2% suggested that they were very or fairly unlikely to use the flight again, although 7% said that they were uncertain.

Figure 4.6: Likelihood of Non-Scottish Businesses Using Same RDF Flights



4.4.19 The above business feedback suggests the RDF programme has had a significant positive impact in changing perceptions of the air transport network in Scotland.

4.5 Social Inclusion

4.5.1 This section provides a qualitative review of the potential benefits of improved connectivity brought about by the RDF services. To assess the general trends brought

about by the changes in connectivity arising from the RDF, the passenger survey results were used to interpret how people have reacted to the changes in accessibility. The appraisal is a qualitative review using a simplified version of the process set out in STAG. At the time of this study, the review was based on STAG version 1.0 (September 2003).

Improved Accessibility for Social Inclusion

4.5.2 There is a strong correlation between reduced journey times and social inclusion, especially for rural areas. Research has shown that the shorter by journey an area is from the main centres of activity, the less feeling of social exclusion by locals.

4.5.3 Table 4.7 shows a comparison of travel times and distances for 7 key RDF services which serve Aberdeen and Inverness airports. These are viewed as connecting the most rural parts of Scotland to other areas of the UK and hence can be considered as helping social inclusion. The comparisons are based on interview feedback.

4.5.4 In the table, flying time includes time taken to travel to/from the airport (i.e. from original origin to ultimate destination) while not flying includes a combination of surface modes for the corresponding journey made without flying (sourced from various travel planning websites such as Travel-line, RAC, etc).

Table 4.7: Differences in Journey Times & Distances at Key RDF Services

Service	Travel Distance (km)			Travel Time (hrs)		
	Flying	Not Flying	Diff (%)	Flying	Not Flying	Diff (%)
Aberdeen to Southampton	694	917	–24%	3.8	10.4	–63%
Inverness to Bristol	677	851	–20%	3.4	10.0	–66%
Inverness to Dublin	467	674	–31%	3.4	9.3	–63%
Inverness to East Midlands	552	759	–27%	3.3	9.1	–64%
Inverness to Leeds/Bradford	440	603	–27%	3.3	8.0	–59%
Aberdeen to Stornoway	270	337	–20%	3.0	7.0	–57%
Aberdeen to Bristol	632	826	–23%	3.8	9.3	–59%
Average Differences (%)			***–24%***			***–62%***

4.5.5 As can be seen from the above table, the RDF services are on average 62% faster than the comparison surface journeys and also 24% shorter in distance travelled. This therefore suggests there are likely to be social inclusion benefits experienced by users of these RDF services. These benefits include reducing the perceptions of the remoteness of parts of Scotland (especially rural areas and the islands). Feedback from the surveys suggests that the perceptions of the RDF services are of in-filling and connecting parts of the country which were previously difficult to reach directly and that these perceptions are considered important by users.

Unemployed/Actively looking for Work or in Education Passengers

4.5.6 Exploring the theme of improved connections further, the passenger interviews have confirmed there are travellers using the RDF services for social inclusion purposes such as journeys to/from education and unemployment people attending job interviews or further training to gain additional skills to help them back to work.

4.5.7 During the interviews, passengers were asked for their purpose of travel and about their background and circumstances. These were used to estimate the proportions of those

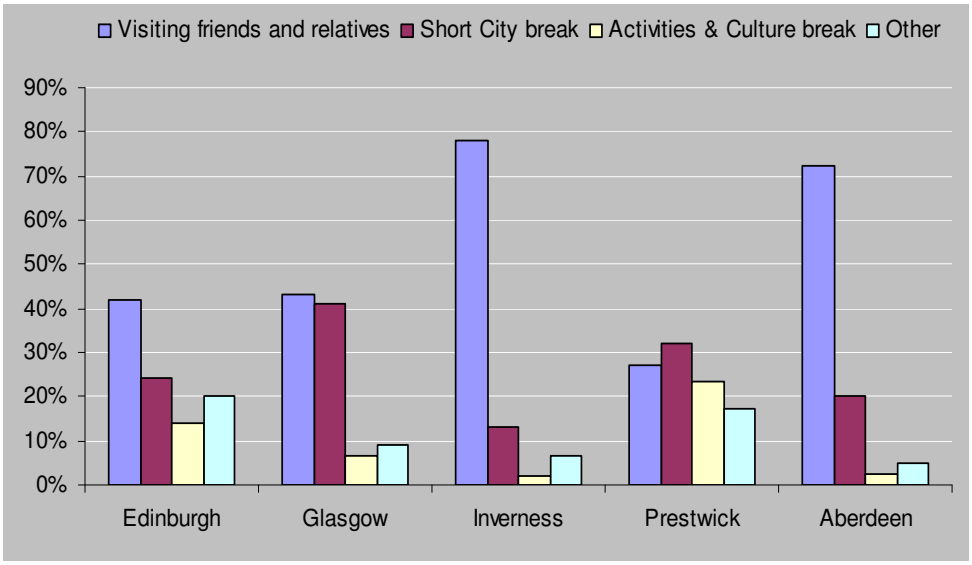
interviewed who view the RDF services as providing a socially inclusive benefit to them. Our surveys focussed on those travelling to educational establishments or those unemployed looking to access work. Applying these rates to the annual passenger totals for the relevant RDF services, we have estimated the following numbers of passengers who have travelled in 2008 for enhancing their education or employment prospects:

- No. of Education Passengers = 51 (travel for college, training, etc in 2008); and
- No. of Unemployed Passengers = 13 (travel for job interviews, gaining additional skills, etc in 2008).

Connections to Friends & Family

4.5.8 A further benefit to social inclusion would be for friends and relatives to visit their families elsewhere in the UK or abroad. Figure 4.8 shows RDF passenger trip purposes and highlights a strong correlation between areas served by Inverness and Aberdeen airports for visiting friends and relatives. This suggests the RDF services appear to meet these requirements, particularly for Inverness and Aberdeen but also for other parts of the country.

Figure 4.8: Purpose of Journeys for Social Reasons by Airport



4.5.9 The above suggests almost 80% of RDF passengers at Inverness airport and over 70% of RDF passengers at Aberdeen airport travel to visit friends and families who were previously remote from them.

Migrant Workers

4.5.10 Social inclusion is also concerned with overseas-based people coming to Scotland to work and support their families back home. Our surveys considered migrant workers who use the RDF services for exactly those reasons. These people come to Scotland to work for a number of weeks at a time and then travel back home to visit their families for a short while, before repeating the cycle.

4.5.11 The discussions with travellers have suggested that migrant workers accounted for about 3.2% of the total overall passengers in 2008. While this figure might be modest, the level varied between flights and certain RDF services were of significant benefit to migrant workers.

Overall Findings

4.5.12 The above findings point towards a mixture of results:

- impacts of the RDF services are potentially significant for remote and rural areas. Journey time savings have been significantly high compared to alternative surface-based transport; and
- RDF services have in-filled previous gaps in the network; and are benefiting travellers for a variety of purposes including travelling to/from education, looking for employment, visiting friends and family, and migrant workers coming to work in Scotland for periods of time.

4.5.13 A summary of impacts are shown in Table 4.8.

Table 4.8: Summary of Social Inclusion Impacts

Sector	Summary of Impacts	
	Gainers	Losers
Improved Journey Times	RDF services are on average 62% faster than comparison surface modes. Helped reduced perceptions of remoteness.	No significant effects.
Access to Education	51 passengers in 2008 used RDF services for education.	No significant effects.
Helping the Unemployed and Others (e.g. Migrant Workers)	13 passengers in 2008 used RDF services for education. Also, 3.2% of total passengers in 2008 were Migrant Workers.	No significant effects.
Visiting Friends and Families	Strong correlation between areas served by Inverness and Aberdeen airports for visiting friends and relatives.	No significant effects.

4.6 Environmental Impacts

4.6.1 While the RDF services have produced positive impacts to the economy they have also increased the number of flights and hence the impact on the environment. Over recent years there has been an increased awareness of climate change and the challenges it poses. Therefore, this section of the appraisal considers the implications of the RDF on emissions, air pollution and climate change, and estimates the amount of tons of Carbon Dioxide (CO2) from the services.

4.6.2 Aircrafts cause more environmental damage than just CO2 emissions. Other impacts include noise, local air pollution, water vapours which can cause contrails and cirrus clouds and consequent warming, and nitrogen oxides which can produce ozone and cause warming. However, this study will focus on CO2 emissions.

Method of Estimation

4.6.3 The method used to estimate the impact on climate change was based on the amount of CO2 emissions from the start of the RDF programme for a period of 10 years to match the appraisal period of the economic analysis discussed earlier in this chapter (except for those services which have stopped running, in which case the actual number of years of operation was used). In particular, this related to the net change in tonnage of CO2 emissions due to the RDF programme. Our process was based on industry-standard techniques published by EU monitoring advisors[30]. Estimates were undertaken of the annual increase of CO2 emitted in terms of the increases in flights as a result of the RDF.

4.6.4 Furthermore, the emission rates used in the methodology matches that of the original York Aviation appraisals and allows comparison with these earlier documents. However, these rates differ from other government policies and therefore may not be directly comparable with other transport studies.

4.6.5 We calculated the amount of CO2 tons emitted for each landing and takeoff (LTO) and cruise flights using values of CO2 emitted per flight produced for different aircraft types. This information was sourced from data supplied by York Aviation who carried out the original RDF appraisals for each service, in order to maintain consistency with previous assumptions used in the earlier route evaluations[31]. We expanded individual flights to annual equivalents using the frequency of services, which resulted in an annual set of emissions of tons of CO2 per RDF route. These were estimated for each year of the RDF programme to include for the effects of RDF services stopping and new services starting over time. Those services which are still running were continued in the analysis up to the full 10-year appraisal period. This provides a slightly more refined analysis than using averages. The steps of the individual calculations were as follows:

- Step 1 : convert the LTO CO2 emissions from kg/LTO into tonnes by dividing by 1000;

- Step 2 : expand the number of weekly flights into annual flights and also multiply by 2 to get two-way movements;

[30] Co-operative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe
[31] Route Evaluation Reports for each RDF Service, York Aviation, 2003 to 2007

- Step 3 : estimate the total number of flights by multiplying the number of flights from Step 2 by either the number of years of operation (in the case of services which are no longer running) or 10 years in the case of services still operating;
- Step 4 : calculate the CO2 emissions due to LTO's by multiplying the value from Step 1 by the value from Step 3;
- Step 5 : calculate the kilometres of flights by multiplying the number of flights of each service from Step 3 by the distances of each service;
- Step 6 : convert the cruising fuel consumption CO2 emission rate from kg/km to tonnes by dividing by 1000 and multiplying by 3.15 (to convert from liquid fuel consumption to gaseous emissions);
- Step 7 : multiply the value from Step 6 by the number of flight-kilometres from Step 5;
- Step 8 : the total CO2 emissions is the results of Step 4 plus the result of Step 7; and
- Step 9 : to get the monetary value of the CO2 emissions, multiply the result from Step 8 by the value of CO2 emission (£25.50 at 2007 prices sourced from DEFRA website).

4.6.6 LTOs are used as the basis of estimating local emissions at airports since the UK National Atmospheric Emission Inventory (UKNAEI) considers emissions within a 1000 m ceiling of landing and takeoff. In addition to emissions from LTOs, the process also estimates CO2 emissions during the cruising distance from the origin to the destination.

4.6.7 It could also be argued that while there is an increase in CO2 emissions due to the RDF services, there could also be a reduction in emissions from other modes (e.g. car and ferry) which would have been used in the absence of the RDF services as some people would still travel using these alternative modes. Furthermore, some people may still have travelled by air using two flights and changed at a hub airport. However, we have not been provided with sufficient data to estimate the CO2 emissions for these people who would have used alternative transport. Hence, it could be argued that the estimates presented here are higher than what has actually occurred.

4.6.8 Appendix E shows the calculations and Table 4.9 overleaf summarises the results. The net CO2 emissions from RDF flights over a 10-year appraisal period was just under 4.02m tons. This is equal to £69m discounted to 2002 prices to match the same price base as the TEE Appraisal calculations.

4.6.9 The above monetary value of the CO2 emissions can be compared to the total economic NPV of between £453 million and £458 million of NPV (over a 10-year appraisal period) at 2002 prices. In addition, there are further economic benefits such as additional business and tourism spend which would increase the overall economic return.

Table 4.9: Estimates of Carbon Dioxide Emissions per RDF Service

Service	CO2 Tons from RDF services
Dundee to Belfast	3,433
Dundee to Birmingham	4,547
Edinburgh to Milan	102,850
Edinburgh to Munich	79,439
Edinburgh to Zurich	65,709
Edinburgh to Madrid	119,582
Prestwick to Riga	40,746
Glasgow to Berlin	14,685
Prestwick to Warsaw	78,965
Prestwick to Wroclaw	35,714
Prestwick to Gdansk	35,049
Edinburgh to Geneva	15,297
Aberdeen to Stornoway	3,449
Inverness to Bristol	30,449
Edinburgh to Barcelona	58,217
Glasgow to Barcelona	17,474
Aberdeen to Southampton	8,169
Aberdeen to Bristol	7,662
Aberdeen to Copenhagen	63,539
Edinburgh to New York	1,041,599
Aberdeen to Groningen	51,655
Glasgow to Dubai	1,151,803
Prestwick to Bergamo	69,897
Prestwick to Gothenburg	39,211
Prestwick to Girona	130,826
Edinburgh to Cologne	85,488
Prestwick to Pisa	58,927
Prestwick to Rome	22,281
Prestwick to Stockholm	84,060
Inverness to Dublin	1,262
Inverness to East Midlands	26,322
Inverness to Leeds/Bradford	20,183
Sumburgh to Stansted	11,669
Aberdeen to Kristiansand	5,611
Aberdeen to Liverpool	1,652
Inverness to Newcastle	2,228
Sumburgh to Oslo	373
Edinburgh to Atlanta	253,696
Edinburgh to Warsaw	7,579
Aberdeen to Blackpool	510
Prestwick to Lubeck	19,155
Aberdeen to Oslo	10,338
Prestwick to Dusseldorf	49,687
Glasgow to Prague	23,447
Inverness to Stockholm	3,148
Edinburgh to Munich	7,944
Edinburgh to Geneva	3,059
Edinburgh to Jersey	6,141
Edinburgh to Milan	20,570
Edinburgh to Oslo	17,964
Edinburgh to Zurich	2,642
Kirkwall to Bergen	157
Totals	***4,016,060***

5 Conclusions

5.1 Introduction

5.1.1 The Air Route Development Fund (RDF) was established in November 2002 to improve business connectivity and inbound tourist access all year round. The purpose of a RDF was to provide incentives through public funding to initiate new direct airline links that would benefit the overall economic development of the region. The objective of RDF was to promote the establishment of new routes by facilitating the sharing of risk between airports and airlines. It was intended to act as a catalyst for promoting links either not under immediate consideration or ones thought to have marginal business cases in the short term. Funds were allocated to routes that were likely to become commercially viable after the first three years.

5.1.2 The RDF was operated on a partnership basis by the Scottish Government, Highlands and Islands Airports Limited (HIAL), VisitScotland and Scottish Enterprise, which administered the fund on behalf of the Government. The fund has contributed to a dramatic increase in the Scottish direct air network by concentrating only on those routes that would help business and tourism.

5.1.3 Scott Wilson, in association with the aviation experts at Westminster University's Transport Studies Group (TSG) and the data collection specialists Sky High Ltd, were appointed by Scottish Enterprise, the Scottish Government, VisitScotland and Highlands & Islands Airports Limited (HIAL) to evaluate the benefits and impacts of the Scottish Air RDF. This report has set out an appraisal of the impacts of the RDF programme.

5.2 Background to the Air RDF

5.2.1 A general review of the RDF in Scotland was carried out which identified the following:

- 63 services were offered RDF investment, of which 55 services went ahead with 28 of them currently operating either with support or post-support;
- over the period of the RDF, there has been a steep rise in the number of domestic and international passengers carried and in services that were operated with RDF investment;
- Scotland was the first place to use the RDF mechanism with other parts of the UK subsequently introducing similar schemes. Data from the Civil Aviation Authority (CAA) has shown the extent of the use of RDFs in other parts of the UK. Overall, the Scottish performance in establishing successful new services is markedly better than other areas of the UK. The least sustainable routes appear to be flights originating outside Scotland; and
- strict criteria must be met before RDF funding is allocated to services. Essentially, a new direct route must be of economic benefit to Scotland and travellers. A full economic appraisal was carried out for each prospective route.

5.2.2 A number of appraisal tests were identified which were used to assess the success of the Scottish RDF, namely:

- Economic Impacts:
  - restricted Transport Economic Efficiency (TEE) Appraisal;
  - change in aggregate Gross Value Added (GVA) in the economy;
  - total expenditure added due to business and leisure trips; and
  - number of additional jobs over the period of the RDF programme.
- Adjustments to the Market:
  - potential degree to which airlines and non-Scottish businesses have had their perceptions changed by the RDF.
- Social Inclusion:
  - qualitative review of the potential benefits of improved connectivity. This was based on the simplification of the STAG process and was intended to highlight the social inclusion benefits. At the time of this appraisal, the version of STAG being used was version 1.0, September 2003.
- Environmental Impacts:
  - estimation of the increase in carbon emissions.

5.3 Appraisal of the RDF Services

Passenger Flows

5.3.1 The total number of passengers grew from approximately 286,000 in 2003/4 to 1.8 million in 2008/9 (based on an extrapolation of RDF invoices received at the time of this study). Since the 2008/9 figure is partly estimated, it is worth noting the total numbers of passengers in 2007/8 was about 1.9 million. While some services have stopped the majority (28 out of 55) are currently running.

5.3.2 This suggests the RDF had a significant increase in passenger levels on Scottish air services. Compared to the annual total for terminating passengers in Scotland (at 25.13million), the 1.9million passengers on RDF services in 2007/8 is about 7.6% of the total.

Travel Patterns

5.3.3 In terms of travel patterns, the following was noted:

Tourism & Leisure Trips

- the ultimate origin and destination of most Scottish and non-Scottish tourists are the SESTRAN and SPT areas, with the SESTRAN area receiving the most non-Scottish tourists, but the SPT area the source of most Scottish tourists;
- visiting friends and relatives is the most common reason for the holiday trip, but Scottish tourist are more likely to take short city breaks, and non-Scottish tourist more likely to undertake an activities or cultural visit; and
- non-Scottish tourists are more likely to stay longer in Scotland, with an average of 10.8 nights than Scottish tourists elsewhere, who stay away for an average of 7.9 nights.

Business & Migrant Workers

- there is a wide range of Non-Scottish businesses using the RDF services. The sector that is most represented is Academia, however a significant proportion of non-Scottish businesses are technology centred, either in the energy, aerospace, optics or electronics markets;
- more Scottish business trips (circa 141,000) were made abroad in 2008 than non-Scottish business trips to Scotland (circa 95,000) using both RDF supported flights and post-RDF supported services. This equates to approximately 22% of the total passengers on RDF services currently operating; and
- migrant workers are heavily dependent on RDF supported flights to access jobs in Scotland, but the expenditure impacts as a result of this are expected to be small, partly because it is likely that migrant expenditure in Scotland is relatively insignificant, but also the benefits would probably be outweighed by high rates of leakage represented by the general level of migrant wage remittances.

Economic Impacts

Restricted Transport Economic Efficiency (TEE) Appraisal

5.3.4 A TEE Appraisal was carried out which estimated the benefits of the RDF services against the investment made and additional costs to the public sector. These were restricted to a limited number of benefits (journey time and fare savings) and costs (RDF support and public sector costs, e.g. staff, consultants, etc) in order to measure the gain experience by the public sector from their RDF contributions.

5.3.5 The TEE appraisal showed that nearly all the RDF services return a positive net present value (NPV) and benefit-to-cost ratio (BCR) greater than 1.0 suggesting the RDF programme has been successful in improving travel conditions for business and leisure passengers. In a number of cases, the rate of return is very high. Examples of services with high returns include:

- Prestwick to Stockholm: NPV = £25,941,877 and BCR = 166.6;
- Prestwick to Rome: NPV = £18,822,817 and BCR = 114.3;
- Edinburgh to Cologne: NPV = £8,138,252 and BCR = 107.4; and
- Prestwick to Wroclaw: NPV = £18,323,557 and BCR = 79.2.

5.3.6 Only 2 services produced negative returns, namely:

- Aberdeen to Blackpool : NPV = –£371 and BCR = 0.9; and
- Inverness to Newcastle : NPV = –£19,424 and BCR = 0.8.

5.3.7 The total NPV for all RDF services is estimated to be £406 million (over a 10-year appraisal period) at 2002 prices with a resultant BCR of 23.9.

Gross Value Added (GVA)

5.3.8 This appraisal described the wider economic impacts of the RDF services in terms of the additional aggregate Gross Value Added (GVA) to the economy. This was based on the net present value produced by the RDF services, with suitable Type I and Type II economic multipliers used to estimate total impacts including induced expenditure. The appraisal was based on the Scottish Enterprise GVA calculator.

5.3.9 The total GVA impact for all RDF services combined has been estimated to be between £47 million and £52 million (over a 10-year appraisal period) at 2002 prices.

Total TEE and GVA Economic Benefits

5.3.10 Adding the TEE and GVA estimates together suggests the RDF produced between £453 million and £458 million of NPV (over a 10-year appraisal period) at 2002 prices.

Tourist & Business Trip Spend

5.3.11 The level of tourism expenditure was obtained from the passenger surveys undertaken at different airports. The results indicated that the expenditure by Scottish tourists outside Scotland for 2008 was approximately £156.3 million. Likewise the expenditure for non-Scottish tourists gave a value of approximately £176.2 million in 2008. Scottish tourism spend in non-Scottish destinations, represents leakage to the Scottish economy. The difference between these two values, £19.9 million, represents the estimated net additional tourist expenditure accruing to the Scottish economy in 2008 as a result of the implementation of the RDF supported air services.

5.3.12 Business expenditure was estimated in a similar way to that estimated for tourists above. However, the length of business stays for both non-Scottish business trips in Scotland and Scottish business trips elsewhere were very much shorter than those for tourists for the respective direction. In addition businesses tended to make repeat visits to Scotland. For a high proportion of non-Scottish and Scottish businesses these amounted to multiple visits. Business trip expenditure was taken from the surveys. Taking into account both deadweight and leakage, the additional net expenditure in Scotland is estimated at £7.8 million.

Numbers of Additional Jobs

5.3.13 In addition to providing direct monetised benefits, the surveys asked key stakeholders such as airports and airlines whether there has been any increase in job numbers during the RDF programme period. The interviews identified the total net increase in job numbers during the period of the RDF was 37 full time equivalents (FTEs).

Connectivity and Market Efficiency Issues

5.3.14 In addition to looking at the economic impacts of the RDF, the appraisal has sought to identify if the proposals have influenced business perceptions of air transport.

