Briefing Paper 14.2

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Environmental impact of immigration

Summary

The following are the main findings:

- Migration of people from developing to developed countries will normally cause an absolute increase in global emissions.
- Over the entire 19 years between 1991 to 2009, as a direct result of net migration, greenhouse gas (GHG) emissions from the UK increased by almost 190 million tonnes of CO2, equivalence. Taking into account the indirect impact of immigration caused primarily by higher fertility amongst some groups of settled migrants, the total increase in the 'carbon footprint' may be up to 285 million tonnes of carbon.
- Over the25 year period from 2008 to 2033, projected population growth in the UK arising from net migration will add 7 million to the population, increasing the UK's GHG emissions by almost 40 million tonnes of carbon dioxide in the five years to 2015, by over 125 million tonnes by 2020, and by almost 515 million tonnes by 2033.
- As a result of the population increase, emissions in 2033 will be 33 million tonnes higher at a time when emissions must be reduced by 240 tonnes a year to achieve the government's target enshrined in legislation. Thus the costs of mitigation will be significantly higher, with negative impacts on public expenditure and economic competitiveness
- Migration is a key driver of international aviation growth and countries which have sent the biggest numbers of immigrants to the UK in recent years have seen the fastest growth in passenger journeys to and from the UK. GHG emissions from aviation are projected to grow strongly over the next few decades.
- England is already one of the most densely populated countries in Europe. Increasing population pressures will disproportionately impact England where population is projected to increase by 18 per cent, with densities projected to be 465 persons per square kilometre by 2033.
- In the South East of England by 2033, population densities are projected to increase by 20 per cent, to a level one third higher than those of the Netherlands now
- If all the increase in population was going to be accommodated in urban areas, we would have to build 60 towns the size of Slough, or 20 cities the size of Leicester, or alternatively urbanize areas equivalent in area to Surrey or Warwickshire
- Such a loss of countryside would inevitably cause loss of wildlife habitats, damage the UK's biodiversity and have a detrimental impact on the 'amenity' that people derive from the rural environment and contact with nature.

Introduction

2. The two principal impacts that migration is likely to have on the environment are its contribution to GHG emissions, and therefore climate change, and to the 'amenity', 'enjoyment' or 'benefit', that is provided by aspects of the natural environment that are seen to be of value by many people, and which might be

affected by the impact of migration on population numbers.

Greenhouse Gas Emissions

3. A number of gases are responsible for the 'greenhouse effect'. Many of these occur naturally, but they can also be produced by human activity. The most significant of these is carbon dioxide –responsible for around 80 per cent of emissions.

Legal obligations: 'Kyoto' and Climate Change Act

4. Concern about global warming resulted in the Kyoto 'Protocol' on climate change which the EU ratified in 2002. EU Member States committed themselves to reduce by 2012 the level of CO2 and five other GHG by 8 per cent overall compared with emission levels in 1990.

5. The UK is on course to achieve this target quite easily, primarily because of the increased use of natural gas in electricity generation and the recent recession. Compared to 1990, emissions of the six Kyoto gases fell by over 25 per cent to the equivalent of 575 million tonnes of carbon dioxide in 2009. In 2009 alone, GHG emissions in the UK fell by almost 9 per cent as a result of the recession and declining use of coal in electricity generation.

6. The UK Government subsequently committed itself to achieve the more demanding target of reducing UK emissions of the Kyoto GHG emissions by at least 80 per cent by 2050 compared with 1990. This was put into primary legislation –the Climate Change Act (2008). To achieve this overarching target a 'carbon budget' was promulgated in 2009 mandating a 22 per cent reduction in emissions by 2012 over 1990 levels, from 774 million tonnes to 604 million tonnes a further 28 per cent cut by 2017 and by 34 per cent by the end of the third carbon budget in 2022 to 511 million tonnes.