5.3.15 The surveys suggested that nearly two-thirds of the non-Scottish businesses interviewed see the RDF services they use as instrumental in maintaining connectivity and competitiveness in Scotland. The importance of RDF flights to business connectivity seems to be reinforced where nearly three-quarters of non-Scottish businesses stated that they either “strongly agree” or “tended to agree” that the availability of the RDF supported flights has reduced the feeling that Scotland is remote from the centres of business activity.

5.3.16 The importance of the RDF supported services to business activity in Scotland was further illustrated from the surveys where 92% of non-Scottish business respondents indicated that they would "very likely" or "fairly likely" use the same flight again.

5.3.17 In addition to addressing market inefficiencies in the business sector, the RDF was also introduced to tackle issues of risk aversion and the lack of knowledge on Scotland amongst potential airlines, both of which impact on Scotland's economic competitiveness.

5.3.18 In this regard, the results of our airline interviews suggest that the RDF has mitigated both risk aversion on the part of airlines and their lack of knowledge of Scotland. The effect has been a raised awareness of Scotland amongst airline companies and the establishment of new key routes to international destinations which otherwise would have been unlikely to have commenced. This, and the continuation of many flights post RDF, suggests that airline companies continue to consider Scotland as a viable market for flights in the long term.

Social Inclusion

5.3.19 The RDF services are on average 62% faster than the comparison surface journeys and also 24% shorter in distance travelled. This therefore suggests there are likely to be social inclusion benefits experienced by users of these RDF services. These benefits include reducing the perceptions of the remoteness of parts of Scotland (especially rural areas and the islands). Feedback from the surveys suggested that the perceptions of the RDF services are of in-filling and connecting parts of the country which were previously difficult to reach directly and that these perceptions are considered important by users.

5.3.20 During the interviews, passengers were asked for their purpose of travel and about their background and circumstances. These were used to estimate the proportions of those interviewed who travelled to educational establishments or those unemployed looking to access work. Applying these rates to the annual passenger totals for the relevant RDF services, we have estimated the following numbers of passengers who have travelled in 2008 for enhancing their education or employment prospects:

- No. of Education Passengers = 51 (travel for college, training, etc in 2008); and
- No. of Unemployed Passengers = 13 (travel for job interviews, gaining additional skills, etc in 2008).

5.3.21 A further benefit to social inclusion would be for friends and relatives to visit their families elsewhere in the UK or abroad. The data showed RDF passenger trip purposes and highlighted a strong correlation between areas served by Inverness and Aberdeen airports for visiting friends and relatives.

5.3.22 In terms of overseas-based people coming to Scotland to work and support their families back home, the surveys considered migrant workers who use the RDF services for exactly those reasons. The results have suggested that migrant workers accounted for about 3.2% of total passengers in 2008. While this figure might be modest, the level varied between flights and certain RDF services were of significant benefit to migrant workers.

Environmental Impacts

5.3.23 While the RDF services have produced positive impacts to the economy they have also increased the number of flights and hence the amount of air pollution emissions. In particular, the appraisal considered the implications of the RDF programme on climate change, by estimating the amount of tons of Carbon Dioxide emissions from the services.

5.3.24 The analysis suggests the Carbon Dioxide emissions from the RDF services were just under 4.02m tons over a 10-year appraisal period. This is equal to £69m discounted to 2002 prices to match the same price base as the TEE and GVA Appraisal calculations.

5.3.25 The above monetary value of the Carbon Dioxide emissions can be compared to the total economic NPV of between £453 million and £458 million of NPV (over a 10-year appraisal period) at 2002 prices. In addition, there are further economic benefits such as additional business and tourism spend which would increase the overall economic return.

Glossary of Terms

BCR = Benefit-to-Cost Ratio

CAA = Civil Aviation Authority

CO2 = Carbon Dioxide

FTE = full-time equivalents

GVA = Gross Value Added

HIAL = Highlands & Islands Airports Limited

HIE = Highlands and Islands Enterprise

HITRANS = Highlands and Islands Transport Partnership;

IQCS = Interviewer Quality Control Scheme

LTO = Landing and Take-Off

MRSCC = Market Research Society Code of Conduct

NESTRAN = North East Scotland Transport Partnership

NPV = Net Present Value

PVB = Present Value of the Benefits

PVC = Present Value of the Costs

RDF = Route Development Fund

RoW = Rest of the World

RTP = Regional Transport Partnership

RUK = Rest of the UK

SESTRAN = South East Scotland Transport Partnership

SPT = Strathclyde Partnership for Transport

STAG = Scottish Transport Appraisal Guidance

SWESTRAN = South West Scotland Transport Partnership

TACTRAN = Tayside and Central Transport Partnership

TEE = Transport Economic Efficiency

UKNAEI = UK National Atmospheric Emission Inventory

WebTAG = web-based Transport Appraisal Guidance

Appendix A

Survey Headline Charts & Figures

Appendix A – Summary of Key Survey Headline Charts & Figures

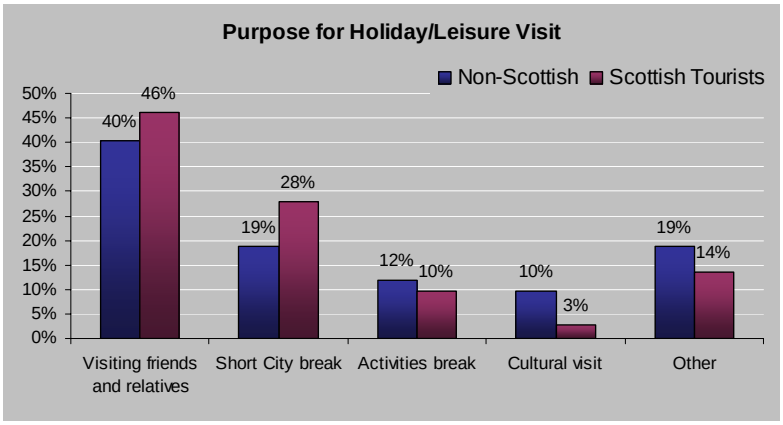
Origin of Non-Scottish Tourists and Destination of Scottish Tourists

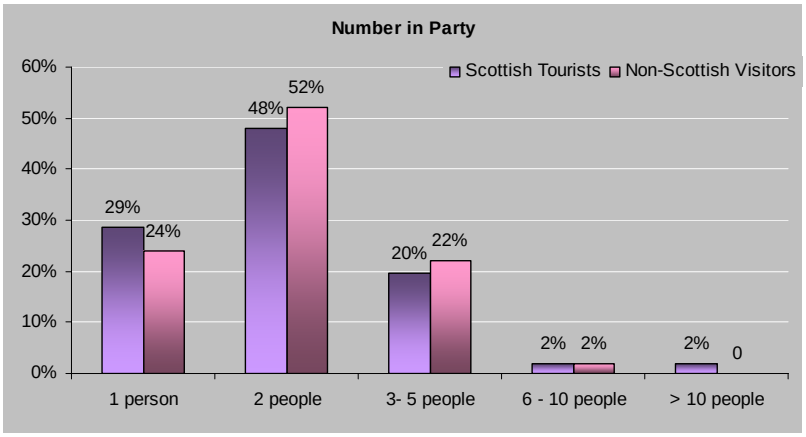
Origin of Non-Scottish Tourists	Proportion	Destination of Scottish Tourists	Proportion
Scandinavia	17%	Spain	25%
Rest of World	17%	Italy	18%
Spain	16%	Rest of World	16%
Italy	16%	Other UK	14%
Germany	13%	Germany	8%
Poland	8%	Scandinavia	8%
Other UK	8%	Switzerland	5%
Switzerland	1%	Poland	4%
Baltic States	1%	Ireland	1%
Netherlands	1%	Netherlands	1%
Ireland	0%	Baltic States	0%

Scottish Tourist Destinations by Key Airports in Scotland

	Scandinavia	Netherlands	Spain	Switzerland	Italy	Germany	Poland & Baltic States	Ireland	Other UK	Rest of World
Aberdeen	59%	8%	-	-	-	-	-	-	33%	-
Edinburgh	-	-	34%	17%	20%	10%	7%		-	12%
Glasgow	-	-	23%	-	-	19%	-	-	-	58%
Inverness	-	-	-	-	-	-	-	7%	93%	-
Prestwick	9%	-	37%	-	45%	3%	6%	-	-	-
Dundee	-	-	-	-	-	-	-	-	100%	-

Trip Characteristics and Issues





Primary Purpose of Tourist Visits

Airport of Arrival to Scotland	Non-Scottish Tourists to Scotland			
	Visiting friends and relatives	Short City break	Activities & Culture break	Other
Aberdeen	55%	18%	9%	18%
Dundee	n/a	n/a	n/a	n/a
Edinburgh	33%	18%	20%	29%
Glasgow	81%	8%	4%	8%
Inverness	62%	15%	23%	0%
Prestwick	28%	24%	31%	17%

Airport of Departure	Scottish Tourist Trips Overseas			
	Visiting friends and relatives	Short City break	Activities & Culture break	Other
Aberdeen	73%	20%	3%	5%
Dundee	86%	14%	0%	0%
Edinburgh	42%	24%	14%	20%
Glasgow	43%	41%	7%	9%
Inverness	78%	13%	2%	7%
Prestwick	27%	32%	23%	17%

Sector Expenditure

Fares by Origin of Non-Scottish Tourist Visits

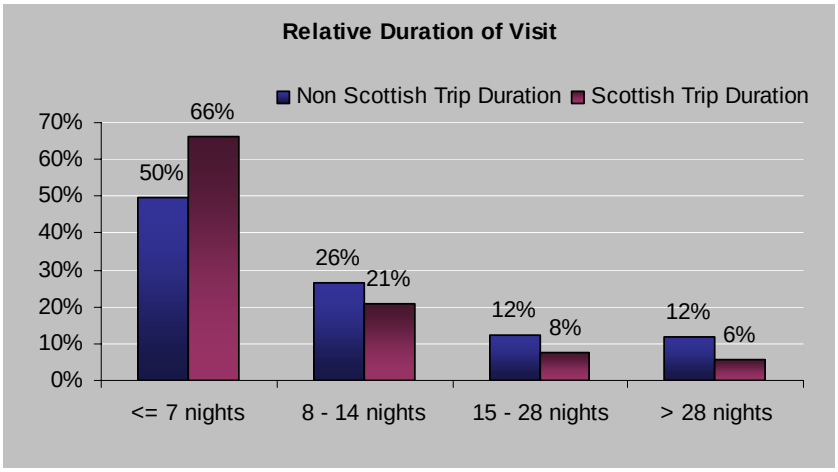
Origin of Non-Scottish Tourists	<= £100	>£100 - £250	>£250 - £500	>£500
Spain	23%	60%	14%	3%
Other UK	50%	44%	0%	6%
Italy	37%	50%	10%	3%
Germany	62%	34%	0%	3%
Scandinavia	54%	38%	5%	3%
Rest of World	11%	3%	25%	61%
Ireland	0%	100%	0%	0%
Poland	42%	53%	5%	0%
Switzerland	50%	50%	0%	0%
Netherlands	0%	0%	100%	0%
Baltic States	33%	67%	0%	0%

Appendix A – Summary of Key Survey Headline Charts & Figures

Fares by Departure Airport of Scottish Tourists

Departure Airport of Scottish Tourists Overseas	<= £100	>£100 - £250	>£250 - £500	>£500
Aberdeen	8%	66%	26%	0%
Dundee	14%	71%	14%	0%
Edinburgh	30%	43%	16%	11%
Glasgow	8%	30%	24%	39%
Inverness	73%	24%	2%	0%
Prestwick	51%	37%	10%	2%

Duration of Visits



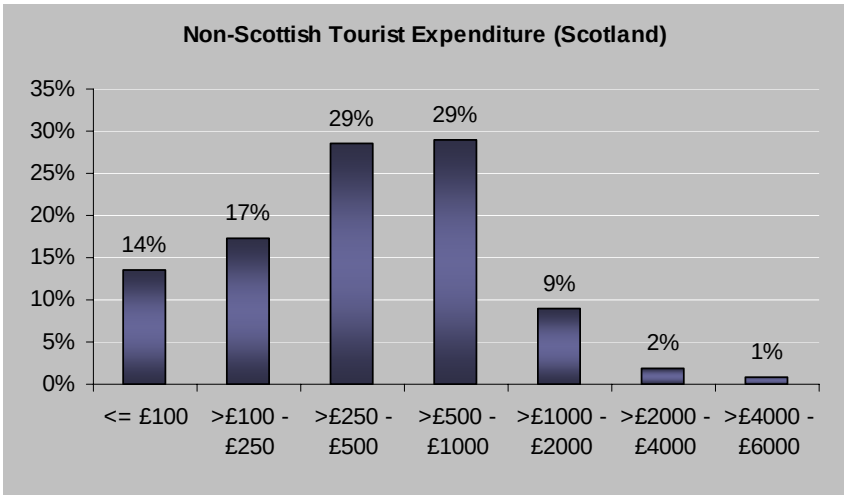
Non-Scottish Tourist Trip Duration by Arrival Airport

Arrival Airport	<= 7 nights	8 - 14 nights	15 - 28 nights	> 28 nights
Aberdeen	73%	18%	9%	0%
Dundee	60%	22%	9%	9%
Edinburgh	100%	0%	0%	0%
Glasgow	38%	39%	11%	11%
Inverness	19%	15%	35%	31%
Prestwick	82%	9%	0%	9%

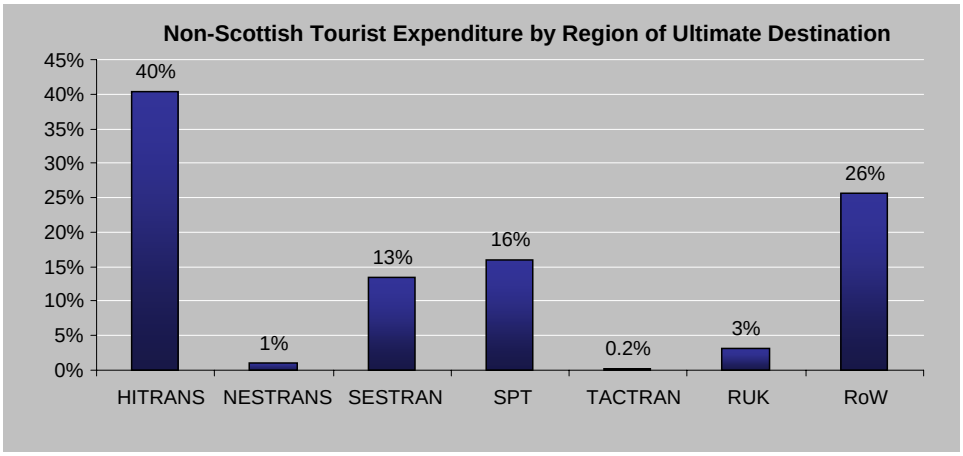
Scottish Tourist Trip Duration by Departure Airport

Departure Airport	<= 7 nights	8 - 14 nights	15 - 28 nights	> 28 nights
Aberdeen	78%	15%	5%	3%
Dundee	86%	0%	14%	0%
Edinburgh	65%	25%	6%	4%
Glasgow	49%	22%	12%	17%
Inverness	83%	11%	7%	0%
Prestwick	68%	22%	7%	3%

Tourist Spend



Estimated Non-Scottish Tourist Spend by Arrival Airport

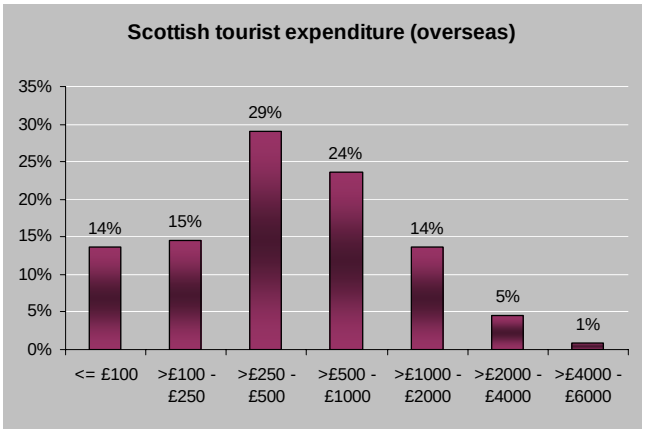


Arrival Airport/ Spend	Aberdeen	Edinburgh	Glasgow	Prestwick	Inverness
<= £100	27%	10%	19%	11%	15%
>£100 - £250	27%	15%	10%	19%	8%
>£250 - £500	18%	33%	19%	33%	31%
>£500 - £1000	18%	33%	19%	27%	38%
>£1000 - £2000	0%	9%	24%	8%	0%
>£2000 - £4000	0%	1%	10%	0%	8%
>£4000 - £6000	9%	0%	0%	1%	0%

Estimated Non-Scottish Tourist Spend by Scottish Region

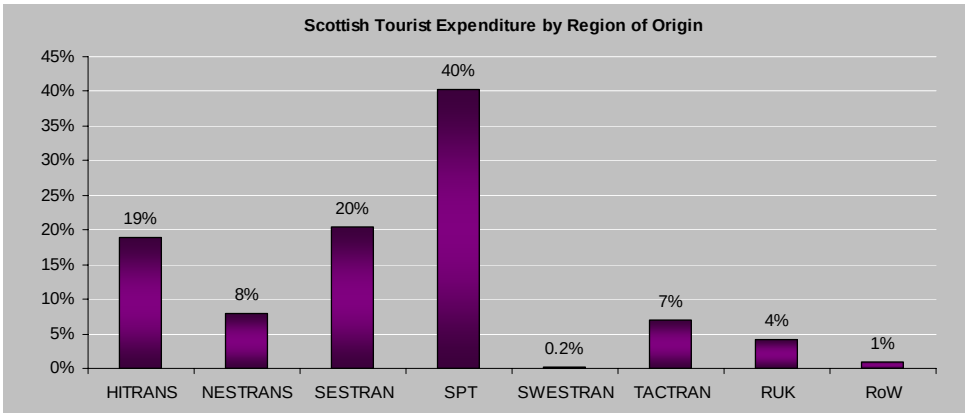
	HITRANS	NESTRANS	SEStran	SPT	TACTRAN	SWestrans	RUK	RoW
<= £100	6%	50%	7%	16%	100%	14%	0%	16%
>£100 - £250	18%	0%	20%	26%	0%	29%	20%	19%
>£250 - £500	0%	50%	40%	26%	0%	24%	60%	29%
>£500 - £1000	41%	0%	27%	21%	0%	19%	20%	32%
>£1000 - £2000	18%	0%	7%	11%	0%	14%	0%	3%
>£2000 - £4000	12%	0%	0%	0%	0%	0%	0%	0%
>£4000 - £6000	6%	0%	0%	0%	0%	0%	0%	0%

Tourist Leakage



Estimated Scottish Tourist Spend by Departure Airport

Departure Airport/ Spend	Aberdeen	Edinburgh	Glasgow	Prestwick	Inverness
<= £100	24%	17%	7%	5%	26%
>£100 - £250	32%	18%	8%	12%	37%
>£250 - £500	24%	28%	29%	28%	26%
>£500 - £1000	19%	24%	30%	35%	12%
>£1000 - £2000	0%	9%	16%	14%	0%
>£2000 - £4000	0%	3%	6%	5%	0%
>£4000 - £6000	0%	1%	5%	0%	0%



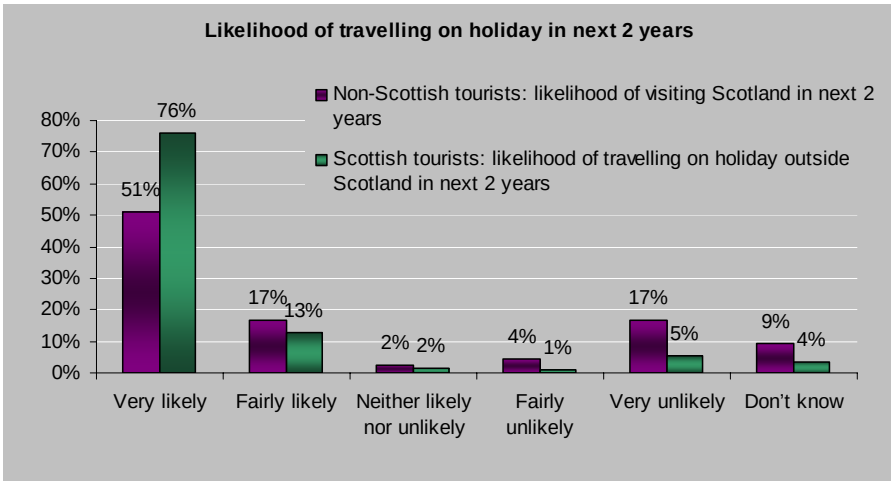
Estimated Scottish Tourist Spend Overseas by Origin

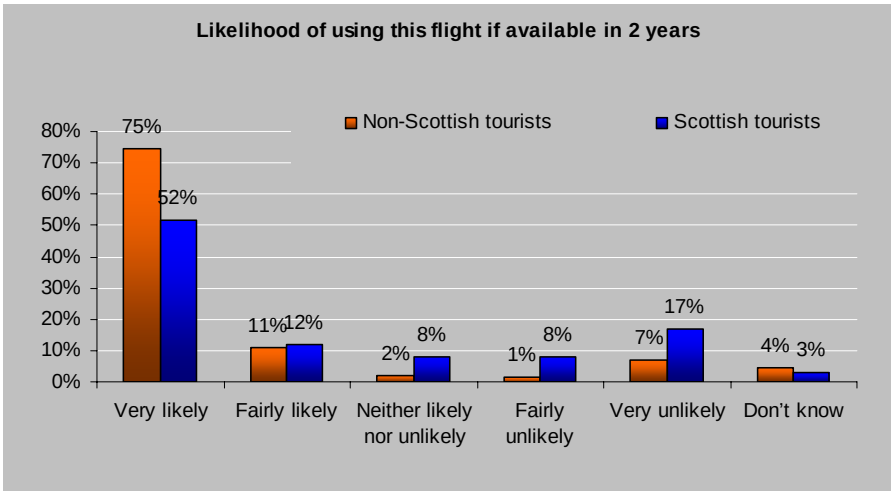
	HITRANS	NESTRANS	SESTRAN	SPT	TACTRAN	SWestrans	RUK	RoW
<= £100	12%	17%	30%	7%	0%	0%	0%	0%
>£100 - £250	24%	25%	11%	7%	0%	45%	40%	0%
>£250 - £500	24%	8%	26%	39%	20%	40%	20%	100%
>£500 - £1000	24%	42%	15%	24%	40%	15%	20%	0%
>£1000 - £2000	6%	8%	15%	15%	40%	0%	20%	0%
>£2000 - £4000	6%	0%	4%	7%	0%	0%	0%	0%
>£4000 - £6000	6%	0%	0%	0%	0%	0%	0%	0%

Scottish and Non-Scottish Tourist Reaction to Flight Unavailability

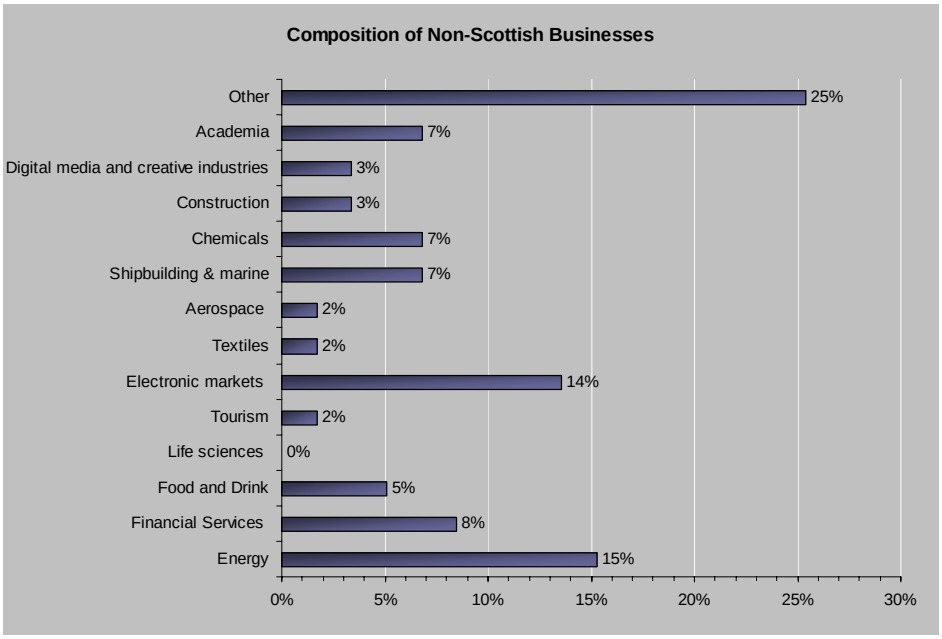
Scottish Tourists	Very likely	Fairly likely	Neither likely nor unlikely	Fairly unlikely	Very unlikely	Don't know
If flight not available: likelihood of not making the trip at all	24%	8%	1%	5%	59%	3%
If flight not available: likelihood of making trip elsewhere in Scotland	12%	15%	2%	2%	63%	7%
If flight not available: likelihood of making trip elsewhere in GB & Ireland	5%	3%	2%	0%	80%	10%
If flight not available: likelihood of making trip elsewhere overseas	23%	14%	1%	1%	56%	5%
Non-Scottish Tourists						
If flight not available: likelihood of not making the trip at all	20%	9%	5%	6%	56%	4%
If flight not available: likelihood of making trip to Scotland	42%	13%	7%	27%	11%	0%
If flight not available: likelihood of making trip elsewhere in GB & Ireland	5%	7%	1%	5%	75%	7%
If flight not available: likelihood of making trip elsewhere overseas	14%	8%	1%	4%	69%	4%

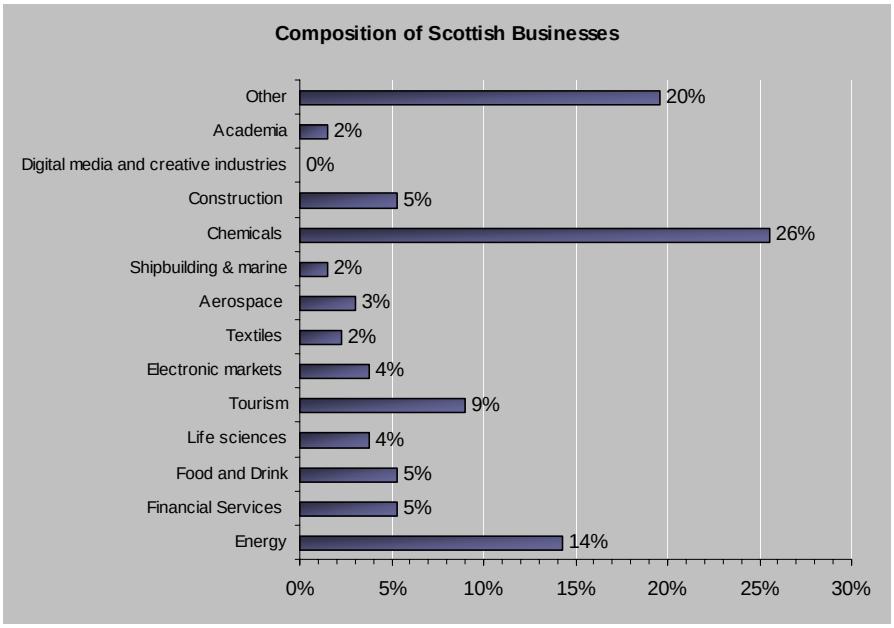
Travel Likelihood



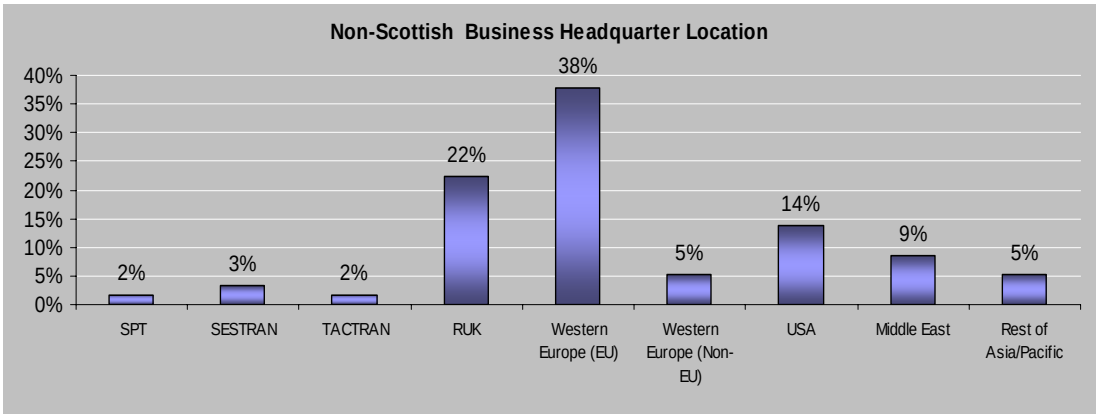


Business Trip Types

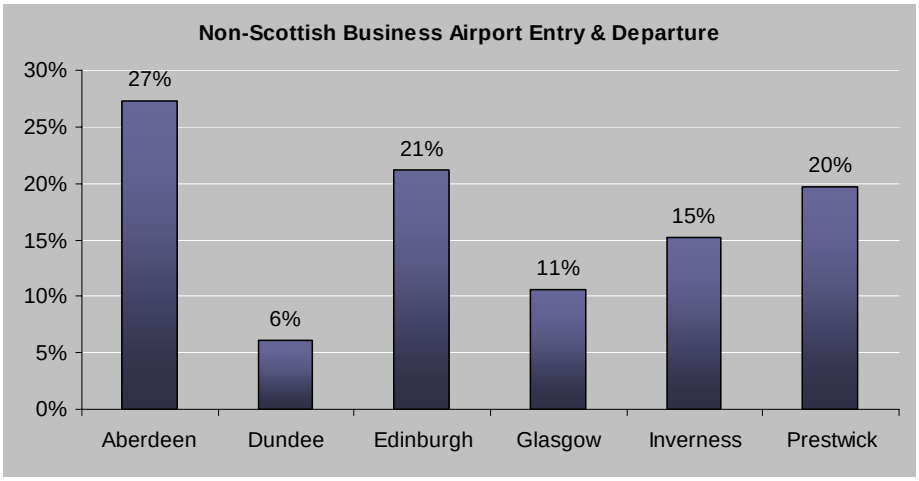


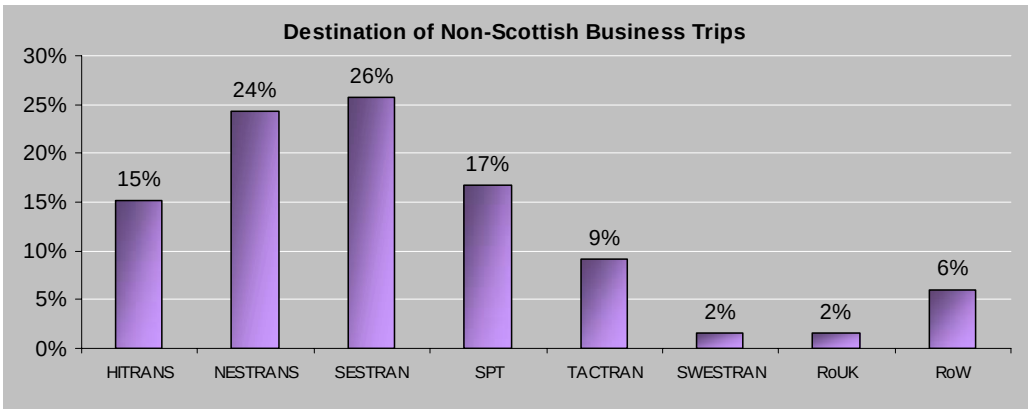


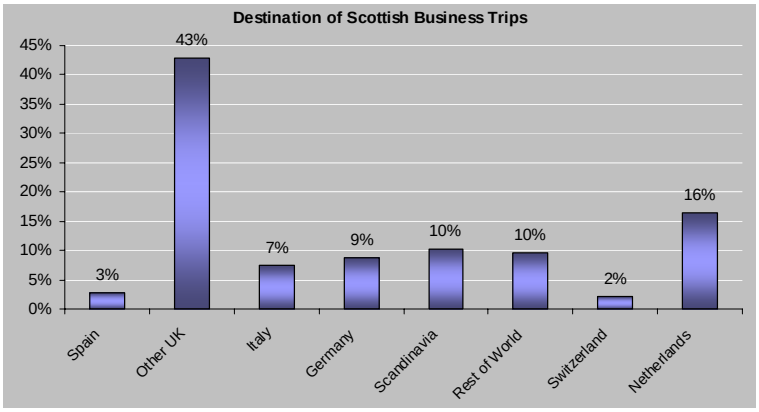
Business Locations



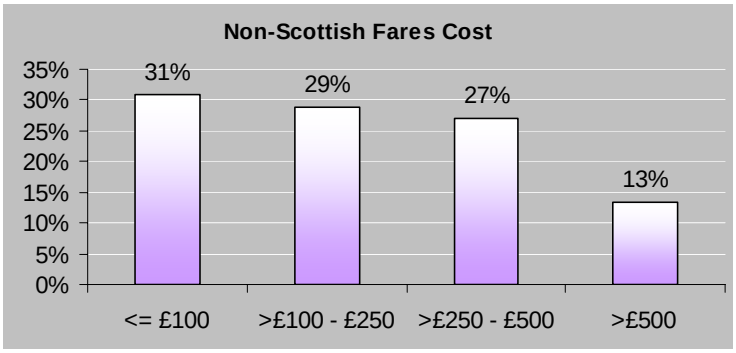
Business Arrivals & Departures

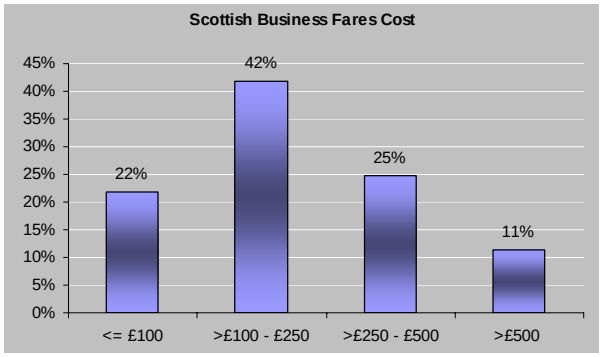


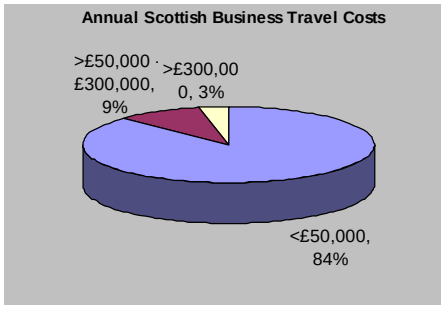


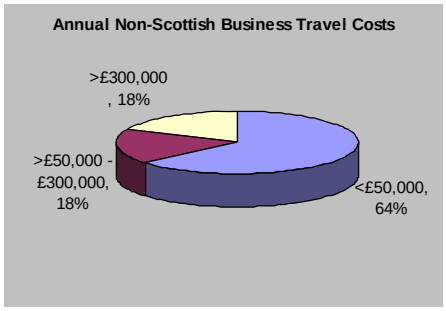


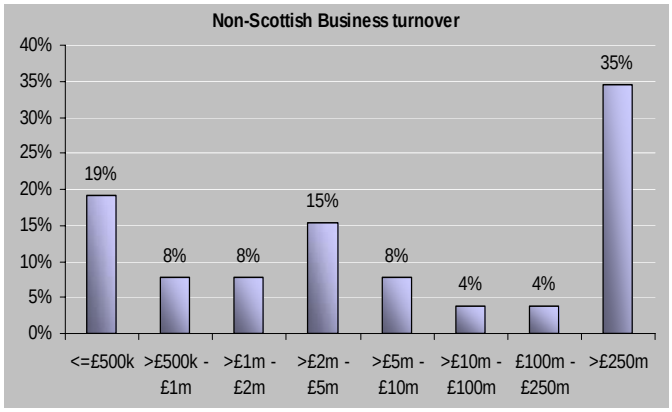
Business Expenditure

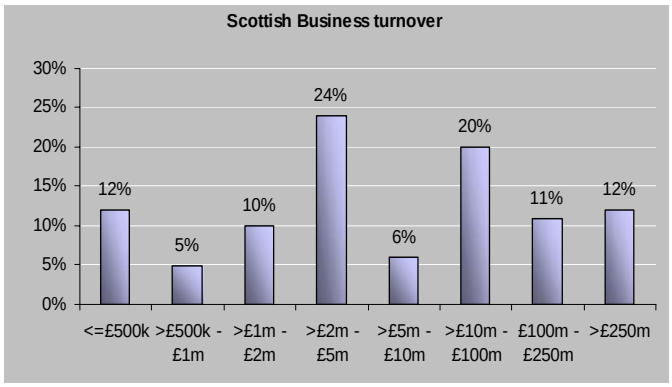



Scottish Business Fares Cost
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
22%
42%
25%
11%
<= £100
>£100 - £250
>£250 - £500
>£500

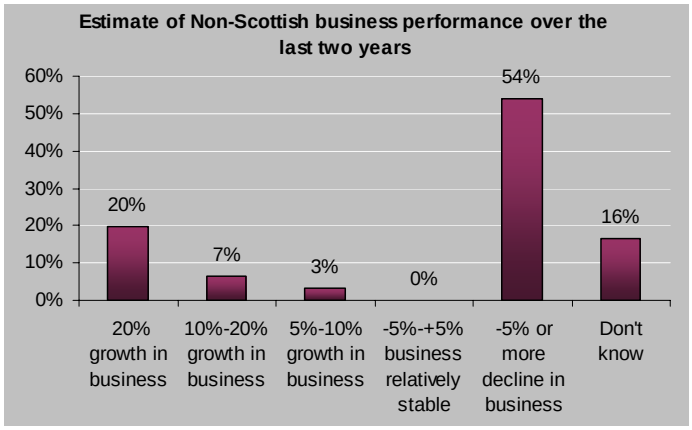

Annual Scottish Business Travel Costs
>£50,000 - £300,000, 9%
>£300,000, 3%
<£50,000, 84%

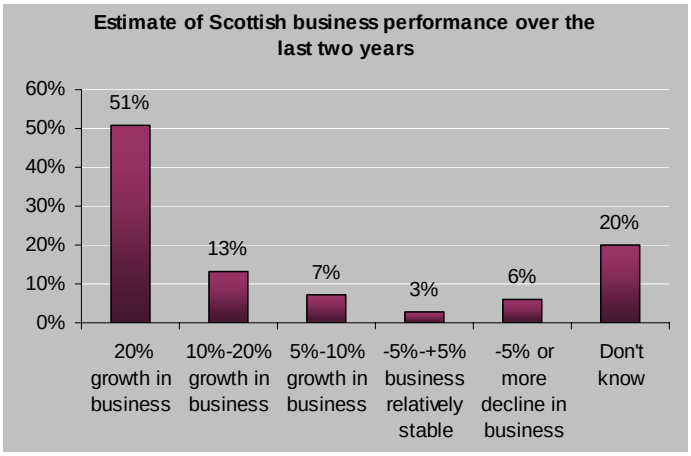

Annual Non-Scottish Business Travel Costs
>£300,000, 18%
>£50,000 - £300,000, 18%
<£50,000, 64%

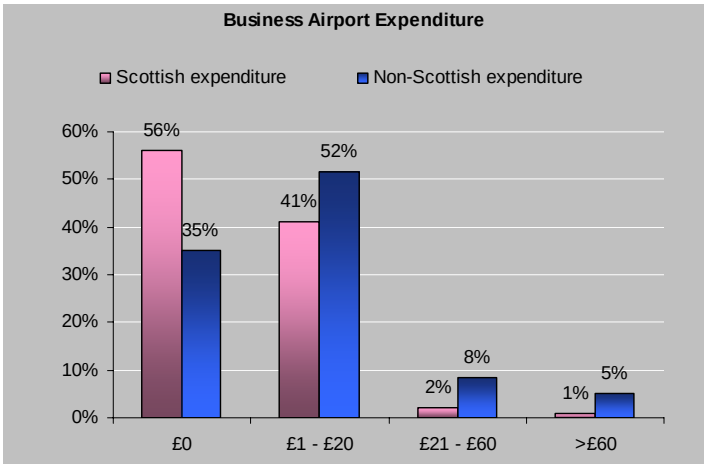

Non-Scottish Business turnover
40%
35%
30%
25%
20%
15%
10%
5%
0%
19%
8%
8%
15%
8%
4%
4%
35%
<=£500k
>£500k - £1m
>£1m - £2m
>£2m - £5m
>£5m - £10m
>£10m - £100m
£100m - £250m
>£250m


Scottish Business turnover
30%
25%
20%
15%
10%
5%
0%
12%
5%
10%
24%
6%
20%
11%
12%
<=£500k
>£500k - £1m
>£1m - £2m
>£2m - £5m
>£5m - £10m
>£10m - £100m
£100m - £250m
>£250m

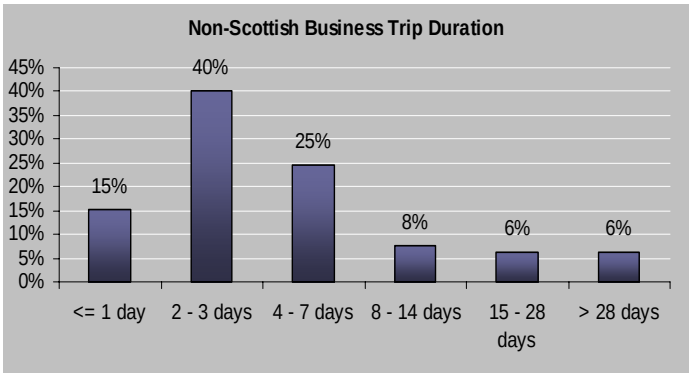
Business Performance

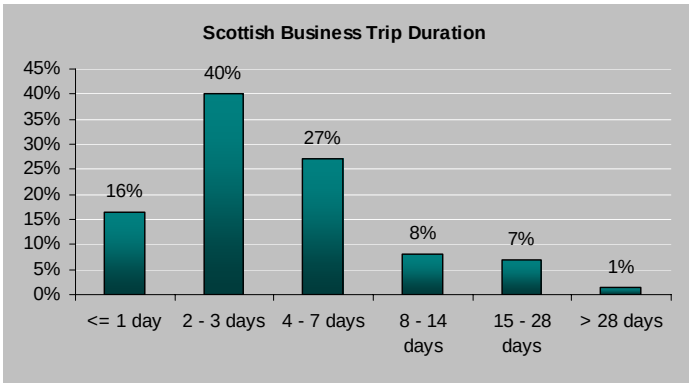






Trip Characteristics and Issues





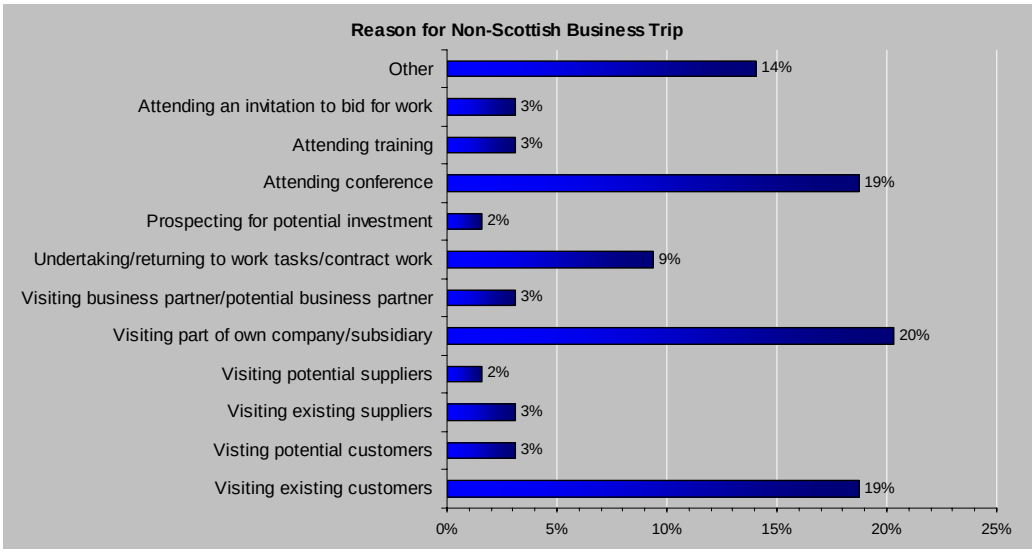
Number of Non-Scottish and Scottish Business Trips Made