Net Migration Impact on GHG Emissions

7. Most GHG emissions are caused by combustion of fossil fuels for transportation, electricity generation, industrial and domestic use. Energy consumption is linked to income levels and richer more developed countries are responsible for a disproportionate share of emissions. In 2009, in the UK, an estimated 39 per cent of carbon dioxide emissions were from the energy supply sector, 25 per cent from transport, 15 per cent from business and 16 per cent from residential fossil fuel use. Use of transport and consumption of energy is broadly related to income levels, and because one of the key drivers of migration flows is income differentials, it would be expected that migration of people from poor parts of the world to richer parts would overall tend to contribute towards:

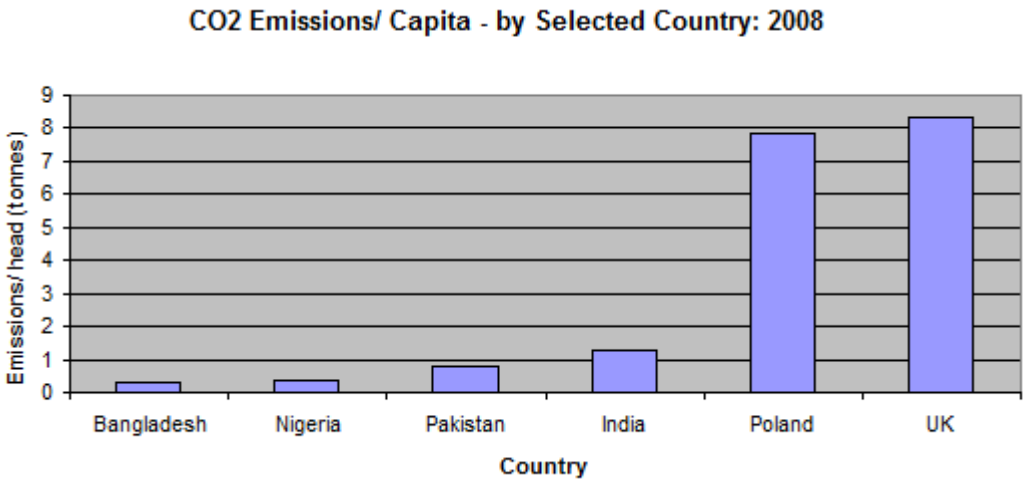
- Increasing global emissions, and
- Increasing UK emissions

The scale of any such effects, however, is small relative to the GHG emissions of the developed countries they migrate into –which are overwhelmingly the prime source of carbon emissions.

Increasing global emissions

8. Movement of people from 'low-carbon' to 'high-carbon' parts of the world will cause an absolute increase in GHG emissions if migrants from 'low-carbon' areas increase consumption of carbon-intensive products once they have migrated. Although this effect is likely to occur, its scale is uncertain, because it depends on income levels and consumption patterns amongst migrants relative to the 'host' populations of the countries they are migrating to and from. Over time, consumption patterns of migrants would tend to converge with those of the host country into which they migrate, so any discrepancy would become less significant over time. Migration is also a key driver of international travel by air, a rapidly growing source of carbon emissions.

Figure 1: CO2 Emissions –Selected Countries



Source: IEA –CO2 Emissions From Fuel Combustion, 2010

9. An example of this effect is set out below based on migration data over the period 1991 –2008 available from ONS's 'Long Term International Migration' (LTIM) database. Table 1 shows net UK migration to various areas and countries, an estimate of CO2 emissions per head for these areas, and the impact of these net migration flows on total global carbon emissions in just one year - 2008.

Table 1: Net Migration Flows to/ from UK, 1991 –2008, and Increase in Global Carbon Emissions

Country/ Area	Net migration flows to/ from UK ('000)	CO_2 emissions/ head – 2008 (tonnes – carbon)	After subtracting from UK average emissions/ head	Increase / decrease in carbon emissions (thousand tonnes – carbon)
UK		8.68	N/A	N/A
EU	216	7.72	0.96	207
Australia	-265	18.48	-9.8	2597
New Zealand	-55	7.74	0.94	-52
Canada	-39	16.53	-7.85	306
South Africa	188	6.93	1. 75	329
Other African Commonwealth	363	0.29	8.40	3048
Indian Sub-Continent	737	1.1	7.58	5586
Other Commonwealth	95	N/A	N/A	N/A
Other Foreign countries	1025	N/A	N/A	N/A
o.w: United States	-49	18.38	-9.7	475
o.w: Middle East	136	7.52	1.16	158
o.w.: Rest of the world	938	N/A	N/A	N/A
TOTAL	2265	N/A	N/A	12654