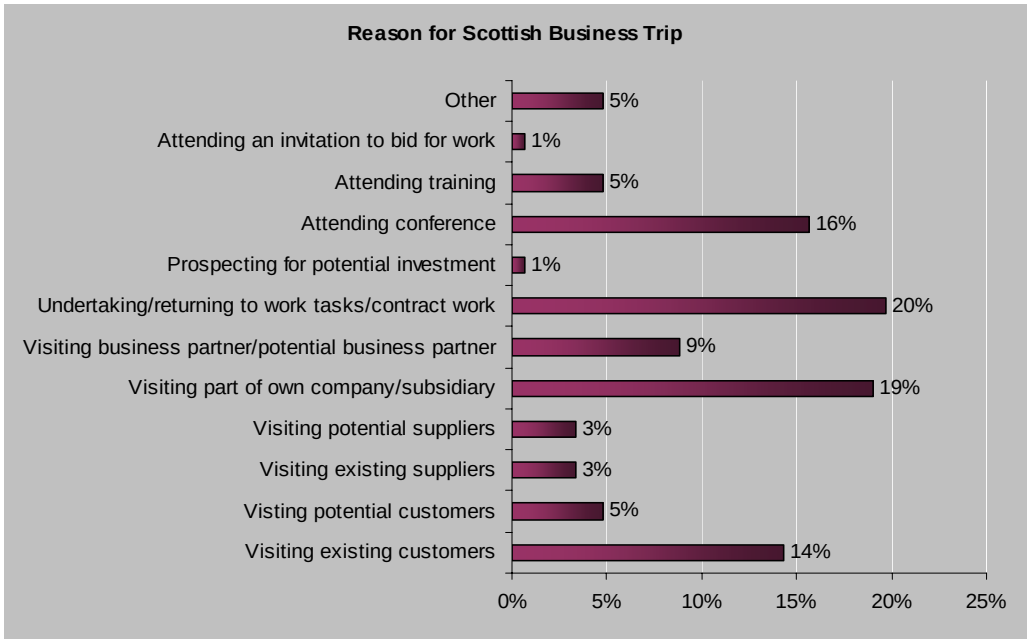
	Non-Scottish Businesses		Scottish Businesses	
	Trips within last 3 months	**Trips within last 12 months**	**Trips within last 3 months**	**Trips within last 12 months**
None	18%	9%	9%	2%
1 trip	45%	31%	20%	10%
2 trips	20%	11%	15%	4%
3 trips	3%	9%	10%	3%
4 - 5 trips	3%	9%	11%	10%
>5 - 10 trips	6%	18%	20%	26%
> 10 trips	5%	12%	15%	46%

Planned Future Non-Scottish and Scottish Business Trips

	Non-Scottish Businesses		Scottish Businesses	
	Trips planned in next 3 months	**Trips planned in next 12 months**	**Trips planned in next 3 months**	**Trips planned in next 12 months**
None	28%	7%	11%	4%
1 trip	24%	21%	16%	9%
2 trips	17%	12%	27%	4%
3 trips	7%	5%	18%	8%
4 - 5 trips	9%	9%	10%	12%
>5 - 10 trips	11%	19%	12%	27%
> 10 trips	4%	28%	7%	37%

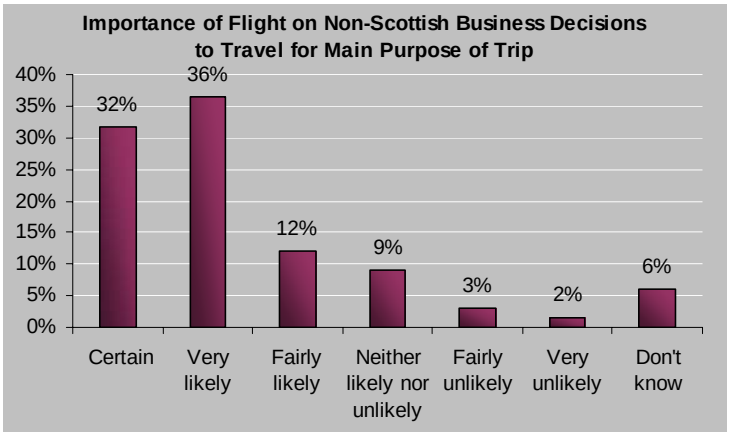
Business Compositions

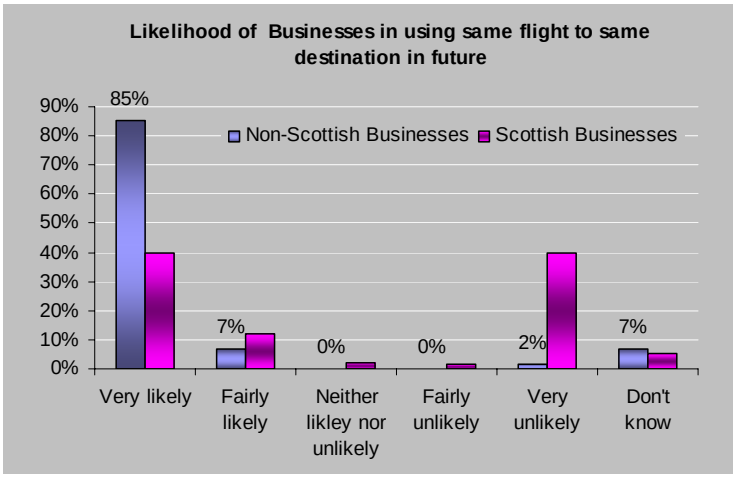




Most Important of Flight for Non-Scottish and Scottish Businesses

Factor	Non-Scottish Businesses	Scottish Businesses
Access to customers and markets at destination	26%	20%
Access to suppliers at destination	19%	18%
Access and communications with other parts of	18%	20%
Likelihood on investment at destination	11%	17%
Reducing the impression of Scotland's	12%	13%
Enabling me or colleagues to attend	14%	12%





Availability of flight influences the frequency of business trips from Scotland or main purpose of travel		
Influence/ Departure airport	**Yes**	**No**
All	61%	39%
Aberdeen	53%	47%
Dundee	50%	50%
Edinburgh	57%	43%
Glasgow	71%	29%
Inverness	67%	33%
Prestwick	50%	50%

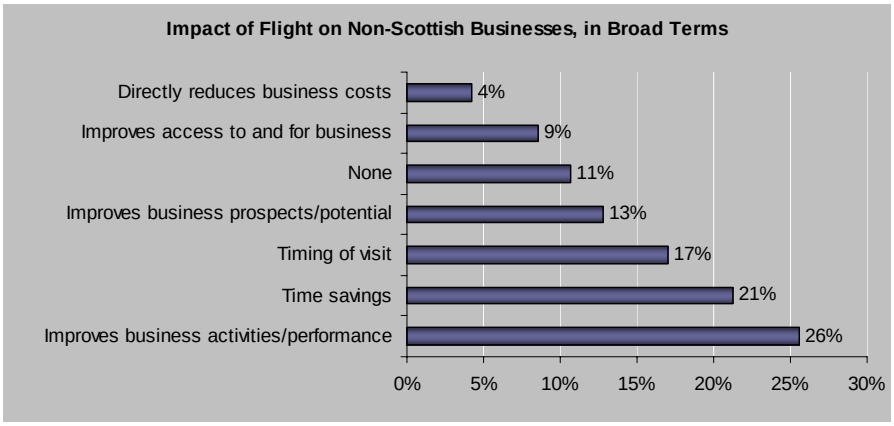
Planned Future Non-Scottish and Scottish Business Trips

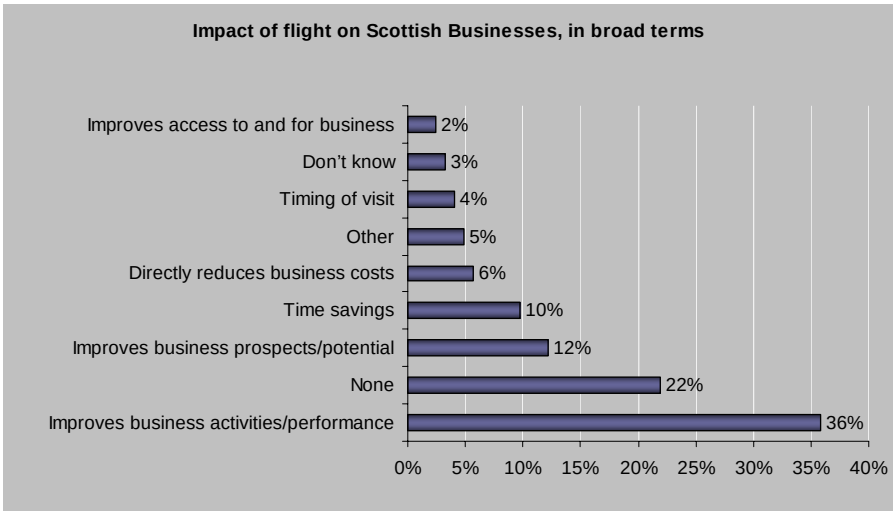
Non-Scottish Business Responses	Very likely	Fairly likely	Neither likely nor unlikely	Fairly unlikely	Very unlikely	Don't know
If flight unavailable, likelihood of visiting Scotland on business this time	50%	23%	6%	0%	16%	5%
If flight unavailable, likelihood of not have made the trip at this time	21%	13%	10%	0%	13%	38%
If flight unavailable, likelihood of visiting another part of GB or Ireland	20%	3%	2%	3%	66%	7%
If flight unavailable, likelihood of travelling elsewhere overseas	20%	7%	3%	0%	54%	16%
Scottish Business Responses						
If flight unavailable, likelihood of visiting Scotland on business this time	31%	33%	0%	18%	11%	7%
If flight unavailable, likelihood of not have made the trip at this time	28%	17%	4%	6%	41%	4%
If flight unavailable, likelihood of visiting another part of GB or Ireland	15%	7%	1%	1%	67%	8%
If flight unavailable, likelihood of travelling elsewhere overseas	14%	4%	3%	4%	63%	12%

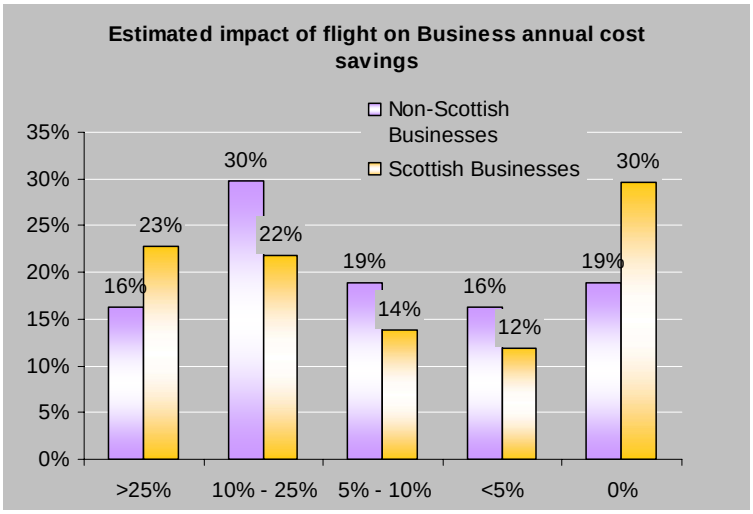
Impact of Flight Availability on Non-Scottish and Scottish Businesses

Non-Scottish Business Responses	Strongly agree	Tend to agree	Neither agree nor disagree	Tend to disagree	Strongly disagree	Don't know
Flight availability has improved access to customers and markets in Scotland	30%	38%	17%	3%	2%	10%
Flight availability has improved access to suppliers in Scotland	24%	27%	27%	0%	2%	19%
Flight availability has improved access to other parts of the company	31%	37%	16%	2%	3%	11%
Flight availability has improved the likelihood of business investing in Scotland	13%	25%	33%	2%	10%	18%
Flight availability has reduced the feeling that Scotland is remote from the centres of business activity	40%	34%	10%	6%	3%	6%
Scottish Business Responses						
Flight availability has improved access to customers and markets in Scotland	39%	30%	15%	4%	7%	4%
Flight availability has improved access to suppliers in Scotland	32%	36%	19%	3%	6%	5%
Flight availability has improved access to other parts of the company	34%	26%	24%	1%	6%	9%
Flight availability has improved the likelihood of business investing in Scotland	13%	25%	33%	2%	10%	18%
Flight availability has reduced the feeling that Scotland is remote from the centres of business activity	40%	34%	10%	6%	3%	6%

Impact of Flights on Businesses







Appendix B

Transport Economic Efficiency (TEE) Appraisal

Cost Benefit Analysis
TAG Unit 3.5.4

February 2006

Contents

1 Introduction

1.1.1 This TAG Unit provides background material on a number of aspects of cost benefit analysis. The topics covered are:

- the nature of cost benefit analysis (CBA);
- the method of CBA to be employed in transport studies - an explanation of the changes resulting from the adoption of the Sugden approach;
- key elements of the framework for calculation of measures of economic worth, including guidance on the appraisal period; and
- ways of comparing costs and benefits and measures of economic worth.

2 Cost Benefit Analysis

2.1.1 The Treasury definition of 'cost benefit analysis' is: 'Analysis which quantifies in monetary terms as many of the costs and benefits of a proposal as feasible, including items for which the market does not provide a satisfactory measure of economic value." See page 4 of *Appraisal and Evaluation in Central Government*, (HMT,2003). The concept of cost benefit analysis can therefore be very broad.

2.1.2 The purpose of the Appraisal Summary Table (AST) is to present all the main impacts of a proposal. The AST includes both qualitative and quantitative information, with the latter expressed in either money terms or in other units. The Department is moving towards valuing more of the impacts in the AST in money terms - for example, money values of noise, local air quality and greenhouse gas impacts are currently being considered. However, it is unlikely to be feasible to value all the impacts in the AST in money terms - for example, it will not generally be possible to value in money terms impacts on landscape, townscape, heritage of historic resources and biodiversity. Cost benefit analysis, as defined by the Treasury, will therefore not encompass all the impacts of a proposal as recorded in the AST.

2.1.3 For practical reasons, therefore, cost benefit analysis which confines itself to those impacts which are valued in money terms, has to be conducted, at present, on a narrower basis. The Analysis of Monetised Costs and Benefits Table (**Table 1**) includes costs and benefits which are regularly or occasionally presented in monetised form in transport appraisals, together with some where monetisation is in prospect. There may be other significant costs and benefits, some of which cannot be presented in monetised form. Where this is the case, the analysis presented in this table does not provide a good measure of value for money and should not be used as the sole basis for decisions.

2.1.4 At the present time, monetised cost benefit analysis:

- **includes** changes in business and consumer travellers' journey time, vehicle operating costs, fares and other changes;
- **includes** impacts on private sector providers' revenues and costs;
- **includes** changes in the numbers of accidents, but **excludes** impacts on personal and freight security;
- **includes** the effects of better transport interchange on traveller journey times but **excludes** other transport interchange quality factors ;
- **includes** impacts of noise
- **subsumes** the accessibility impacts to the extent that the cost benefit analysis takes account of all significant behavioural responses;
- **usually excludes** journey ambience impacts, although factors such as rail overcrowding, station facilities and rolling stock quality may be included in some studies (see the SRA's Appraisal Criteria, 2003);
- **usually excludes** option values, although these may be included for some rail studies;
- **currently excludes** impacts on local air quality and greenhouse gas levels, although the Department expects to publish money values for these sub-objectives in the near future;
- **currently excludes** reliability impacts as methods of estimating these and values of changes in reliability have yet to be determined, although the Department expects to publish advice in the near future which will enable monetised estimates of reliability impacts to be derived for some studies;
- **excludes** impacts on landscape, townscape, heritage of historic resources, biodiversity, water environment, physical fitness and journey ambience as no money values for these have yet been established by the Department;
- **excludes** any wider economic impacts, including impacts on land use; and
- **excludes** the impacts on integration with land-use policies and other Government policies.

2.1.5 Impacts not included in monetised cost benefit analysis must be taken into account in assessing overall value for money. Guidance on their assessment is given in *The Environment Objective* (TAG Unit 3.3), *The Safety Objective* (TAG Unit 3.4), *The Economy Objective* (TAG Unit 3.5), *The Accessibility Objective* (TAG Unit 3.6), and *The Integration Objective* (TAG Unit 3.7), and is intended to lead to a robust, evidence-based, quantitative assessment or text score that should appear in the Appraisal Summary Table.

2.1.6 The benefits or disbenefits accruing to users of motorised transport modes will usually be derived from a transport model. They should include all significant user costs and benefits, taking account of all significant traveller responses. Further guidance on modelling is given in *Modelling* (TAG Unit 3.1), while the derivation of monetised benefits/disbenefits is discussed in *The Transport Economic Efficiency Sub-objective* (TAG Unit 3.5.2).

2.1.7 Benefits or disbenefits accruing to pedestrians, cyclists and others will usually be assessed separately. Where it is possible to calculate monetary values for these benefits, they should be included in the overall analysis. However, this may not always be possible, in which case, these impacts should be assessed qualitatively,

based on an analysis of quantitative factors - see *Impacts on Pedestrians, Cyclists and Others* (TAG Unit 3.5.5).

2.1.8 The cost used in a CBA is the cost to Public Accounts which is defined in *The Public Accounts Sub-Objective* (TAG Unit 3.5.1).

3 Method of CBA to be Employed in Multi-Modal Transport Studies

3.1.1 *The Common Appraisal Framework* (MVA *et al*, 1994) was developed specifically for the appraisal of multi-mode transport interventions. More recently, the DETR commissioned a review of cost benefit analysis of transport projects from Professor Robert Sugden (see Sugden, 1999). The Department decided to adopt the Sugden approach for multi-modal transport appraisal. It is important to realise that this approach changes the presentation of results, rather than in the substance of the results themselves.

3.1.2 Adopting the Sugden approach entails two changes in convention:

- a change from a factor cost unit of account to a market prices unit of account; and
- a change from a calculus of social costs and benefits to a calculus of willingness to pay (WTP).

3.1.3 It is important to understand that the distinction between the two units of account is entirely separate from the distinction between the calculus of social costs and benefits and the calculus of WTP. In principle, cost benefit analysis (CBA) accounts can be drawn up using any of four (that is, 2 x 2) different conventions: either calculus can be combined with either unit of account. Which calculus is used should make no difference at all to the final results. Which unit of account is used should affect only the *scale* of the results: that is, every magnitude expressed in one unit of account should be the same multiple of the corresponding magnitude in the other unit of account. What matters is that the results of all studies are reported using the same accounting conventions, so that consistency is maintained.

3.1.4 **Market Prices**. Any CBA needs a unit of account. Obviously, the most convenient unit of account is money. In an economy with indirect taxes, the unit of account can be either *at factor cost* (that is, net of indirect tax) or *at market prices* (that is, gross of indirect tax). Focusing on people's willingness to pay for final consumption, a market-price unit of account seems more natural, since prices to consumers are generally quoted gross of tax.

3.1.5 Which unit is used in CBA is of no real significance but consistency is essential. The *indirect tax correction factor* is the conversion between the two units. If CBA uses the factor-cost unit, a correction factor has to be applied to any costs or benefits that have been measured gross of tax. Conversely, if the market-price unit of account is used, the reciprocal of that correction factor has to be applied to costs or benefits that have been measured net of tax.

3.1.6 The principles of the market price base are summarised in the extracts from Sugden's report in Box 1.

Box 1: Principles of the Market Price Base

Denote the average rate of indirect tax on final consumption by t. Thus, goods which are valued at £1 net of tax are valued at £(1 + t) gross of tax; of each £1 of consumer spending, £1/(1 + t) goes to producers in wages, rents and profits and £t/(l + t) goes to the government. Assume that the government balances its budget. Now suppose the government increases its spending by £1, and wishes to finance this through direct taxation. To do this, it must raise direct taxes by *more than £1*, since the increase in direct taxation will imply a reduction in disposable income and hence a fall in indirect tax revenue. In fact, direct taxation must be

increased by £(1 + t). Disposable income will then fall by £(1 + t). Since the proportion t/(1 + t) of all consumer spending goes to the government direct tax revenue, indirect tax revenue will fall by £(1 + t) x t/(1 + t), i.e. by £t. Thus the net effect on government tax revenue is £(1 + t) - £t = £1. The implication of this example is that each extra £1 spent by the government is equivalent to a £(1 + t) loss of disposable income by households.

This conclusion should not be interpreted as saying that resources have a different value when they are in the hands of the government than when they are in the hands of private consumers. The point is simply that we are using two different units of account. When we say the government spends £1, we mean that it spends £1 in terms of the factor-cost unit of account. The cost to households in terms of disposable income is £(1 + t), but this is in terms of the market-price unit of account. Each factor-cost unit converts into (1 + t) market-price units: this conversion rate (or its reciprocal, depending on which unit we treat as basic) is the indirect tax correction factor.

Nor should it be thought that this argument applies only to goods which are traded on markets. For example, suppose the government spends £1 million (in factor-cost terms) on a road improvement whose only benefits are savings in leisure time. Suppose these time savings have a value of x when measured in terms of individuals' WTP, as expressed in stated preference surveys. How great must x be in order for the road improvement to be worthwhile? The answer is £(1 + t) million. In other words, if we are carrying out a CBA and are using the factor-cost unit of account, the WTP measure of benefit must be deflated by the tax correction factor. Why? Because stated preference surveys use the market-price unit of account. When a person says that she would be willing to pay up to (say) £1 to save one extra hour of travelling time, she is saying that, in order to save that hour, she would be willing to forgo consumption goods which are worth £1 *at market prices*. The same information could equally well be expressed by saying that she would be willing to forgo consumption goods which are worth £1/(1 + t) at factor cost. It is simply an accounting convention of stated-preference surveys (when addressed to private individuals or households) that answers are expressed in the market-price unit of account.

3.1.7 **Cost benefit Calculus**. A CBA aims to take account of all the ways in which a project affects people, irrespective of whether those effects are registered in conventional financial accounts. It can be described in two different ways - as a *calculus of willingness-to-pay* or as a *calculus of social costs and benefits*. These lead to two different ways of presenting the cost-benefit accounts, but (if properly carried out) both lead to the same valuation of net social benefit.

3.1.8 The principal advantage of the calculus of willingness to pay is that it leads naturally to a presentation of results which makes clear how a project impacts on the members of different economic interest groups (e.g. car users, public transport users, taxpayers), rather than hiding distributional impacts in the aggregation of resource costs and benefits. Similarly, financial and non-financial impacts can be readily distinguished from one another. The latter kind of disaggregation is particularly important when projects are sponsored or co-sponsored by private sector firms, or by public sector agencies which are expected to act in a quasi-commercial way (i.e. to have regard to their own financial balance sheets). For a traditional highway project, where all costs are borne by a government agency and the services of the road are provided to users free of charge, the distinction between financial costs and non-financial benefits is straightforward; in such an application, the calculus of social costs and benefits may be acceptable. But almost all public transport, and some roads, are now supplied by private firms. A common CBA methodology for the transport sector needs to lead to the kind of balance sheet that is generated by the calculus of willingness to pay.

3.1.8 The principles of the willingness to pay calculus are summarised in the extracts from Sugden's report in Box 2.

Box 2: The Willingness to Pay Calculus

The basic strategy of the willingness-to-pay (WTP) calculus is to arrive at a money measure of the net welfare change for each individual that is brought about by the project under consideration, and then to sum these. The welfare change for any individual is measured by the *compensating variation*, i.e. the individual's WTP for benefits or the negative of his/her willingness to accept compensation for disbenefits. The principle behind this calculus is the Kaldor-Hicks *compensation test*: a move from one state of affairs to another passes this test if, in principle, those who benefits from the move could fully compensate those who lose (without themselves becoming losers). When the cost-benefit accounts are presented in this way, there often are items which appear as benefits for one person and equally-valued costs for someone else: such items are *transfer payments or pecuniary externalities*. Items which do not cancel out in this way are *social* costs or benefits (sometimes called *resource or real resource* costs or benefits). The word 'social' is used to signify that these are costs or benefits which fall on 'society as a whole', understood as the aggregate of all individuals.