10. There is data on carbon emissions for countries in the above table which accounted for 55 per cent of net international migration to and from the UK in this period. These range from Member States of the EU, 'Old Commonwealth' countries (Australia, New Zealand, Canada, South Africa), to the 'New Commonwealth' (Sub-Saharan Africa, the countries of the Indian Sub-Continent), the Middle East and the United States. The increase in carbon emissions in one year - 2008 - from the countries and areas listed in the table is almost 13 million tonnes, compared to the overall UK total of 511 million tonnes. Of this, about 70 per cent resulted from net migration from African 'New Commonwealth' countries and countries in the Indian Sub-Continent. Net outflows of UK citizens to countries with lower carbon emissions per head would cause an overall reduction in global emissions, but the only such country identified in the above table is New Zealand. The other countries in the above table attracting significant net inflows of UK migrants –Australia, Canada, the US –all have per capita carbon emissions which are significantly bigger, thus increasing global emissions. The smallest increase in global carbon emissions relative to population was caused by net migration from EU Member States.

11. Once emitted, atmospheric CO2 persists over many years1 - thus to identify the true impact of net migration to and from the UK on global CO2, concentrations in the atmosphere over this period, it is necessary to accumulate data on emissions over the entire period for the countries and regions which can be identified from ONS's 'Long Term International Migration' database . For the same countries and regions identified above, the cumulative increase in global CO2 –the world's 'carbon footprint' - was approximately 100 million tonnes.

Increasing UK Emissions

12. As well as leading to an absolute increase in global emissions, purely as a result of movement of people from 'low carbon' to 'high carbon' countries, net international migration to the UK will cause an increase in the UK's GHG emissions. To quantify this –assuming that migrants to the UK produce the same emissions as the existing population –is straightforward, multiplying the cumulative number of net migrants by emissions for each year of migration, then summing the total to derive a figure from which an estimate of the net cumulative total of emissions can be made. Net international migration and the cumulative total of CO2 equivalent emissions are in table 2 below:

13. Between 1991 and 2009 the UK's population had increased by 2.5 million as a result of net international migration. By 2009, cumulative emissions equivalent to around 190 million tonnes of CO2 had resulted as a result of the population increase. In one year alone, 2008, emissions of some 23 million tonnes (almost 4 per cent of the UK total for that year) resulted.

14. However, the contribution of immigration to UK GHG emissions is significantly bigger than this if the 'natural change' –manifested in an increased birth rate caused by migration –is taken into account. Fertility levels of immigrants are usually higher than the UK-born population, and this will cause a further increase in the impact that migration has on population levels. The ONS, for example, in its most recent 'Principal Population projection' for the UK published in 2009, estimated that over a 25 year period, such 'natural change' would cause a further 50 per cent increase in population growth caused by net migration alone, pushing the UK's 'carbon footprint' further upwards still. Between 1991 and 2009, the total increase in the UK 'carbon footprint' arising from the direct and indirect impact of net migration could be as high as 285 million tonnes.

Table 2: Net Migration into the UK and GHG Emissions: 1991 - 2009

Year	Net International Migration ('000)	Cumulative Net Migration ('000)	GHG emissions/ head (Tonnes CO_2 eq)	Cumulative gross GHG emissions (Tonnes CO_2 eq)
1991	44			
1992	-13	31	13.1	406
1993	-1	30	12.7	381
1994	77	107	12.5	1338
1995	76	183	12.3	2251
1996	55	238	12.7	3023
1997	48	286	12.2	3489
1998	140	426	12.1	5155
1999	163	589	11.5	6774
2000	158	747	11.4	8516
2001	171	918	11.5	10557
2002	153	1071	11.1	11888
2003	148	1219	11.1	13531
2004	245	1464	11	16104
2005	206	1670	10.9	18203
2006	198	1868	10.7	19988
2007	233	2101	10.5	22061
2008	163	2264	10.2	23093
2009	196	2460	9.3	22878
TOTAL	2460			189636