The calculus of social costs and benefits seeks to measure the value of the 'resources' used by, and the benefits created by, a project. This approach distinguishes between social costs/benefits and transfer payments at the outset, and takes account only of the former. For example, consider a straightforward market transaction: a person buys and consumes a can of beer. In the calculation of social costs and benefits, the marginal cost of producing the beer is a social cost, while the consumer's enjoyment of the beer is a social benefit; the actual payment made for the beer ' is a transfer payment, and is ignored. (In contrast, the calculus of WTP would record a benefit to the consumer equal to the consumer's surplus on the beer, i.e. the excess of WTP over the price paid, and it would record a benefit to the producer of the beer equal to the producer's surplus, i.e. the excess of price received over marginal cost.) Because the calculus of social costs and benefits nets out transfer payments, this approach does not allow the net social benefit of a project to be disaggregated into impacts on different economic interest groups.

Clearly, the two methods are equivalent. It is important to realise that the difference between the two methods is simply a difference in presentation. It is *not* a difference between wider and narrower ways of defining the class of effects that ultimately count in CBA.

4 Framework for Calculation of Measures of Economic Worth

The following section provides a brief introduction to a number of concepts and issues which need to be taken into account when carrying out a CBA for transport studies.

4.1 Discounting

4.1.1 Discounting is a technique used to compare costs and benefits that occur in different time periods. It is based on the principle known as time preference that people prefer goods and services now rather than later. This preference for goods and services now rather than later applies to both individuals and society.

Formally any sum (S) can be reduced to its present value (PV) by this formula:

$$\mathbf{PV = S/(1+ r)^n}$$

Where:
PV = The present value
S = the sum
r = the discount rate
n = year in which the sum is received
n = o is the present value year

4.1.2 The discount rates, which should be used to convert all costs and benefits to present values, are provided in the HMT Green Book. These discount rates should be used to calculate the present value of an option

4.1.3 The present value of benefits (PVB) in year 0 of a stream of benefits (Bi) for years i where i ranges from 0 to n is given by:

$$PVB = B_0 + B_1 /(1+ r) + ... + B_n /(1+ r)^n$$

A similar formula is used to calculate the present value of costs (PVC).

The net present value (NPV) of a scheme is given by:

$$NPV = PVB – PVC$$

4.1.4 The Green Book provides the discount rate which should be applied over different periods. The discount rate is assumed to fall for very long periods because of uncertainty about the future.

Green Book Discount Rates

Years from the current year	Discount rate
0-30	3.5%
31-75	3.0%
76-125	2.5%
126-200	2.0%
201-300	1.5%
301 and over	1.0%

4.1.5 **Base year for discounting**. The base year for discounting, to which all costs and benefits should be discounted, is the Department's standard base year, which is currently 2002.

4.1.6 **Price base.** The price base year should also be the Department's standard base year of 2002. Thus, all prices in the appraisal should be adjusted for inflation, back to the price level of the Department's standard base year for appraisal purposes.

4.2 Modelling

4.2.1 **Model base year.** The model base year will depend on the currency of the dataset used to develop the model. On the assumption that significant new datasets will be collected, the model base year is likely to be the current year (the year in which the surveys will be conducted).

4.2.2 **Forecasts.** In the case of a single intervention, forecasts are ideally required for the year of opening (see below) and a second 'forecast' year some years after opening. In the case of a strategy or plan, forecasts are ideally required for at least the year of opening of each of the main elements of the option and for the future 'forecast year'. However, it may not always be practical to conduct forecasts for the opening years of every one of the main elements of an option - in these cases an appropriate common year should be chosen so that streams of costs and benefits can reasonably be inferred from a variety of different starting points.

4.2.3 **Opening year.** In order to establish streams of costs and benefits for use in the CBA, it is necessary to assume an option opening year. This will be the year in which operating and maintenance costs begin to be incurred and typically the year in which the users begin to gain positive benefits from the option. Where elements of an option have different opening years, a reasonable approach to estimating cost and benefit

streams without making an excessive number of model runs will be required. This will typically involve extrapolation and interpolation of the costs and benefits back from a common year for which the model is run.

4.2.4 **Forecast year.** The 'forecast year' is the future year - typically 10 to 15 years after the opening year - for which the model is also run to generate single-year costs and benefits from which the streams of costs and benefits may be inferred. The forecast year may vary, depending on:

- the timing at which problems are thought likely to become critical and in need of solution;
- the kinds of solution considered appropriate and the time likely to be required for implementation; and
- the availability of model input data on future trends, economic growth, and so on.

4.2.5 Thus, a study which is concerned with problems which are in need of urgent resolution in the next few years and for which traffic management solutions, for example, are considered appropriate, may use a forecast year only a few years away from the model base year. On the other hand, a study in which problems are thought likely to persist over a longer timeframe may use a forecast year 20 to 30 years away from the model base year.

4.2.6 A study may involve preparing forecasts and conducting analyses and appraisals for more than one forecast year. For example, if a strategy involves phased implementation of the proposals or if there is expected to be significant change in the rate of growth in user benefits over the appraisal period, then it is recommended that the model be run to generate forecasts for a set of time points which will enable the whole benefit and cost stream to be calculated.

5 Appraisal Period

5.1 Introduction

5.1.1 The new Treasury Green Book (TGB) '*The Green Book - Appraisal and Evaluation in Central Government*' was published in January 2003. The Department for Transport has implemented a number of changes to appraisal methods to ensure that they are in line with this new guidance.

5.1.2 One of the key emphases of the TGB is the need to ensure that costs and benefits are '*extended to cover the period of the usefulness of the assets encompassed by the options under consideration*' (TGB paragraph 5.10). The new declining discount rate regime means that costs and benefits occurring after 30 years are now more significant.

5.1.3 The following advice is an interim measure. The Department is considering further changes to the appraisal period guidance, to be published later on this year.

5.2 Appraisal Period

5.2.1 The appraisal period is the period over which streams of costs and benefits should be estimated, discounted back to a base year (usually the Department's standard base year, as specified in *Values of Time and Operating Costs* (TAG Unit 3.5.6)). It includes the period during which investment is being planned and implemented (the 'investment period') as well as the operating period. It should be used in the calculation of the various measures of economic worth, such as Net Present Value (NPV) or Benefit Cost Ratio (BCR).

Projects with indefinite lives

5.2.2 For many transport investments, including most road, rail and airports infrastructure, the expectation is that maintenance and renewal will take place when required. Once in place, future decisions are concerned only with upgrading or (rarely) closure, against a 'without project' case that would include sufficient maintenance and

renewals investment to maintain the existing infrastructure. Under these circumstances, it is very difficult to determine the 'period of usefulness' of the project - these projects have an indefinite life.

5.2.3 For these projects, the appraisal period should end 60 years after the scheme opening year.

5.2.4 Extending the appraisal period to 60 years after opening takes account of the new, lower, discount rates introduced in the Treasury Green Book. Using the new discount rates, £1 would be worth roughly the same value in 60 years as it would have been worth in 30 years using the old rate.

Projects with finite lives

5.2.5 For some projects, the project life may be determined from the limited life of its component assets. In these cases, analysts should set out the evidence, and select an appropriate end year for the appraisal, subject to a maximum of 60 years.

5.2.6 In addition, where there are special circumstances such as franchise or other arrangements or the transport problem being addressed by the scheme has a short time horizon, the appraisal period should correctly mirror those circumstances.

5.2.7 It is important to highlight in the Appraisal Summary Table that these projects have finite lives and clearly to state the assumed end year for the appraisal period.

5.3 Residual Value

5.3.1 The Treasury Green Book (TGB paragraph 5.22) states "even where an appraisal covers the full expected period of use of an asset, the asset may still have some residual value, in an alternative use within an organisation, in a second hand market, or as scrap. These values should be included".

5.3.2 **The Department recommends the use of residual values (as defined by TGB) for projects with finite lives less than 60 years.** The residual value should be estimated as follows:

- Resale or scrap value of the assets in the future should be used as a proxy for the residual value. These assets include land and buildings - see the TGB for detailed guidance on valuation.
- Clean up costs must be explicitly shown where applicable. These should be subtracted from the final residual amount. In some cases these costs may already be factored into the resale or scrap value. The Department encourages these costs to be highlighted separately in the appraisal results.
- Derivation of the residual value at the beginning of appraisal should take account of the 'residual value risk' (the uncertainty to what the residual value will prove to be in the future), and adjustments made accordingly. Advice should be sought from the DfT economists or external risk experts.

5.3.3 In cases where project life is limited by special circumstances such as franchise arrangements, residual values should be estimated as follows:

- Unconstrained project benefits (or the benefits resulting from investment in key assets) should be estimated disregarding the special circumstances. Thus, projects with indefinite lives should be appraised over a 60 year period from opening, while projects with finite lives should be appraised to the end year dictated by the life of their assets.
- Benefits relating to the project life as dictated by the special circumstances should be deducted from the unconstrained project benefits to give the appropriate residual value.

5.3.4 For projects with indefinite lives, it is inappropriate to estimate a residual value based on resale or scrap value. Depending on what is assumed about the growth and decay

in the magnitude of benefits, these projects will continue to generate benefits for more than 60 years after opening. In principle, these additional benefits represent the residual value of a project with indefinite life. In practise, they could most efficiently be estimated by extending the appraisal period. But, for projects with indefinite lives, it is not clear how far beyond 60 years after opening the appraisal period should be extended. The Department is giving further thought to this issue and expects to issue further guidance in due course. **In the interim, residual values should not be included in the appraisal of projects with indefinite lives.** However, analysts may wish to estimate residual values for these projects as a sensitivity test. These estimates should be made by extending the appraisal period beyond 60 years after opening. Analysts will need to explain very clearly the reasons for their choice of a revised end point for the appraisal period.

5.4 Forecasting

5.4.1 Extending the appraisal period from 30 years requires streams of costs and benefits to be estimated over a longer period than has been the case in the past. In most cases, this can only be achieved by extrapolation and assumption - formal modelling and detailed analysis is unlikely to be feasible or worthwhile. However, analysts should take care to ensure that their work is as robust as possible, and based on whatever evidence is available. **All assumptions and supporting evidence should be fully documented in the project appraisal report.**

User benefits

5.4.2 For most projects, formal modelling will not be practical for forecast years more than 15-20 years after project opening. This is because the local data needed to ensure that results are credible is not available that far into the future. Analysts are encouraged to choose a last forecast year as far into the future as is practical.

5.4.3 Beyond the last forecast year, benefits should be estimated by extrapolation from benefits estimated up to the last forecast year by the application of factors representing the following effects:

- The growth in the value of benefits;
- The effect of the discount rate; and
- The change over time of the magnitude of benefits

5.4.4 For most of the major components of benefit, the growth in the value of benefits will be the same for all projects. In particular, most studies will adopt the standard assumptions that the values of accident savings and values of time are assumed to grow in line with forecast growth in real GDP per head. Similarly, most schemes will adopt the standard discount rates. All non-standard assumptions should be made transparent and be accompanied by explanatory text.

5.4.5 Determining the change over time of the magnitude of benefits will require more care. (The term 'magnitude of benefits' is used to describe the benefits measured in 'natural' units - hours saved, reductions in numbers of casualties and so on.) Results from formal modelling for the opening year, the last forecast year and, where available, any intermediate years will be useful in determining what it is appropriate to assume. It is also useful to recognise that the magnitude of benefits is usually the product of usage (numbers of trips, vehicle-kilometres and so on) and benefit per unit of use.

5.4.6 It is not credible to assume that the magnitude of benefits will increase indefinitely (if at all) after the last modelled year. Analysts will, therefore, need to specify a profile of growth and decline in the magnitude of benefits beyond the last modelled year. In particular, they will need to consider:

- Whether the magnitude of benefits will continue to grow after the last modelled year and, if so, at what rate; and
- Whether the magnitude of benefits will decline in the future and, if so, at what rate and from when.

5.4.7 Growth in the magnitude of benefits will largely be driven by growth in usage. In particular, it will generally be reasonable to assume that growth after the last forecast year is not higher than that implied by formal modelling up to the last forecast year. A sensitivity test assuming zero growth from the last forecast year is recommended for most schemes.

5.4.8 Decline in the magnitude of benefits will mainly be determined by reducing benefits (or increasing disbenefits) per unit of use. It is, therefore, scheme dependent. The approach may be expected to vary by mode. For a highway scheme, for example, time savings per trip may fall as congestion grows. For a public transport scheme, however, time savings may be preserved, but overcrowding may lead to disbenefits.

5.4.9 Determining the transition from growth to decline (including any intermediate period between the two) will also be a scheme specific issue. In many cases, the growth in demand (which underlies growth in the magnitude of benefits) will lead to congestion or overcrowding and hence to decline in the magnitude of benefits.

5.4.10 Every appraisal should set out clearly what has been assumed about growth and decline in the magnitude of benefits beyond the last modelled forecast year, together with evidence supporting the assumptions. Sensitivity tests and the results they lead to should also be fully documented.

5.4.11 The Department's standard appraisal software (TUBA and COBA) will extrapolate user benefits as outlined above. Users will be able to input their own profile of growth and decline in the magnitude of benefits for the period after the last modelled year. The software will also include default profiles.

Operating, Maintenance And Renewal Costs

5.4.12 Operating and maintenance costs must also be forecast for the whole of the appraisal period. In forecasting future operating, maintenance and renewal costs, analysts should consider:

- The impact of increasing usage or patronage;
- The potential for cost increases in excess of general cost inflation; and
- The effect of the discount rate.

5.4.13 For projects with indefinite lives, the extension of the appraisal period from 30 to 60 years after opening may bring additional elements of major structural maintenance and/or renewal within the appraisal period. For example, road pavements and drainage may require renewal, as may rail track and rolling stock. Wherever possible, the timing, cost and duration of these major elements of cost should be estimated explicitly. Where this is not possible, these costs may be included in annual maintenance rates, though care must be taken to avoid underestimation. Major maintenance and/or renewal may cause delays and other disbenefits to users. Where this is the case, estimates of the disbenefits caused must be made and taken into account.

5.4.14 For roads, useful information has been developed by the Highways Agency as part of its work on whole life costing methods. Typical maintenance profiles, cost and durations for new roads are given in the QUADRO manual. (Currently, this information is only given for the first 30 years of a new road's life - this is being updated.) For other modes, maintenance profiles, costs and durations should be forecast as discussed above, disaggregated to show the main determinants of cost.

5.4.15 The need for periodic major maintenance and renewal means that the profile over time of operating and maintenance costs is likely to be 'spiky'. Thus, this guidance recommends that costs should be examined separately from benefits. Care is required to ensure that costs are correctly integrated with benefits to provide overall

measures of net benefit. In particular, it is important to ensure that private sector costs are deducted from benefits, where appropriate.

6 Ways of Comparing Costs and Benefits and Measures of Economic Worth

6.1.1 In a hypothetical cost benefit analysis where every effect of an option could be expressed in money terms and included in the CBA, the overall economic worth of an option could be summarised using one or more of the following measures:

- The Net Present Value (NPV);
- The Benefit/Cost Ratio (BCR);
- The Net Present Value/Cost to Public Accounts Ratio (NPV/C);
- The Net Present Value/Cost to Funding Agency (NPV/K); and
- The Forecast Year Benefit/Cost Ratio (FYBC).

Each of these summary measures compares the benefits of the option with its costs, although there are differences in definition which give each measure a different appeal. Their features are summarised below.

6.1.2 In practice, the use of these summary measures is hampered by the lack of monetised values for many of the impacts of options. Clearly, a value can be calculated, based on those impacts which can be monetised. However, assessors must be aware that such values are partial and can be misleading, since they do not take into account those impacts which cannot be valued in monetary terms.

6.1.3 **Net Present Value.** The NPV is the discounted sum of all future benefits less the discounted sum of all future costs over the appraisal period. In a world with no constraint on investment funds, there would be a strong case for taking forward all projects with a positive NPV.

6.1.4 **Benefit/Cost Ratio.** The BCR is given by the ratio:

$$\frac{\text{Net Present Value (NPV)} + \text{Present Value of Cost to Public Accounts}}{\text{Present Value of Cost to Public Accounts}}$$

where NPV is as defined above and Present Value of Cost to Public Accounts is as defined in *The Public Accounts Sub-Objective* (TAG Unit 3.5.1). The BCR is, therefore, a value for money measure, which indicates how much net benefit would be obtained in return for each unit of cost to public accounts. This is clearly relevant in the real world situation of limited funding available from public accounts. Note that the BCR is of limited value where projects (road user charging, for example) result in significant revenues accruing to public accounts

6.1.5 **Net Present Value/Cost to Public Accounts Ratio.** The NPV/C is a measure of best value for public accounts expenditure, defined as the ratio:

$$\frac{\text{Net Present Value (NPV)}}{\text{Present Value of Cost to Public Accounts}}$$

where NPV is as defined above, and Present Value of Cost to Public Accounts, as defined in *The Public Accounts Sub-Objective* (TAG Unit 3.5.1).

6.1.6 This measure enables assessors to compare the overall benefit to society of an option with the cost to public accounts required to deliver that benefit - affordability to Government will often be a critical factor in deciding whether options are realistic and practical.

6.1.7 **Net Present Value/Cost to Funding Agency Ratio.** This measure parallels the previous one but uses the cost to the funding agency conducting the appraisal instead of the cost to public accounts. The measure is recommended by the SRA in

its Appraisal Criteria (SRA, 2003) but is, in principle, applicable to appraisals conducted by any funding agency.

6.1.8 **Forecast Year Benefit/Cost Ratio.** The FYBCR is a relatively crude measure, which compares a snapshot of the net benefits in a single future year (once the intervention is fully implemented and working) with the investment costs. The appeal of the FYBCR is that it requires data for only one future year (the 'forecast year'), therefore avoids the need for repeated runs of the model and avoids the interpolation and extrapolation which are then required to generate the full stream of costs and benefits. One obvious disadvantage of the FYBCR is than it gives only a partial picture of the overall benefits and costs - if maintenance costs occur irregularly for example, then some sort of annual equivalent will need to be produced. The FYBCR is most useful in the early stages of option testing and appraisal.

6.1.9 The forecast year benefit/cost ratio (FYBCR) is defined as the ratio:

$$\frac{\text{Present Value of Forecast Year Benefits (PVFYB)}}{\text{Present Value of Investment Costs (PVI)}}$$

where 'Forecast Year Net Benefit' is equal to User Benefit plus increase in Operator Revenue minus increase in Operator Costs, for the year chosen as the Forecast Year.

6.1.10 To obtain this ratio, the forecast year net benefit and the option investment costs must be discounted to the discounting base year.

6.1.11 The forecast year benefit/cost ratio is a useful indicator in the earlier stages of appraisal, as discussed in *Appraisal* (TAG Unit 3.2). The relationship between the forecast year benefit/cost ratio and the benefit/cost ratio of an option over the whole appraisal period depends on:

- the chosen forecast year;
- the growth rate and profile of the benefit stream;
- the value of the discount rate and the length of the appraisal period.

6.1.12 However, the FYBCR has significant limitations.

- It is a ratio, so that when comparing options with very different scales of investment costs and benefits, consideration should also be given to the absolute numbers. To take a crude example, a very low cost option might have a high ratio of forecast year benefits to costs and yet have a low absolute benefit relative to other more expensive options.
- When comparing options it is important to remember that their time profiles of benefits are likely to be different depending on capacity limitations and other factors. Therefore no single multiplier (such as 30 in the example above) will be right for all options.

Therefore, for the 'full appraisal', and the final comparisons between options, estimates of the present values of the whole benefit and cost streams are required.