Role of Aviation

15. Aviation is a small but rapidly growing contributor to global carbon emissions, and its share of climate change emissions, currently around 2 per cent a year, is projected by the IPCC to treble over the next 40 years to 5 –6 per cent a year. In the UK, if governments were to be successful in reducing overall emissions by 80 per cent by 2050, in line with the requirements of the Climate Change Act, aviation emissions would then make up around a quarter of all UK emissions by 2050. Aviation has been for many decades the most rapidly growing sector of transport, and over the last decade or so the fastest growth in passenger journeys has been in the 'Visiting Friends and Relatives' (VFR) category. Obviously, there can be no objection to people visiting their friends and relatives but the fact is that between 2000 and 2007, whilst total airline passengers to and from the UK increased by around one third, those traveling for the purpose of VFR increased by over three-quarters. A critical influence of demand for such flights is migration. The table below shows the links between flights for VFR purpose and immigration.

Table 3: VFR Travel in 2007 and Foreign Born Resident Population (Top 10 countries) in the UK

Country of Migration	Resident Population in the UK ('000)	Percentage of UK Population	Proportion of Passengers Travelling for VFR
India	613	10	50
Ireland	420	7	47
Poland	405	6	70
Pakistan	377	6	87
Germany	266	4	35
Bangladesh	205	3	69
South Africa	201	3	56
USA	188	3	32
Jamaica	166	3	35
Nigeria	140	2	58

16. In 2008, since 24 per cent of journeys to and from major UK airports were for the purpose of VFR, the table shows the extent to which such flights are influenced by the presence of a substantial foreign-born resident population in the UK –as a direct consequence, in most cases, of long-term international migration.

Projected Increase in Population

17. The Government's 2008 population projection projects over its 25 year period an increase of 10.2 million in the population of the UK to 72 million, of which approximately 7 million will be the direct or indirect impact of net migration2. The UK's GHG 'footprint' in 2032-33 will thus be some 41 million tonnes of CO2–or almost over ten per cent bigger -as a result of migration, which will make it significantly more challenging for the Government to meet its very demanding targets for carbon reduction under the Climate Change Act. As a consequence of this increase, there will be significantly more pressure on carbon emitting sectors of the productive economy to reduce emissions, which will increase abatement costs and ultimately have a negative impact on economic costs and the competitiveness of those sectors concerned.

18. The above-mentioned increase in the carbon 'footprint' by 2032-33 significantly understates, however, the true contribution of net migration to GHG emissions because of the accumulation of CO2 and other GHG emissions in the atmosphere over successive years. This means that to calculate the true scale of the carbon 'footprint' one would have to accumulate data over successive years. The table below shows for the period 2008 - 2032: (a) the contribution of net migration to population growth in the UK; (b) the cumulative addition to the population; (c) the additional GHG emissions each year, assuming –in line with the Committee on Climate Change (CCC) –that GHG emissions decline by 1.1 per cent each year over the entire period ;and (d) the cumulative additions to GHG emission s over this entire period at five yearly intervals. These latter figures do not take account of the cumulative removal of CO2 from the earth's atmosphere by 'natural processes'. These are believed to remove around half of all emissions, but the time period over which this happens is inherently uncertain.3

Year	Increase in population as a result of net migration ('000)	Cumulative addition to population – from 2010 ('000)	Additional GHG emissions each year caused by population growth ('000 – tonnes, CO_2 e)	Total additional atmospheric GHG caused by UK net migration ('000 – tonnes, CO_2 e)
2008	191			
2009	218			
2010	222			
2011	226	448	4019	
2012	230	678	5975	
2013	234	912	7896	
2014	238	1150	9781	
2015	247	1397	11674	39442
2016	256	1653	13571	
2017	265	1918	15470	
2018	274	2192	17369	
2019	282	2474	19259	
2020	289	2763	21132	126146
2021	296	3059	22988	
2022	301	3360	24812	
2023	307	3667	26613	
2024	310	3977	28370	
2025	314	4291	30091	
2026	317	4608	31772	
2027	319	4927	33406	
2028	321	5248	34997	
2029	324	5572	36552	
2030	326	5898	38066	
2031	328	6226	39541	
2032	330	6556	40977	514331

19. By 2032-33, the gross contribution –almost 515 million tonnes - caused by net migration over the 22 years from 2010 to GHG emissions is roughly equivalent to GHG emissions for the whole of the UK's population for one year –2008. To achieve the Government's commitments under the Climate Change Act (para 6 above) annual GHG emissions by 2033 will have to fall•by almost 240•million tonnes of carbon•compared with their current level. However, the addition of around 7 million people to the UK's population caused by net migration over this period, will add about 33 million tonnes in that year making the target significantly more difficult and expensive to reach.