Air RDF Evaluation

2002 prices

Service																	
Discount factor @	3.50%	0.965	0.931	0.899	0.867	0.837	0.808	0.779	0.752	0.726	0.700	0.676	0.652	0.629	0.607		
		2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**PVB**	**PVB Total**
Aberdeen to Southampton	Benefits JT	£0	£0	£66,105	£92,760	£85,381	£85,442	£85,483	£85,506	£85,511	£85,286	£85,045	£84,788	£0	£0	£841,308	£2,982,628
	Benefits Fares	£0	£0	£186,432	£254,250	£228,528	£223,874	£219,266	£214,706	£210,196	£205,740	£201,338	£196,992	£0	£0	£2,141,320	
Edinburgh to Barcelona	Benefits JT	£0	£0	£234,508	£446,279	£404,372	£410,832	£416,970	£422,796	£428,317	£432,574	£436,523	£440,175	£0	£0	£4,073,347	£7,468,480
	Benefits Fares	£0	£0	£214,985	£398,843	£353,807	£352,700	£351,238	£349,446	£347,349	£344,971	£342,334	£339,459	£0	£0	£3,395,133	
Edinburgh to Geneva	Benefits JT	£0	£0	£15,824	£500,508	£808,124	£937,515	£951,686	£965,240	£978,193	£988,144	£997,470	£1,006,192	£0	£0	£8,148,897	£16,414,824
	Benefits Fares	£0	£0	£18,046	£555,094	£875,665	£994,945	£989,177	£982,593	£975,258	£967,234	£958,576	£949,339	£0	£0	£8,265,927	
Edinburgh to Madrid	Benefits JT	£0	£0	£0	£0	£862,116	£965,169	£958,820	£952,440	£946,032	£937,391	£928,761	£920,144	£911,543	£902,959	£9,285,376	£14,348,466
	Benefits Fares	£0	£0	£0	£0	£511,681	£561,514	£546,783	£532,396	£518,346	£504,628	£491,235	£478,161	£465,400	£452,947	£5,063,091	
Edinburgh to Milan	Benefits JT	£0	£0	£0	£0	£456,996	£1,414,383	£1,421,306	£1,427,714	£1,433,620	£1,435,560	£1,437,010	£1,437,985	£1,438,502	£1,438,577	£13,341,653	£27,702,782
	Benefits Fares	£0	£0	£0	£0	£540,720	£1,639,369	£1,613,780	£1,587,975	£1,561,999	£1,535,897	£1,509,708	£1,483,470	£1,457,220	£1,430,991	£14,361,130	
Edinburgh to Munich	Benefits JT	£0	£0	£0	£0	£1,228,100	£1,548,796	£1,550,696	£1,552,182	£1,553,265	£1,550,274	£1,546,909	£1,543,187	£1,539,121	£1,534,724	£15,147,254	£30,817,819
	Benefits Fares	£0	£0	£0	£0	£1,386,911	£1,714,110	£1,681,896	£1,649,837	£1,617,962	£1,586,297	£1,554,866	£1,523,693	£1,492,796	£1,462,197	£15,670,565	
Edinburgh to Warsaw*	Benefits JT	£0	£0	£0	£0	£1,281,814	£1,547,363	£0	£0	£0	£0	£0	£0	£0	£0	£2,829,177	£7,075,735
	Benefits Fares	£0	£0	£0	£0	£1,945,343	£2,301,214	£0	£0	£0	£0	£0	£0	£0	£0	£4,246,557	
Edinburgh to Zurich	Benefits JT	£0	£0	£0	£0	£272,183	£266,142	£265,859	£265,523	£265,136	£264,073	£262,965	£261,815	£260,625	£259,396	£2,643,717	£3,134,387
	Benefits Fares	£0	£0	£0	£0	£55,010	£52,714	£51,606	£50,510	£49,428	£48,359	£47,305	£46,266	£45,241	£44,231	£490,670	
Glasgow to Berlin	Benefits JT	£0	£0	£0	£885,476	£1,342,158	£1,295,881	£1,279,737	£1,263,787	£1,248,031	£1,229,562	£1,211,360	£1,193,421	£1,175,741	£0	£12,125,154	£27,313,377
	Benefits Fares	£0	£0	£0	£1,212,982	£1,797,864	£1,701,425	£1,646,874	£1,594,058	£1,542,922	£1,493,412	£1,445,478	£1,399,069	£1,354,139	£0	£15,188,223	
Inverness to Bristol*	Benefits JT	£0	£0	£1,118,365	£1,500,744	£1,427,899	£1,317,049	£1,298,282	£1,279,784	£1,261,553	£1,240,486	£1,219,772	£1,199,407	£0	£0	£12,863,342	£30,462,486
	Benefits Fares	£0	£0	£1,689,608	£2,203,563	£2,047,381	£1,848,691	£1,783,986	£1,721,547	£1,661,293	£1,603,148	£1,547,037	£1,492,891	£0	£0	£17,599,145	
Inverness to Dublin*	Benefits JT	£0	£0	£0	£200,433	£194,592	£191,655	£188,764	£185,917	£183,113	£179,920	£176,784	£173,702	£170,675	£0	£1,845,556	£1,869,472
	Benefits Fares	£0	£0	£0	£2,834	£2,690	£2,596	£2,505	£2,417	£2,332	£2,251	£2,172	£2,096	£2,023	£0	£23,915	
Inverness to East Midlands*	Benefits JT	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£6,513,146
	Benefits Fares	£0	£0	£0	£66,077	£822,573	£793,783	£766,001	£739,191	£713,319	£688,353	£664,261	£641,012	£618,576	£0	£6,513,146	
Inverness to Leeds/Bradford*	Benefits JT	£0	£0	£0	£47,941	£6,890	£26,769	£26,399	£26,034	£25,674	£25,255	£24,843	£24,437	£24,038	£0	£258,280	£1,075,851
	Benefits Fares	£0	£0	£0	£166,206	£23,314	£88,637	£85,534	£82,541	£79,652	£76,864	£74,174	£71,578	£69,072	£0	£817,571	
Prestwick to Gdansk	Benefits JT	£0	£0	£0	£368,647	£530,279	£500,921	£495,747	£490,613	£485,519	£479,358	£473,262	£467,231	£461,265	£0	£4,752,842	£13,793,200
	Benefits Fares	£0	£0	£0	£765,040	£1,076,629	£997,280	£967,813	£939,186	£911,378	£884,366	£858,129	£832,644	£807,893	£0	£9,040,358	
Prestwick to Pisa	Benefits JT	£0	£0	£558,725	£474,261	£438,799	£423,707	£409,012	£394,705	£380,777	£366,450	£352,540	£339,037	£0	£0	£4,138,013	£18,000,352
	Benefits Fares	£0	£0	£2,021,825	£1,675,786	£1,520,027	£1,441,928	£1,367,435	£1,296,390	£1,228,643	£1,164,050	£1,102,473	£1,043,781	£0	£0	£13,862,339	
Prestwick to Riga	Benefits JT	£0	£0	£0	£160,354	£793,261	£562,900	£533,396	£504,665	£476,690	£448,385	£420,932	£394,307	£368,491	£0	£4,663,382	£8,161,926
	Benefits Fares	£0	£0	£0	£131,079	£633,959	£440,854	£409,383	£379,575	£351,352	£324,640	£299,367	£275,465	£252,870	£0	£3,498,544	
Prestwick to Warsaw	Benefits JT	£0	£0	£0	£10,809	£19,632	£19,259	£19,180	£19,068	£18,773	£18,439	£18,111	£17,789	£17,473	£0	£178,534	£10,533,845
	Benefits Fares	£0	£0	£0	£686,506	£1,219,316	£1,172,434	£1,144,475	£1,115,244	£1,076,211	£1,038,543	£1,002,194	£967,118	£933,268	£0	£10,355,311	
Prestwick to Wroclaw	Benefits JT	£0	£0	£0	£169,853	£1,054,628	£818,331	£799,507	£781,080	£763,042	£743,676	£724,766	£706,301	£688,271	£0	£7,249,456	£18,557,911
	Benefits Fares	£0	£0	£0	£289,484	£1,758,743	£1,338,366	£1,282,356	£1,228,628	£1,177,090	£1,127,654	£1,080,237	£1,034,758	£991,139	£0	£11,308,456	
Sumburgh to Stansted*	Benefits JT	£0	£0	£0	£22,947	£24,535	£26,016	£27,448	£28,830	£30,165	£31,378	£32,539	£33,650	£34,713	£0	£292,221	£1,087,297
	Benefits Fares	£0	£0	£0	£68,824	£71,926	£74,726	£77,242	£79,491	£81,487	£83,247	£84,783	£86,110	£87,240	£0	£795,075	
Aberdeen to Stornoway	Benefits JT	£0	£0	£72,541	£338,234	£416,822	£436,280	£437,698	£433,586	£427,826	£420,611	£413,359	£406,183	£0	£0	£3,803,140	£11,960,953
	Benefits Fares	£0	£0	£173,264	£786,036	£946,809	£970,957	£954,404	£926,303	£895,496	£864,644	£834,531	£805,368	£0	£0	£8,157,812	
Aberdeen to Bristol	Benefits JT	£0	£12,055	£87,560	£110,020	£110,488	£110,655	£110,794	£110,907	£110,995	£110,781	£110,544	£0	£0	£0	£984,799	£1,519,128
	Benefits Fares	£0	£7,393	£52,069	£63,589	£62,362	£61,143	£59,933	£58,733	£57,543	£56,365	£55,199	£0	£0	£0	£534,329	
Aberdeen to Copenhagen	Benefits JT	£0	£58,342	£528,587	£599,723	£605,841	£591,492	£577,431	£563,653	£550,153	£535,596	£521,373	£0	£0	£0	£5,132,191	£5,307,659
	Benefits Fares	£0	£2,246	£19,730	£21,760	£21,469	£20,521	£19,614	£18,745	£17,913	£17,116	£16,353	£0	£0	£0	£175,468	
Aberdeen to Groningen	Benefits JT	£0	£219,123	£367,874	£347,030	£261,354	£256,406	£251,546	£246,772	£242,082	£236,879	£231,781	£0	£0	£0	£2,660,847	£2,627,284
	Benefits Fares	£0	-£3,069	-£4,994	-£4,577	-£3,365	-£3,232	-£3,103	-£2,979	-£2,860	-£2,746	-£2,637	£0	£0	£0	-£33,563	
Edinburgh to Cologne	Benefits JT	£594,728	£788,107	£803,917	£817,646	£827,280	£834,531	£841,385	£847,855	£853,949	£857,596	£0	£0	£0	£0	£8,066,995	£8,214,759
	Benefits Fares	£12,150	£15,769	£15,610	£15,443	£15,269	£15,088	£14,902	£14,709	£14,512	£14,311	£0	£0	£0	£0	£147,764	
Edinburgh to New York	Benefits JT	£0	£1,098,361	£2,233,755	£2,024,877	£1,701,330	£1,672,772	£1,644,698	£1,617,100	£1,589,971	£1,559,642	£1,529,895	£0	£0	£0	£16,672,400	£21,795,507
	Benefits Fares	£0	£373,265	£737,486	£650,914	£534,876	£515,529	£496,880	£478,906	£461,581	£444,883	£428,787	£0	£0	£0	£5,123,107	
Glasgow to Dubai	Benefits JT	£0	£1,843,624	£2,821,812	£2,854,495	£2,381,200	£2,350,936	£2,321,041	£2,291,511	£2,262,341	£2,228,413	£2,194,977	£0	£0	£0	£23,550,350	£32,116,017
	Benefits Fares	£0	£739,980	£1,101,038	£1,085,099	£885,711	£857,597	£830,366	£803,991	£778,445	£753,702	£729,737	£0	£0	£0	£8,565,666	
Prestwick to Bergamo	Benefits JT	£0	£803,417	£839,609	£791,436	£475,728	£466,994	£458,421	£450,004	£441,741	£432,636	£423,718	£0	£0	£0	£5,583,704	£5,630,219
	Benefits Fares	£0	£7,284	£7,400	£6,796	£3,997	£3,848	£3,704	£3,566	£3,433	£3,305	£3,182	£0	£0	£0	£46,515	
Prestwick to Gothenburg	Benefits JT	£0	£0	£128,329	£659,043	£648,346	£471,438	£461,883	£452,517	£443,336	£433,354	£423,591	£414,043	£0	£0	£4,535,881	£4,626,918
	Benefits Fares	£0	£0	£2,822	£14,126	£13,602	£9,703	£9,326	£8,963	£8,614	£8,279	£7,956	£7,646	£0	£0	£91,037	
Prestwick to Dusseldorf	Benefits JT	£0	£79,795	£738,974	£521,854	£468,668	£456,166	£443,945	£431,999	£420,324	£407,970	£395,928	£0	£0	£0	£4,365,622	£4,450,437
	Benefits Fares	£0	£1,716	£15,445	£10,624	£9,335	£8,910	£8,503	£8,114	£7,741	£7,385	£7,044	£0	£0	£0	£84,816	
Prestwick to Girona	Benefits JT	£511,774	£920,651	£967,070	£935,756	£928,414	£919,018	£909,686	£900,419	£891,217	£880,080	£0	£0	£0	£0	£8,764,086	£13,849,759
	Benefits Fares	£328,646	£579,835	£592,272	£558,481	£542,303	£526,573	£511,280	£496,413	£481,959	£467,910	£0	£0	£0	£0	£5,085,673	
Prestwick to Rome	Benefits JT	£0	£732,010	£1,121,074	£1,009,052	£432,123	£419,616	£407,402	£395,473	£383,825	£371,599	£359,694	£0	£0	£0	£5,631,869	£18,988,885
	Benefits Fares	£0	£1,876,955	£2,794,645	£2,450,745	£1,027,000	£978,096	£931,357	£886,692	£844,013	£803,235	£764,277	£0	£0	£0	£13,357,017	
Prestwick to Stockholm	Benefits JT	£1,210,011	£1,472,030	£1,492,913	£923,151	£904,071	£883,242	£862,843	£842,864	£823,299	£802,231	£0	£0	£0	£0	£10,216,655	£26,098,509
	Benefits Fares	£2,056,533	£2,451,405	£2,414,348	£1,453,046	£1,391,270	£1,332,037	£1,275,247	£1,220,801	£1,168,603	£1,118,564	£0	£0	£0	£0	£15,881,854	
Aberdeen to Blackpool	Benefits JT	£0	£0	£9,535	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£9,535	£4,341
	Benefits Fares	£0	£0	-£5,195	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	-£5,195	
Aberdeen to Kristiansand	Benefits JT	£0	£0	£0	£0	£69,724	£0	£0	£0	£0	£0	£0	£0	£0	£0	£69,724	£86,003
	Benefits Fares	£0	£0	£0	£0	£16,279	£0	£0	£0	£0	£0	£0	£0	£0	£0	£16,279	
Aberdeen to Liverpool	Benefits JT	£0	£0	£0	£38,069	£96,494	£0	£0	£0	£0	£0	£0	£0	£0	£0	£134,562	£704,064
	Benefits Fares	£0	£0	£0	£163,594	£405,907	£0	£0	£0	£0	£0	£0	£0	£0	£0	£569,501	
Aberdeen to Oslo*	Benefits JT	£0	£0	£562,414	£566,483	£512,178	£0	£0	£0	£0	£0	£0	£0	£0	£0	£1,641,076	£2,389,157
	Benefits Fares	£0	£0	£263,150	£257,560	£227,371	£0	£0	£0	£0	£0	£0	£0	£0	£0	£748,081	
Edinburgh to Atlanta	Benefits JT	£0	£0	£0	£1,324,878	£1,618,993	£0	£0	£0	£0	£0	£0	£0	£0	£0	£2,943,871	£3,784,090
	Benefits Fares	£0	£0	£0	£382,824	£457,396	£0	£0	£0	£0	£0	£0	£0	£0	£0	£840,219	
Edinburgh to Geneva	Benefits JT	£45,148	£117,471	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£162,619	£262,353
	Benefits Fares	£28,090	£71,644	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£99,734	
Edinburgh to Jersey*	Benefits JT	£164,749	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£164,749	£502,352
	Benefits Fares	£337,603	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£337,603	
Edinburgh to Milan	Benefits JT	£15,910	£59,881	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£75,791	£186,485
	Benefits Fares	£23,628	£87,066	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£110,694	
Edinburgh to Munich	Benefits JT	£0	£20,307	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£20,307	£23,609
	Benefits Fares	£0	£3,302	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£3,302	
Edinburgh to Oslo	Benefits JT	£52,414	£153,301	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£205,715	£488,605
	Benefits Fares	£73,243	£209,647	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£282,889	
Edinburgh to Zurich	Benefits JT	£15,199	£50,679	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£65,877	£165,433
	Benefits Fares	£23,334	£76,221	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£99,555	
Glasgow to Prague	Benefits JT	£0	£72,673	£237,545	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£310,218	£725,564
	Benefits Fares	£0	£96,729	£318,617	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£415,346	
Inverness to Stockholm*	Benefits JT	£0	£93,948	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£93,948	£182,086
	Benefits Fares	£0	£88,138	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£88,138	
Inverness to Newcastle*	Benefits JT	£0	£0	£0	£45,913	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£45,913	£58,715
	Benefits Fares	£0	£0	£0	£12,802	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£12,802	
Kirkwall to Bergen*	Benefits JT	£0	£0	£0	£6,957	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£6,957	£19,759
	Benefits Fares	£0	£0	£0	£12,802	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£12,802	
Prestwick to Lubeck	Benefits JT	£0	£0	£945,342	£346,873	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£1,292,215	£3,122,251
	Benefits Fares	£0	£0	£1,348,130	£481,906	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£1,830,036	
Sumburgh to Oslo*	Benefits JT	£0	£40,291	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£40,291	£200,033
	Benefits Fares	£0	£159,741	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£159,741	
Glasgow to Barcelona	Benefits JT	£0	£96,435	£775,112	£918,485	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£1,790,032	£3,412,347
	Benefits Fares	£0	£90,877	£710,581	£820,857	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£1,622,315	
Dundee to Belfast	Benefits JT	£0	£0	£0	£0	£0	£20,744	£21,042	£21,344	£21,651	£21,909	£22,171	£22,436	£22,705	£22,976	£196,978	£1,250,724
	Benefits Fares	£0	£0	£0	£0	£0	£119,945	£119,219	£118,498	£117,781	£117,069	£116,360	£115,656	£114,957	£114,261	£1,053,746	
Dundee to Birmingham	Benefits JT	£0	£0	£0	£0	£0	£15,775	£15,994	£16,217	£16,442	£16,632	£16,824	£17,019	£17,216	£17,415	£149,535	£2,137,580
	Benefits Fares	£0	£0	£0	£0	£0	£226,294	£224,925	£223,564	£222,211	£220,867	£219,531	£218,202	£216,882	£215,570	£1,988,046	

Air RDF Evaluation
2002 prices

Service																				
Discount factor @	3.50%			0.965	0.931	0.899	0.867	0.837	0.808	0.779	0.752	0.726	0.700	0.676	0.652	0.629	0.607			
Service	**Airport**	**Support - total**	**Months support**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	Support PVC	Propn	Extra Costs	**PVC**
Aberdeen to Southampton	ABZ	£50,413	24	£0	£0	£18,876	£21,859	£21,094	£20,355	£19,643	£18,955	£18,292	£17,652	£17,034	£16,438	£0	£0	£190,197	1.24%	£29,313	£219,510
Edinburgh to Barcelona	EDI	£218,039	35	£0	£0	£44,786	£64,827	£62,558	£60,369	£58,256	£56,217	£54,249	£52,350	£50,518	£48,750	£0	£0	£552,880	3.59%	£85,210	£638,090
Edinburgh to Geneva	EDI	£121,637	20	£0	£0	£5,465	£47,466	£45,805	£44,202	£42,655	£41,162	£39,721	£38,331	£36,989	£35,695	£0	£0	£377,491	2.45%	£58,179	£435,671
Edinburgh to Madrid	EDI	£113,999	14	£0	£0	£0	£0	£74,955	£78,907	£76,145	£73,480	£70,908	£68,427	£66,032	£63,721	£61,490	£59,338	£693,404	4.51%	£106,868	£800,272
Edinburgh to Milan	EDI	£49,994	9	£0	£0	£0	£0	£27,891	£53,829	£51,945	£50,127	£48,372	£46,679	£45,046	£43,469	£41,948	£40,479	£449,785	2.92%	£69,321	£519,106
Edinburgh to Munich	EDI	£109,461	13	£0	£0	£0	£0	£63,415	£74,795	£78,739	£75,983	£73,323	£70,757	£68,281	£65,891	£63,585	£61,359	£696,128	4.52%	£107,288	£803,416
Edinburgh to Warsaw*	EDI	£113,933	26	£0	£0	£0	£34,200	£44,004	£42,464	£0	£0	£0	£0	£0	£0	£0	£0	£120,668	0.78%	£18,597	£139,265
Edinburgh to Zurich	EDI	£46,212	13	£0	£0	£0	£0	£29,747	£34,447	£33,241	£32,078	£30,955	£29,872	£28,826	£27,817	£26,844	£25,904	£299,732	1.95%	£46,195	£345,927
Glasgow to Berlin	GLA	£202,184	24	£0	£0	£0	£58,443	£84,597	£74,833	£78,779	£76,021	£73,361	£70,793	£68,315	£65,924	£63,617	£0	£714,682	4.65%	£110,148	£824,830
Inverness to Bristol*	INV	N/A	N/A	£0	£0	£236,538	£308,489	£286,625	£258,809	£249,751	£241,009	£232,574	£224,434	£216,579	£208,998	£0	£0	£2,463,806	16.01%	£379,724	£2,843,530
Inverness to Dublin*	INV	N/A	N/A	£0	£0	£0	£50,150	£47,590	£45,925	£44,317	£42,766	£41,269	£39,825	£38,431	£37,086	£0	£0	£387,359	2.52%	£59,700	£447,059
Inverness to East Midlands	INV	N/A	N/A	£0	£0	£0	£11,629	£144,765	£139,698	£134,808	£130,090	£125,537	£121,143	£116,903	£112,812	£108,863	£0	£1,146,248	7.45%	£176,661	£1,322,909
Inverness to Leeds/Bradford*	INV	N/A	N/A	£0	£0	£0	£23,482	£3,294	£12,523	£12,085	£11,662	£11,254	£10,860	£10,480	£10,113	£9,759	£0	£115,510	0.75%	£17,802	£133,312
Prestwick to Gdansk	PIK	£95,065	26	£0	£0	£0	£28,536	£36,717	£35,432	£34,192	£32,995	£31,840	£30,726	£29,650	£28,613	£27,611	£0	£316,311	2.06%	£48,750	£365,061
Prestwick to Pisa	PIK	£115,866	30	£0	£0	£34,707	£40,191	£29,088	£37,427	£36,117	£34,853	£33,633	£32,456	£31,320	£30,224	£0	£0	£340,013	2.21%	£52,403	£392,417
Prestwick to Riga	PIK	£64,387	15	£0	£0	£0	£7,445	£35,921	£41,596	£40,140	£38,735	£37,380	£36,071	£34,809	£33,590	£32,415	£0	£338,102	2.20%	£52,109	£390,210
Prestwick to Warsaw	PIK	£113,933	26	£0	£0	£0	£34,200	£44,004	£42,464	£40,978	£39,543	£38,159	£36,824	£35,535	£34,291	£33,091	£0	£379,089	2.46%	£58,426	£437,515
Prestwick to Wroclaw	PIK	£41,570	17	£0	£0	£0	£10,602	£24,555	£23,696	£22,867	£22,066	£21,294	£20,549	£19,829	£19,135	£18,466	£0	£203,059	1.32%	£31,296	£234,355
Sumburgh to Stansted*	LSI	N/A	N/A	£0	£0	£0	£8,760	£9,155	£9,511	£9,831	£10,117	£10,371	£10,595	£10,791	£10,960	£11,104	£0	£101,195	0.66%	£15,596	£116,791
Aberdeen to Stornoway	ABZ	N/A	N/A	£5,073	£23,014	£27,721	£28,428	£27,944	£27,121	£26,219	£25,316	£24,434	£23,580	£0	£0	£0	£0	£238,850	1.55%	£36,812	£275,662
Aberdeen to Bristol	ABZ	£95,117	25	£0	£10,629	£41,028	£32,993	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£84,651	0.55%	£13,046	£97,697
Aberdeen to Copenhagen	ABZ	£189,818	36	£0	£9,820	£56,859	£54,869	£44,124	£0	£0	£0	£0	£0	£0	£0	£0	£0	£165,671	1.08%	£25,533	£191,205
Aberdeen to Groningen	ABZ	£87,528	37	£0	£17,623	£25,510	£24,617	£9,898	£0	£0	£0	£0	£0	£0	£0	£0	£0	£77,648	0.50%	£11,967	£89,616
Edinburgh to Cologne	EDI	£68,695	8	£66,290	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£66,290	0.43%	£10,217	£76,507
Edinburgh to New York	EDI	£1,088,808	37	£0	£191,824	£317,331	£306,225	£147,753	£0	£0	£0	£0	£0	£0	£0	£0	£0	£963,133	6.26%	£148,439	£1,111,572
Glasgow to Dubai	GLA	£1,705,392	37	£0	£386,295	£497,034	£479,637	£154,283	£0	£0	£0	£0	£0	£0	£0	£0	£0	£1,517,250	9.86%	£233,840	£1,751,090
Prestwick to Bergamo	PIK	£166,594	37	£0	£50,315	£48,554	£46,854	£3,768	£0	£0	£0	£0	£0	£0	£0	£0	£0	£149,490	0.97%	£23,040	£172,530
Prestwick to Gothenburg	PIK	£131,305	37	£10,274	£39,657	£38,269	£30,774	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£118,974	0.77%	£18,336	£137,310
Prestwick to Dusseldorf	PIK	£109,897	34	£0	£6,020	£34,855	£33,635	£21,639	£0	£0	£0	£0	£0	£0	£0	£0	£0	£96,149	0.62%	£14,819	£110,968
Prestwick to Girona	PIK	£168,481	37	£35,153	£50,884	£49,103	£19,744	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£154,885	1.01%	£23,871	£178,756
Prestwick to Rome	PIK	£161,734	37	£0	£36,635	£47,137	£45,487	£14,632	£0	£0	£0	£0	£0	£0	£0	£0	£0	£143,892	0.94%	£22,177	£166,068
Prestwick to Stockholm	PIK	£147,206	37	£34,554	£44,459	£42,903	£13,800	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£135,716	0.88%	£20,917	£156,632
Aberdeen to Blackpool	ABZ	£4,543	3	£0	£0	£4,082	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£4,082	0.03%	£629	£4,712
Aberdeen to Kristiansand	ABZ	£3,273	8	£0	£0	£0	£0	£2,739	£0	£0	£0	£0	£0	£0	£0	£0	£0	£2,739	0.02%	£422	£3,161
Aberdeen to Liverpool	ABZ	£77,263	13	£0	£0	£0	£15,462	£49,735	£0	£0	£0	£0	£0	£0	£0	£0	£0	£65,197	0.42%	£10,048	£75,245
Aberdeen to Oslo*	ABZ	N/A	N/A	£48,573	£47,541	£41,969	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£138,083	0.90%	£21,282	£159,365
Edinburgh to Atlanta	EDI	£453,816	17	£0	£0	£0	£162,046	£223,392	£0	£0	£0	£0	£0	£0	£0	£0	£0	£385,438	2.51%	£59,404	£444,842
Edinburgh to Geneva	EDI	£28,301	6	£9,104	£17,570	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£26,674	0.17%	£4,111	£30,784
Edinburgh to Jersey*	EDI	N/A	N/A	£33,876	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£33,876	0.22%	£5,221	£39,097
Edinburgh to Milan	EDI	£12,276	6	£3,949	£7,621	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£11,570	0.08%	£1,783	£13,353
Edinburgh to Munich	EDI	£3,949	2	£0	£3,677	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£3,677	0.02%	£567	£4,244
Edinburgh to Oslo	EDI	£16,209	6	£5,214	£10,063	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£15,276	0.10%	£2,354	£17,631
Edinburgh to Zurich	EDI	£15,224	6	£4,897	£9,451	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£14,348	0.09%	£2,211	£16,560
Glasgow to Prague	GLA	£44,753	11	£0	£11,366	£29,248	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£40,614	0.26%	£6,259	£46,873
Inverness to Stockholm*	INV	N/A	N/A	£0	£101,954	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£101,954	0.66%	£15,713	£117,668
Inverness to Newcastle*	INV	N/A	N/A	£0	£34,455	£33,249	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£67,705	0.44%	£10,435	£78,139
Kirkwall to Bergen*	KOI	N/A	N/A	£1,281	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£1,281	0.01%	£197	£1,478
Prestwick to Lubeck	PIK	£51,840	17	£0	£0	£27,403	£18,511	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£45,914	0.30%	£7,076	£52,990
Sumburgh to Oslo*	LSI	N/A	N/A	£4,623	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£4,623	0.03%	£713	£5,336
Glasgow to Barcelona	GLA			£0	£17,012	£100,156	£121,457	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£238,625	1.55%	£36,777	£275,403
Dundee to Belfast	DND			£0	£0	£0	£0	£0	£41,572	£40,117	£38,713	£0	£0	£0	£0	£0	£0	£120,402	0.78%	£18,557	£138,959
Dundee to Birmingham	DND			£0	£0	£0	£0	£0	£91,459	£88,258	£85,169	£0	£0	£0	£0	£0	£0	£264,885	1.72%	£40,824	£305,709
																	Total Support PVC =	£15,385,221			

Consultants	Undiscount	£298,558	£274,203	£301,896	£301,543	£222,323	£98,512	£20,000	£25,000	£0	£0	£0	£0	£0	£0			
	Discountec	£288,108	£255,345	£271,293	£261,492	£186,046	£79,552	£15,586	£18,800	£0	£0	£0	£0	£0	£0	£1,376,223		
Marketting	Undiscount	£629,743	£36,604	£7,627	£4,311	£6,372	£0	£0	£0	£0	£0	£0	£0	£0	£0			
	Discountec	£607,702	£34,087	£6,854	£3,738	£5,332	£0	£0	£0	£0	£0	£0	£0	£0	£0	£657,713		
SEnt Staff	Undiscount	£138,804	£31,152	£26,154	£26,664	£12,790	£2,202	£1,656	£966	£0	£0	£0	£0	£0	£0			
	Discountec	£133,946	£29,010	£23,503	£23,122	£10,703	£1,778	£1,290	£726	£0	£0	£0	£0	£0	£0	£224,079		
SGovt Staff	Undiscount	£7,874	£8,087	£8,891	£8,891	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0			
	Discountec	£7,599	£7,530	£7,990	£7,710	£0	£0	£0	£0	£0	£0	£0	£0	£0	£0	£30,829		
VisitScotland Staff	Undiscount	£50,425	£5,991	£5,991	£5,991	£5,991	£5,991	£5,991	£3,994	£0	£0	£0	£0	£0	£0			
	Discountec	£48,660	£5,579	£5,384	£5,195	£5,013	£4,838	£4,669	£3,004	£0	£0	£0	£0	£0	£0	£82,342		
Total Extra Costs	Discountec	£1,086,015	£331,550	£315,024	£301,258	£207,095	£86,169	£21,545	£22,530	£0	£0	£0	£0	£0	£0	£2,371,185		

Air RDF Evaluation

Transport Economic Efficiency (TEE) Appraisal Results - 2002 prices

Service	Airport	Status	Present Value Benefits (PVB)	Present Value Costs (PVC)	Net Present Value (NPV)	Benefit-to-Cost Ratio (BCR)
Dundee to Belfast	DND	Current RDF	£1,250,724	£138,959	£1,111,766	9.0
Dundee to Birmingham	DND	Current RDF	£2,137,580	£305,709	£1,831,871	7.0
Edinburgh to Milan	EDI	Current RDF	£27,702,782	£519,106	£27,183,676	53.4
Edinburgh to Munich	EDI	Current RDF	£30,817,819	£803,416	£30,014,403	38.4
Edinburgh to Zurich	EDI	Current RDF	£3,134,387	£345,927	£2,788,460	9.1
Edinburgh to Madrid	EDI	Current RDF	£14,348,466	£800,272	£13,548,194	17.9
Prestwick to Riga	PIK	Op post RDF	£8,161,926	£390,210	£7,771,715	20.9
Glasgow to Berlin	GLA	Op post RDF	£27,313,377	£824,830	£26,488,547	33.1
Prestwick to Warsaw	PIK	Op post RDF	£10,533,845	£437,515	£10,096,330	24.1
Prestwick to Wroclaw	PIK	Op post RDF	£18,557,911	£234,355	£18,323,557	79.2
Prestwick to Gdansk	PIK	Op post RDF	£13,793,200	£365,061	£13,428,139	37.8
Edinburgh to Geneva	EDI	Op post RDF	£16,414,824	£435,671	£15,979,154	37.7
Aberdeen to Stornoway	ABZ	Op post RDF	£11,960,953	£275,662	£11,685,291	43.4
Inverness to Bristol	INV	Op post RDF	£30,462,486	£2,843,530	£27,618,956	10.7
Edinburgh to Barcelona	EDI	Op post RDF	£7,468,480	£638,090	£6,830,390	11.7
Glasgow to Barcelona	GLA	Op post RDF	£3,412,347	£275,403	£3,136,944	12.4
Aberdeen to Southampton	ABZ	Op post RDF	£2,982,628	£219,510	£2,763,118	13.6
Aberdeen to Bristol	ABZ	Op post RDF	£1,519,128	£97,697	£1,421,431	15.5
Aberdeen to Copenhagen	ABZ	Op post RDF	£5,307,659	£191,205	£5,116,454	27.8
Edinburgh to New York	EDI	Op post RDF	£21,795,507	£1,111,572	£20,683,935	19.6
Aberdeen to Groningen	ABZ	Op post RDF	£2,627,284	£89,616	£2,537,668	29.3
Glasgow to Dubai	GLA	Op post RDF	£32,116,017	£1,751,090	£30,364,927	18.3
Prestwick to Bergamo	PIK	Op post RDF	£5,630,219	£172,530	£5,457,689	32.6
Prestwick to Gothenburg	PIK	Op post RDF	£4,626,918	£137,310	£4,489,608	33.7
Prestwick to Girona	PIK	Op post RDF	£13,849,759	£178,756	£13,671,003	77.5
Edinburgh to Cologne	EDI	Op post RDF	£8,214,759	£76,507	£8,138,252	107.4
Prestwick to Pisa	PIK	Op post RDF	£18,000,352	£392,417	£17,607,935	45.9
Prestwick to Rome	PIK	Op post RDF	£18,988,885	£166,068	£18,822,817	114.3
Prestwick to Stockholm	PIK	Op post RDF	£26,098,509	£156,632	£25,941,877	166.6
Inverness to Dublin	INV	Stopped	£1,869,472	£447,059	£1,422,413	4.2
Inverness to East Midlands	INV	Stopped	£6,513,146	£1,322,909	£5,190,237	4.9
Inverness to Leeds/Bradford	INV	Stopped	£1,075,851	£133,312	£942,539	8.1
Sumburgh to Stansted	LSI	Stopped	£1,087,297	£116,791	£970,506	9.3
Aberdeen to Kristiansand	ABZ	Stopped	£86,003	£3,161	£82,842	27.2
Aberdeen to Liverpool	ABZ	Stopped	£704,064	£75,245	£628,819	9.4
Inverness to Newcastle	INV	Stopped	£58,715	£78,139	-£19,424	0.8
Sumburgh to Oslo	LSI	Stopped	£200,033	£5,336	£194,697	37.5
Edinburgh to Atlanta	EDI	Stopped	£3,784,090	£444,842	£3,339,248	8.5
Edinburgh to Warsaw	EDI	Stopped	£7,075,735	£139,265	£6,936,469	50.8
Aberdeen to Blackpool	ABZ	Stopped	£4,341	£4,712	-£371	0.9
Prestwick to Lubeck	PIK	Stopped	£3,122,251	£52,990	£3,069,261	58.9
Aberdeen to Oslo	ABZ	Stopped	£2,389,157	£159,365	£2,229,792	15.0
Prestwick to Dusseldorf	PIK	Stopped	£4,450,437	£110,968	£4,339,470	40.1
Glasgow to Prague	GLA	Stopped	£725,564	£46,873	£678,691	15.5
Inverness to Stockholm	INV	Stopped	£182,086	£117,668	£64,418	1.5
Edinburgh to Munich	EDI	Stopped	£23,609	£4,244	£19,365	5.6
Edinburgh to Geneva	EDI	Stopped	£262,353	£30,784	£231,568	8.5
Edinburgh to Jersey	EDI	Stopped	£502,352	£39,097	£463,255	12.8
Edinburgh to Milan	EDI	Stopped	£186,485	£13,353	£173,132	14.0
Edinburgh to Oslo	EDI	Stopped	£488,605	£17,631	£470,974	27.7
Edinburgh to Zurich	EDI	Stopped	£165,433	£16,560	£148,873	10.0
Kirkwall to Bergen	KOI	Stopped	£19,759	£1,478	£18,281	13.4
			£424,205,567	**£17,756,406**	**£406,449,160**	**23.9**

Appendix C

Gross Value Added (GVA) Appraisal

Additionality Calculator A (for sample survey data)

Version: AMcP/SEL/Jun07/5.1

Enter Project Name	Air Routes Development Fund (RDF) Evaluation Study	Project Reference	All Services Combined

Additionality Calculation

			Area of Benefit		
Intervention Option			Local	Scotland	
Gross Impact	GI	*Enter gross impacts e.g. 25 (jobs); £1m (turnover)*		406,449,160	**Enter Explanation**
Leakage	L	*Enter levels of leakage e.g. 25%*		44%	Sourced from Passenger and Business Surveys
Displacement	Dp	*Enter levels of displacement e.g. 10%*		14%	Sourced from Passenger and Business Surveys
Substitution	S	*Enter level of substitution e.g. 15%*		72%	Sourced from Passenger and Business Surveys
Multiplier	M	*Enter multipliers e.g 1.32, 1.64*		1.5	Sourced from Scottish Govt I/O Tables and weighted by samples
Reference Case					
Deadweight		*Enter level of deadweight e.g. 35%*		40%	Liklihood of making trip anyway (from surveys)
Leakage	L*	*Enter Different Reference Case Values if Required*	0%	44%	
Displacement	Dp*		0%	14%	
Substitution	S*		0%	72%	
Multiplier	M*		0.00	1.50	
Sampling Error		*Enter margin of error from sample survey e.g. 5%*		5%	Confidence Level from Sample Surveys
Additionality	AI				
Lower Limit of Range		(e.g. jobs or turnover)	**0**	**46,861,572**	
Upper Limit of Range			**0**	**51,794,369**	

Air RDF Evaluation

Gross Value Added (GVA) Estimate Results - 2002 prices

Service	Airport	Status	NPV Props	GVA (2002 prices) Lower	Upper
Dundee to Belfast	DND	Current RDF	0.3%	£128,181	£141,674
Dundee to Birmingham	DND	Current RDF	0.5%	£211,206	£233,438
Edinburgh to Milan	EDI	Current RDF	6.7%	£3,134,143	£3,464,053
Edinburgh to Munich	EDI	Current RDF	7.4%	£3,460,512	£3,824,776
Edinburgh to Zurich	EDI	Current RDF	0.7%	£321,496	£355,337
Edinburgh to Madrid	EDI	Current RDF	3.3%	£1,562,040	£1,726,465
Prestwick to Riga	PIK	Current RDF	1.9%	£896,040	£990,360
Glasgow to Berlin	GLA	Current RDF	6.5%	£3,053,998	£3,375,472
Prestwick to Warsaw	PIK	Current RDF	2.5%	£1,164,057	£1,286,589
Prestwick to Wroclaw	PIK	Current RDF	4.5%	£2,112,615	£2,334,996
Prestwick to Gdansk	PIK	Current RDF	3.3%	£1,548,198	£1,711,166
Edinburgh to Geneva	EDI	Current RDF	3.9%	£1,842,317	£2,036,245
Aberdeen to Stornoway	ABZ	Current RDF	2.9%	£1,347,256	£1,489,073
Inverness to Bristol	INV	Current RDF	6.8%	£3,184,329	£3,519,521
Edinburgh to Barcelona	EDI	Current RDF	1.7%	£787,510	£870,406
Glasgow to Barcelona	GLA	Op post RDF	0.8%	£361,674	£399,745
Aberdeen to Southampton	ABZ	Current RDF	0.7%	£318,574	£352,108
Aberdeen to Bristol	ABZ	Op post RDF	0.3%	£163,884	£181,135
Aberdeen to Copenhagen	ABZ	Op post RDF	1.3%	£589,902	£651,997
Edinburgh to New York	EDI	Op post RDF	5.1%	£2,384,755	£2,635,782
Aberdeen to Groningen	ABZ	Op post RDF	0.6%	£292,581	£323,379
Glasgow to Dubai	GLA	Op post RDF	7.5%	£3,500,925	£3,869,444
Prestwick to Bergamo	PIK	Op post RDF	1.3%	£629,244	£695,481
Prestwick to Gothenburg	PIK	Op post RDF	1.1%	£517,630	£572,117
Prestwick to Girona	PIK	Op post RDF	3.4%	£1,576,199	£1,742,115
Edinburgh to Cologne	EDI	Op post RDF	2.0%	£938,300	£1,037,068
Prestwick to Pisa	PIK	Current RDF	4.3%	£2,030,108	£2,243,803
Prestwick to Rome	PIK	Op post RDF	4.6%	£2,170,177	£2,398,617
Prestwick to Stockholm	PIK	Op post RDF	6.4%	£2,990,970	£3,305,809
Inverness to Dublin	INV	Current RDF	0.3%	£163,997	£181,260
Inverness to East Midlands	INV	Current RDF	1.3%	£598,409	£661,399
Inverness to Leeds/Bradford	INV	Current RDF	0.2%	£108,670	£120,109
Sumburgh to Stansted	LSI	Current RDF	0.2%	£111,894	£123,673
Aberdeen to Kristiansand	ABZ	Stopped	0.0%	£9,551	£10,557
Aberdeen to Liverpool	ABZ	Stopped	0.2%	£72,500	£80,131
Inverness to Newcastle	INV	Stopped	0.0%	-£2,240	-£2,475
Sumburgh to Oslo	LSI	Stopped	0.0%	£22,448	£24,810
Edinburgh to Atlanta	EDI	Stopped	0.8%	£384,999	£425,525
Edinburgh to Warsaw	EDI	Stopped	1.7%	£799,740	£883,924
Aberdeen to Blackpool	ABZ	Stopped	0.0%	-£43	-£47
Prestwick to Lubeck	PIK	Stopped	0.8%	£353,871	£391,120
Aberdeen to Oslo	ABZ	Stopped	0.5%	£257,084	£284,145
Prestwick to Dusseldorf	PIK	Op post RDF	1.1%	£500,319	£552,985
Glasgow to Prague	GLA	Stopped	0.2%	£78,250	£86,486
Inverness to Stockholm	INV	Stopped	0.0%	£7,427	£8,209
Edinburgh to Munich	EDI	Stopped	0.0%	£2,233	£2,468
Edinburgh to Geneva	EDI	Stopped	0.1%	£26,699	£29,509
Edinburgh to Jersey	EDI	Stopped	0.1%	£53,411	£59,033
Edinburgh to Milan	EDI	Stopped	0.0%	£19,961	£22,062
Edinburgh to Oslo	EDI	Stopped	0.1%	£54,301	£60,017
Edinburgh to Zurich	EDI	Stopped	0.0%	£17,164	£18,971
Kirkwall to Bergen	KOI	Stopped	0.0%	£2,108	£2,330
				£46,861,572	**£51,794,369**

Appendix D

Business & Tourism Expenditure Estimates

Business Trip Spend Calculation	Spend per trip	Total Trips	Total Spend	Deadweight	Adjusted Business Trips	Adjusted total spend	Annual total cost savings	Net Spend in Scotland
Scottish Businesses	£634	141,172	£89,491,286	74%	36,987	£23,446,717	£6,800,501	£7,794,378
Non_Scottish Businesses	£859	95,480	£82,048,790	64%	34,373	£29,537,564	£5,096,970	
Tourist Trip Spend Calculation								
Scottish Tourist and Leisure Trips	£517	451,608	£233,260,052	33%	302,578	£156,284,235		£19,904,536
Non-Scottish Tourist and Leisure Trips	£622	329,374	£204,870,664	14%	283,262	£176,188,771		

Estimated impact of flight on non-Scottish Business annual cost savings					Cost savings
	>25%	25%	9%	8,680	£1,864,745
	10% - 25%	17.5%	17%	15,913	£2,393,090
	5% - 10%	7.5%	11%	10,127	£652,661
	<5%	2.5%	9%	8,680	£186,475
	0%	0%	55%	52,080	£0
				95,480	£5,096,970
Estimated impact of flight on Scottish Business annual cost savings					Cost savings
	>25%	25%	16%	22,088	£3,500,509
	10% - 25%	17.5%	15%	24,705	£2,740,671
	5% - 10%	7.5%	10%	10,588	£503,388
	<5%	2.5%	8%	3,529	£55,932
	0%	0%	52%	-	£0
				60,910	£6,800,501

Assumption that costs savings to Scottish businesses are spent in and therefore benefits accrue to Scotland

Appendix E

Environmental Carbon Emission Estimates

Service	Airport	Operator	LTO CO2 Emmission in kg/LTO (a)	LTO CO2 Tonnes (b) = [(a)/1000]	Frequency per week (c)	LTO Tons CO2 per year (d) =(b)*2*(c)*52	No. Years of Service (e)	Total LTO Tons CO2 (f) = (d)*(e)	Route Distance Kms (g)	Fuel consumption rate (kg/km) (h)	Cruising CO2 Emmissions (tons) (i) = (e) * (g) * ((h)/1000) * (c) * 52* 2 * 3.15		Grand Total Tons CO2 (k) = (f) + (i)
Aberdeen to Southampton	ABZ	Eastern	478	0.478	5	249	10	2,486	694	0.5	5,684		8,169
Dundee to Belfast	DND	Loganair	378	0.378	4	157	10	1,572	284	0.5	1,861		3,433
Dundee to Birmingham	DND	Loganair	378	0.378	4	157	10	1,572	454	0.5	2,975		4,547
Edinburgh to Barcelona	EDI	FlyGlobespan	2,600	2.600	3	811	10	8,112	1665	3.062	50,105		58,217
Edinburgh to Geneva	EDI	EasyJet	2,527	2.527	1	263	10	2,628	1263	3.062	12,669		15,297
Edinburgh to Madrid	EDI	EasyJet	2,487	2.487	6	1,552	10	15,519	1729	3.062	104,063		119,582
Edinburgh to Milan	EDI	EasyJet	2,487	2.487	6	1,552	10	15,519	1451	3.062	87,331		102,850
Edinburgh to Munich	EDI	EasyJet	2,487	2.487	5	1,293	10	12,932	1326	3.062	66,506		79,439
Edinburgh to Zurich	EDI	bmi	570	0.570	5	296	10	2,964	1251	3.062	62,745		65,709
Glasgow to Berlin	GLA	EasyJet	2,527	2.527	1	263	10	2,628	1202	3.062	12,057		14,685
Inverness to Bristol	INV	EasyJet	2,596	2.596	3	810	10	8,100	677	3.359	22,349		30,449
Inverness to Dublin	INV	Aer Arann	478	0.478	1	50	10	497	467	0.5	765		1,262
Inverness to East Midlands	INV	Ryanair	2,596	2.596	3	810	10	8,100	552	3.359	18,223		26,322
Inverness to Leeds/Bradford	INV	Eastern	196	0.196	4	82	10	815	440	3.359	19,367		20,183
Prestwick to Gdansk	PIK	Wizz Air	2,527	2.527	2	526	10	5,256	1485	3.062	29,792		35,049
Prestwick to Pisa	PIK	Ryanair	2,596	2.596	3	810	10	8,100	1689	3.062	50,828		58,927
Prestwick to Riga	PIK	Ryanair	2,527	2.527	2	526	10	5,256	1769	3.062	35,490		40,746
Prestwick to Warsaw	PIK	Wizz Air	2,527	2.527	4	1,051	10	10,512	1706	3.062	68,452		78,965
Prestwick to Wroclaw	PIK	Ryanair	2,596	2.596	2	540	10	5,400	1511	3.062	30,314		35,714
Sumburgh to Stansted	LSI	Airways	740	0.740	5	385	10	3,848	955	0.5	7,821		11,669
Aberdeen to Stornoway	ABZ	Eastern	238	0.238	5	124	10	1,238	270	0.5	2,211		3,449
Aberdeen to Bristol	ABZ	Eastern	478	0.478	5	249	10	2,486	632	0.5	5,176		7,662
Aberdeen to Copenhagen	ABZ	SAS	2,527	2.527	5	1,314	10	13,140	916	3.359	50,399		63,539
Aberdeen to Groningen	ABZ	bmi	2,527	2.527	5	1,314	10	13,140	700	3.359	38,514		51,655
Edinburgh to Cologne	EDI	Germanwings	2,527	2.527	7	1,840	10	18,397	871	3.359	67,092		85,488
Edinburgh to New York	EDI	Continental	6,077	6.077	7	4,424	10	44,241	5240	8.3	997,359		1,041,599
Glasgow to Dubai	GLA	Emirates	6,077	6.077	7	4,424	10	44,241	5819	8.3	1,107,563		1,151,803
Prestwick to Bergamo	PIK	Ryanair	2,527	2.527	4	1,051	10	10,512	1480	3.062	59,384		69,897
Prestwick to Gothenburg	PIK	Ryanair	2,527	2.527	3	788	10	7,884	1041	3.062	31,327		39,211
Prestwick to Dusseldorf	PIK	Ryanair	2,527	2.527	4	1,051	10	10,512	890	3.359	39,175		49,687
Prestwick to Girona	PIK	Ryanair	2,596	2.596	7	1,890	10	18,899	1594	3.062	111,927		130,826
Prestwick to Rome	PIK	Ryanair	2,596	2.596	1	270	10	2,700	1952	3.062	19,581		22,281
Prestwick to Stockholm (Skavsta)	PIK	Ryanair	2,527	2.527	5	1,314	10	13,140	1414	3.062	70,920		84,060
Aberdeen to Blackpool	ABZ	CityStar	394	0.394	5	205	1	205	373	0.5	305		510
Aberdeen to Kristiansand	ABZ	bmi	2,527	2.527	6	1,577	1	1,577	611	3.359	4,034		5,611
Aberdeen to Liverpool	ABZ	Ryanair	478	0.478	7	348	2	696	417	0.5	956		1,652
Aberdeen to Oslo	ABZ	CityStar	2,527	2.527	3	788	3	2,365	805	3.359	7,972		10,338
Edinburgh to Atlanta	EDI	Delta	6,077	6.077	7	4,424	2	8,848	6432	8.3	244,848		253,696
Edinburgh to Geneva	EDI	Duo	2,527	2.527	1	263	2	526	1263	3.062	2,534		3,059
Edinburgh to Jersey	EDI	bmi	478	0.478	7	348	1	348	752	3.359	5,793		6,141
Edinburgh to Milan	EDI	Duo	2,487	2.487	6	1,552	2	3,104	1451	3.062	17,466		20,570
Edinburgh to Munich	EDI	Duo	2,487	2.487	5	1,293	1	1,293	1326	3.062	6,651		7,944
Edinburgh to Oslo	EDI	Duo	2,487	2.487	7	1,811	2	3,621	931	3.359	14,343		17,964
Edinburgh to Warsaw	EDI	Central Wings	2,527	2.527	2	526	2	1,051	1627	3.062	6,528		7,579
Edinburgh to Zurich	EDI	Duo	570	0.570	5	296	2	593	1251	0.5	2,049		2,642
Glasgow to Barcelona	GLA	FlyGlobespan	2,600	2.600	3	811	3	2,434	1666	3.062	15,041		17,474
Glasgow to Prague	GLA	CSA	2,600	2.600	7	1,893	2	3,786	1400	3.062	19,661		23,447
Inverness to Stockholm	INV	Snowflake	2,527	2.527	2	526	1	526	1307	3.062	2,622		3,148
Inverness to Newcastle	INV	Snowflake	196	0.196	6	122	1	122	319	3.359	2,106		2,228
Kirkwall to Bergen	KOI	Loganair	740	0.740	1	77	1	77	490	0.5	80		157
Prestwick to Lubeck	PIK	Ryanair	2,596	2.596	7	1,890	2	3,780	998	3.359	15,375		19,155
Sumburgh to Oslo	LSI	Duo	740	0.740	2	154	1	154	670	0.5	219		373
											Total =		***4,016,060***

Service	Airport	Operator	CO2 Tons	Total Pax	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Aberdeen to Southampton	ABZ	Eastern	8,169	4			817	817	817	817	817	817	817	817	817	817			
Dundee to Belfast	DND	Loganair	3,433	1						343	343	343	343	343	343	343	343	343	343
Dundee to Birmingham	DND	Loganair	4,547	1						455	455	455	455	455	455	455	455	455	455
Edinburgh to Barcelona	EDI	Flyglobespan	58,217	4			5,822	5,822	5,822	5,822	5,822	5,822	5,822	5,822	5,822	5,822			
Edinburgh to Geneva	EDI	EasyJet	15,297	3				1,530	1,530	1,530	1,530	1,530	1,530	1,530	1,530	1,530	1,530		
Edinburgh to Madrid	EDI	EasyJet	119,582	1						11,958	11,958	11,958	11,958	11,958	11,958	11,958	11,958	11,958	11,958
Edinburgh to Milan	EDI	EasyJet	102,850	1						10,285	10,285	10,285	10,285	10,285	10,285	10,285	10,285	10,285	10,285
Edinburgh to Munich	EDI	EasyJet	79,439	2					7,944	7,944	7,944	7,944	7,944	7,944	7,944	7,944	7,944	7,944	
Edinburgh to Zurich	EDI	bmi	65,709	2					6,571	6,571	6,571	6,571	6,571	6,571	6,571	6,571	6,571	6,571	
Glasgow to Berlin	GLA	EasyJet	14,585	3				1,469	1,469	1,469	1,469	1,469	1,469	1,469	1,469	1,469	1,469		
Inverness to Bristol	INV	EasyJet	30,449	4			3,045	3,045	3,045	3,045	3,045	3,045	3,045	3,045	3,045	3,045			
Inverness to Dublin	INV	Aer Arann	1,282	3				126	126	126	126	126	126	126	126	126	126		
Inverness to East Midlands	INV	Ryanair	26,322	3				2,632	2,632	2,632	2,632	2,632	2,632	2,632	2,632	2,632	2,632		
Inverness to Leeds/Bradford	INV	Eastern	20,183	3				2,018	2,018	2,018	2,018	2,018	2,018	2,018	2,018	2,018	2,018		
Prestwick to Gdansk	PIK	Wizz Air	35,049	3				3,505	3,505	3,505	3,505	3,505	3,505	3,505	3,505	3,505	3,505		
Prestwick to Pisa	PIK	Ryanair	58,927	5		5,893	5,893	5,893	5,893	5,893	5,893	5,893	5,893	5,893	5,893	5,893			
Prestwick to Riga	PIK	Ryanair	40,746	3				4,075	4,075	4,075	4,075	4,075	4,075	4,075	4,075	4,075	4,075		
Prestwick to Warsaw	PIK	Wizz Air	78,965	3				7,896	7,896	7,896	7,896	7,896	7,896	7,896	7,896	7,896	7,896		
Prestwick to Wroclaw	PIK	Ryanair	35,714	3				3,571	3,571	3,571	3,571	3,571	3,571	3,571	3,571	3,571	3,571		
Sumburgh to Stansted	LSI	Atlantic Airways	11,669	3				1,167	1,167	1,167	1,167	1,167	1,167	1,167	1,167	1,167	1,167		
Aberdeen to Stornoway	ABZ	Eastern	3,449	4			345	345	345	345	345	345	345	345	345	345			
Aberdeen to Bristol	ABZ	Eastern	7,892	5			766	766	766	766	766	766	766	766	766	766			
Aberdeen to Copenhagen	ABZ	SAS	63,539	5		6,354	6,354	6,354	6,354	6,354	6,354	6,354	6,354	6,354	6,354	6,354			
Aberdeen to Groningen	ABZ	bmi	51,655	5		5,165	5,165	5,165	5,165	5,165	5,165	5,165	5,165	5,165	5,165	5,165			
Edinburgh to Cologne	EDI	Germanwings	85,488	6	8,549	8,549	8,549	8,549	8,549	8,549	8,549	8,549	8,549	8,549	8,549				
Edinburgh to New York	EDI	Continental	1,041,599	5		104,160	104,160	104,160	104,160	104,160	104,160	104,160	104,160	104,160	104,160	104,160			
Glasgow to Dubai	GLA	Emirates	1,151,803	5		115,180	115,180	115,180	115,180	115,180	115,180	115,180	115,180	115,180	115,180	115,180			
Prestwick to Bergamo	PIK	Ryanair	69,897	6	6,990	6,990	6,990	6,990	6,990	6,990	6,990	6,990	6,990	6,990	6,990				
Prestwick to Gothenburg	PIK	Ryanair	39,211	6	3,921	3,921	3,921	3,921	3,921	3,921	3,921	3,921	3,921	3,921	3,921				
Prestwick to Dusseldorf	PIK	Ryanair	49,587	5		4,969	4,969	4,969	4,969	4,969	4,969	4,969	4,969	4,969	4,969				
Prestwick to Girona	PIK	Ryanair	130,826	6	13,083	13,083	13,083	13,083	13,083	13,083	13,083	13,083	13,083	13,083	13,083				
Prestwick to Rome	PIK	Ryanair	22,281	5		2,228	2,228	2,228	2,228	2,228	2,228	2,228	2,228	2,228	2,228	2,228			
Prestwick to Stockholm (Skavsta)	PIK	Ryanair	84,060	6	8,406	8,406	8,406	8,406	8,406	8,406	8,406	8,406	8,406	8,406	8,406				
Aberdeen to Blackpool	ABZ	Citystar	510	1			510												
Aberdeen to Kristiansand	ABZ	bmi	5,611	1				5,611											
Aberdeen to Liverpool	ABZ	Ryanair	1,652	2				826	826										
Aberdeen to Oslo	ABZ	Citystar	10,338	3			3,446	3,446	3,446										
Edinburgh to Atlanta	EDI	Delta	253,696	2				126,848	126,848										
Edinburgh to Geneva	EDI	Duo	3,059	2	1,530	1,530													
Edinburgh to Jersey	EDI	bmi	6,141	1	6,141														
Edinburgh to Milan	EDI	Duo	20,570	2	10,285	10,285													
Edinburgh to Munich	EDI	Duo	7,944	1		7,944													
Edinburgh to Oslo	EDI	Duo	17,964	2	8,982	8,982													
Edinburgh to Warsaw	EDI	Central Wings	7,579	2				3,790	3,790										
Edinburgh to Zurich	EDI	Duo	2,642	2	1,321	1,321													
Glasgow to Barcelona	GLA	Flyglobespan	17,474	3			5,825	5,825	5,825										
Glasgow to Prague	GLA	CSA	23,447	2		11,723	11,723												
Inverness to Stockholm	INV	Showflake	3,148	1		3,148													
Inverness to Newcastle	INV	Showflake	2,228	1				2,228											
Kirkwall to Bergen	KOI	Loganair	157	1	157														
Prestwick to Lubeck	PIK	Ryanair	19,155	2		9,577	9,577												
Sumburgh to Oslo	LSI	Duo	373	1		373													
			4,016,060	***156***	***69,364***	***340,547***	***326,774***	***472,255***	***478,930***	***361,237***									

			Discount Factor	0.96618	0.93351	0.90194	0.87144	0.84197	0.81350	0.78599	0.75941	0.73373	0.70892	0.68495	0.66178	0.63940	0.61778	0.59689	
Service	Airport	Operator		2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Total Cost
Aberdeen to Southampton	ABZ	Eastern		£0.00	£0.00	£15,820.15	£15,285.17	£14,768.28	£14,268.87	£13,786.35	£13,320.15	£12,869.71	£12,434.50	£12,014.01	£11,607.74	£0.00	£0.00	£0.00	£136,175
Dundee to Belfast	DND	Loganair		£0.00	£0.00	£0.00	£0.00	£0.00	£5,996.55	£5,793.77	£5,597.84	£5,408.55	£5,225.65	£5,048.93	£4,878.20	£4,713.23	£4,553.85	£4,399.85	£51,616
Dundee to Birmingham	DND	Loganair		£0.00	£0.00	£0.00	£0.00	£0.00	£7,942.00	£7,673.43	£7,413.94	£7,163.23	£6,920.99	£6,686.95	£6,460.82	£6,242.34	£6,031.24	£5,827.29	£68,362
Edinburgh to Barcelona	EDI	Flyglobespan		£0.00	£0.00	£112,737.97	£108,925.58	£105,242.10	£101,683.19	£98,244.63	£94,922.35	£91,712.41	£88,611.03	£85,614.52	£82,719.34	£0.00	£0.00	£0.00	£970,413
Edinburgh to Geneva	EDI	EasyJet		£0.00	£0.00	£0.00	£28,621.60	£27,653.72	£26,718.57	£25,815.04	£24,942.07	£24,098.62	£23,283.69	£22,496.32	£21,735.57	£21,000.56	£0.00	£0.00	£246,366
Edinburgh to Madrid	EDI	EasyJet		£0.00	£0.00	£0.00	£0.00	£0.00	£208,862.67	£201,799.68	£194,975.54	£188,382.16	£182,011.75	£175,856.76	£169,909.92	£164,164.17	£158,612.72	£153,249.01	£1,797,824
Edinburgh to Milan	EDI	EasyJet		£0.00	£0.00	£0.00	£0.00	£0.00	£179,638.55	£173,563.81	£167,694.51	£162,023.68	£156,544.62	£151,250.84	£146,136.07	£141,194.27	£136,419.59	£131,806.37	£1,546,272
Edinburgh to Munich	EDI	EasyJet		£0.00	£0.00	£0.00	£0.00	£143,604.70	£138,748.50	£134,056.53	£129,523.21	£125,143.20	£120,911.31	£116,822.52	£112,872.00	£109,055.07	£105,367.22	£0.00	£1,236,104
Edinburgh to Zurich	EDI	bmi		£0.00	£0.00	£0.00	£0.00	£118,784.27	£114,767.41	£110,886.39	£107,136.61	£103,513.63	£100,013.17	£96,631.08	£93,363.36	£90,206.15	£87,155.70	£0.00	£1,022,458
Glasgow to Berlin	GLA	EasyJet		£0.00	£0.00	£0.00	£27,476.73	£26,547.57	£25,649.82	£24,782.44	£23,944.38	£23,134.67	£22,352.34	£21,596.46	£20,866.15	£20,160.53	£0.00	£0.00	£236,511
Inverness to Bristol	INV	EasyJet		£0.00	£0.00	£58,964.11	£56,970.16	£55,043.63	£53,182.25	£51,383.82	£49,646.20	£47,967.34	£46,345.26	£44,778.03	£43,263.80	£0.00	£0.00	£0.00	£507,545
Inverness to Dublin	INV	Aer Arann		£0.00	£0.00	£0.00	£2,361.34	£2,281.49	£2,204.34	£2,129.80	£2,057.77	£1,988.19	£1,920.95	£1,855.99	£1,793.23	£1,732.59	£0.00	£0.00	£20,326
Inverness to East Midlands	INV	Ryanair		£0.00	£0.00	£0.00	£49,249.36	£47,583.92	£45,974.80	£44,420.10	£42,917.97	£41,466.64	£40,064.39	£38,709.55	£37,400.53	£36,135.78	£0.00	£0.00	£423,923
Inverness to Leeds/Bradford	INV	Eastern		£0.00	£0.00	£0.00	£37,761.83	£36,484.86	£35,251.07	£34,059.01	£32,907.25	£31,794.45	£30,719.27	£29,680.46	£28,676.77	£27,707.02	£0.00	£0.00	£325,042
Prestwick to Gdansk	PIK	Wizz Air		£0.00	£0.00	£0.00	£65,576.35	£63,358.79	£61,216.23	£59,146.11	£57,146.00	£55,213.53	£53,346.40	£51,542.42	£49,799.44	£48,115.40	£0.00	£0.00	£564,461
Prestwick to Pisa	PIK	Ryanair		£0.00	£118,106.36	£114,112.42	£110,253.55	£106,525.17	£102,922.87	£99,442.38	£96,079.60	£92,830.53	£89,691.33	£86,658.29	£0.00	£0.00	£0.00	£0.00	£1,016,623
Prestwick to Riga	PIK	Ryanair		£0.00	£0.00	£0.00	£76,236.77	£73,658.72	£71,167.84	£68,761.20	£66,435.94	£64,189.32	£62,018.66	£59,921.42	£57,895.09	£55,937.28	£0.00	£0.00	£656,222
Prestwick to Warsaw	PIK	Wizz Air		£0.00	£0.00	£0.00	£147,743.92	£142,747.75	£137,920.53	£133,256.55	£128,750.29	£124,396.42	£120,189.78	£116,125.39	£112,198.44	£108,404.29	£0.00	£0.00	£1,271,733
Prestwick to Wroclaw	PIK	Ryanair		£0.00	£0.00	£0.00	£66,820.83	£64,561.19	£62,377.96	£60,268.56	£58,230.50	£56,261.35	£54,358.79	£52,520.57	£50,744.51	£49,028.51	£0.00	£0.00	£575,173
Sumburgh to Stansted	LSI	Atlantic Airways		£0.00	£0.00	£0.00	£21,833.70	£21,095.37	£20,382.00	£19,692.75	£19,026.81	£18,383.39	£17,761.73	£17,161.09	£16,580.77	£16,020.06	£0.00	£0.00	£187,938
Aberdeen to Stornoway	ABZ	Eastern		£0.00	£0.00	£6,678.79	£6,452.94	£6,234.72	£6,023.89	£5,820.18	£5,623.36	£5,433.20	£5,249.47	£5,071.95	£4,900.44	£0.00	£0.00	£0.00	£57,489
Aberdeen to Bristol	ABZ	Eastern		£0.00	£15,356.13	£14,836.84	£14,335.11	£13,850.35	£13,381.98	£12,929.45	£12,492.22	£12,069.78	£11,661.62	£11,267.27	£0.00	£0.00	£0.00	£0.00	£132,181
Aberdeen to Copenhagen	ABZ	SAS		£0.00	£127,349.96	£123,043.44	£118,882.55	£114,862.37	£110,978.14	£107,225.25	£103,599.28	£100,095.92	£96,711.03	£93,440.61	£0.00	£0.00	£0.00	£0.00	£1,096,189
Aberdeen to Groningen	ABZ	bmi		£0.00	£103,530.31	£100,029.29	£96,646.65	£93,378.41	£90,220.69	£87,169.75	£84,221.98	£81,373.89	£78,622.12	£75,963.40	£0.00	£0.00	£0.00	£0.00	£891,156
Edinburgh to Cologne	EDI	Germanwings		£177,339.54	£171,342.55	£165,548.36	£159,950.10	£154,541.16	£149,315.13	£144,265.83	£139,387.27	£134,673.70	£130,119.51	£0.00	£0.00	£0.00	£0.00	£0.00	£1,526,483
Edinburgh to New York	EDI	Continental		£0.00	£2,087,653.08	£2,017,056.11	£1,948,846.48	£1,882,943.46	£1,819,269.05	£1,757,747.87	£1,698,307.12	£1,640,876.45	£1,585,387.87	£1,531,775.72	£0.00	£0.00	£0.00	£0.00	£17,969,863
Glasgow to Dubai	GLA	Emirates		£0.00	£2,308,533.04	£2,230,466.70	£2,155,040.29	£2,082,164.53	£2,011,753.17	£1,943,722.87	£1,877,993.11	£1,814,486.10	£1,753,126.67	£1,693,842.19	£0.00	£0.00	£0.00	£0.00	£19,871,129
Prestwick to Bergamo	PIK	Ryanair		£144,995.17	£140,091.95	£135,354.54	£130,777.33	£126,354.91	£122,082.04	£117,953.66	£113,964.89	£110,111.01	£106,387.45	£0.00	£0.00	£0.00	£0.00	£0.00	£1,248,073
Prestwick to Gothenburg	PIK	Ryanair		£81,341.18	£78,590.51	£75,932.86	£73,365.08	£70,884.14	£68,487.09	£66,171.10	£63,933.43	£61,771.43	£59,682.54	£0.00	£0.00	£0.00	£0.00	£0.00	£700,159
Prestwick to Dusseldorf	PIK	Ryanair		£0.00	£99,586.23	£96,218.58	£92,964.81	£89,821.07	£86,783.64	£83,848.93	£81,013.46	£78,273.87	£75,626.93	£73,069.50	£0.00	£0.00	£0.00	£0.00	£857,207
Prestwick to Girona	PIK	Ryanair		£271,389.00	£262,211.59	£253,344.53	£244,777.33	£236,499.83	£228,502.25	£220,775.12	£213,309.30	£206,095.94	£199,126.51	£0.00	£0.00	£0.00	£0.00	£0.00	£2,336,031
Prestwick to Rome	PIK	Ryanair		£0.00	£44,656.43	£43,146.31	£41,687.26	£40,277.55	£38,915.50	£37,599.52	£36,328.04	£35,099.55	£33,912.61	£32,765.81	£0.00	£0.00	£0.00	£0.00	£384,389
Prestwick to Stockholm (Skavsta)	PIK	Ryanair		£174,377.05	£168,480.25	£162,782.85	£157,278.11	£151,959.53	£146,820.80	£141,855.85	£137,058.79	£132,423.95	£127,945.85	£0.00	£0.00	£0.00	£0.00	£0.00	£1,500,983
Aberdeen to Blackpool	ABZ	Citystar		£0.00	£0.00	£9,883.25	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£9,883
Aberdeen to Kristiansand	ABZ	bmi		£0.00	£0.00	£0.00	£0.00	£104,981.57	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£104,982
Aberdeen to Liverpool	ABZ	Ryanair		£0.00	£0.00	£0.00	£15,456.75	£14,934.06	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£30,391
Aberdeen to Oslo	ABZ	Citystar		£0.00	£0.00	£66,730.03	£64,473.46	£62,293.20	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£193,497
Edinburgh to Atlanta	EDI	Delta		£0.00	£0.00	£0.00	£2,373,342.20	£2,293,084.25	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£4,666,426
Edinburgh to Geneva	EDI	Duo		£31,733.28	£30,660.18	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£62,393
Edinburgh to Jersey	EDI	bmi		£127,380.87	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£127,381
Edinburgh to Milan	EDI	Duo		£213,354.24	£206,139.37	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£419,494
Edinburgh to Munich	EDI	Duo		£0.00	£159,217.10	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£159,217
Edinburgh to Oslo	EDI	Duo		£186,322.88	£180,022.10	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£366,345
Edinburgh to Warsaw	EDI	Central Wings		£0.00	£0.00	£0.00	£70,906.56	£68,508.76	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£139,415
Edinburgh to Zurich	EDI	Duo		£27,402.53	£26,475.88	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£53,878
Glasgow to Barcelona	GLA	Flyglobespan		£0.00	£0.00	£112,796.25	£108,981.88	£105,296.50	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£327,075
Glasgow to Prague	GLA	CSA		£0.00	£234,967.19	£227,021.44	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£461,989
Inverness to Stockholm	INV	Showflake		£0.00	£63,089.60	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£63,090
Inverness to Newcastle	INV	Showflake		£0.00	£0.00	£0.00	£41,695.28	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£41,695
Kirkwall to Bergen	KOI	Loganair		£3,261.46	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£3,261
Prestwick to Lubeck	PIK	Ryanair		£0.00	£191,956.44	£185,465.16	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£377,422
Sumburgh to Oslo	LSI	Duo		£0.00	£7,484.21	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£7,484
																		Total =	***£69,047,737***

CO2 Value = £25.50 at 2007 prices
CO2 Value = £21.47 at 2002 prices
http://www.transportscotland.gov.uk/stag/td/Part2/Environment/7.4.2.6

CO2 Costs = £102,409,524 at 2007 prices (undiscounted)
CO2 Costs = £86,226,071 at 2002 prices (undiscounted)
CO2 Costs = £69,047,737 at 2002 prices (Discounted to 2002 prices)

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