Other Environmental Impacts of Migration

20. The impact that migration has on the wider environment is also caused primarily by population growth alone. A higher population in the UK as a result of migration will increase population densities of settlement and urbanization, causing some loss of countryside and open space, with possible negative impacts on biodiversity and those other benefits which people derive from the countryside. These are relatively intangible, difficult if not impossible to value, but still nonetheless of great importance in individual and social welfare.

Population Growth and Increased Density of Settlement

21. England is already one of the most densely populated countries in Europe, with a population density exceeding that of the Netherlands and Belgium, and over three and a half times that of France. Under the ONS 'Principal Projection' for population, the UK's population by 2033 will have increased by around 7 million as a direct and indirect consequence of net migration –and most of this increase will be in England. This will push population densities in England to exceed 465 per square km by 2033 (an increase of 18 per cent over 2008 figures). Particular pressure will be felt in London, whose population is projected to increase by one and a half million, the South East of England, where densities are projected to increase to 526 per square km, and the North West of England –densities projected to be 524 per square km.

Increased Urbanization and Loss of Countryside

22. The UK, and especially England, is already one of the most urbanized countries in the world, and projected population growth will intensify this. An increase of 7 million people to the UK population by 2033, mainly in England, is equivalent to almost 60 towns the size of Slough, or over 20 cities the size of Leicester. If the additional 7 million people were to be accommodated in urban areas developed at the same population density as the City of Birmingham, then over 700 sq miles of countryside would have to be built over, equivalent to the area of Surrey or Warwickshire4.

Impacts of Urbanization on 'Amenity' and Ecological Changes

23. Increasing urbanization by definition causes loss of countryside and the rural environment. This has potential impacts on these environmental and social aspects:

- Biodiversity
- Habitat for specific types of wildlife
- Carbon 'sequestration'
- Visual and physical amenity that some people may derive from countryside
- The psychological well-being and happiness that occurs as a result of more intense contact with nature. According to a report5 for the RSPB, the countryside is a 'natural health service', with a 'quantifiable health value', offering 'considerable mental health benefits'.

27 December, 2010

NOTES

1 See the Stern Review ('The Economics of Climate Change') - para 8.2 p. 194 - for an explanation of why cumulative figures for CO2 need to be used

2 http://www.statistics.gov.uk/downloads/theme_population/NPP2008/NatPopProj2008.pdf page 56.

3 The Stern Review notes that the lifetime of CO2 in the atmosphere is between 5 and 200 years. Table 8.1 'Characteristics of Kyoto Greenhouse Gases', p.198. Some other GHG can persist for much longer. See also Penner et.al: 'Aviation and the Global Atmosphere' –IPCC, 1999

4 This assumes that development will be on a 'green field' sites.

5 'Natural Thinking' –Dr. William Bird, RSPB June 2007

Sources of Data

Migration to the UK:

http://www.statistics.gov.uk/pdfdir/mig0810.pdf
http://www.statistics.gov.uk/statbase/Product.asp?vlnk=15054

Global CO2 emissions:

http://www.iea.org/co2highlights/co2highlights.pdf
http://webarchive.nationalarchives.gov.uk/+/http://www.hm-treasury.gov.uk/stern_review_report.htm

UK GHG emissions:

http://www.decc.gov.uk/en/content/cms/statistics/climate_change/gg_emissions/gg_emissions.aspx
http://www.decc.gov.uk/en/content/cms/statistics/climate_change/gg_emissions/uk_emissions/2009_prov/2009_prov.aspx
http://www.theccc.org.uk/carbon-budgets/interim-a-intended-budgets

Aviation:

http://www.caa.co.uk/application.aspx?catid=14&pagetype=65&appid=7&newstype=n&mode=detail&nid=1722
http://www.sustainableaviation.co.uk/pages/default/about-us.html

UK Population projection:

http://www.statistics.gov.uk/pdfdir/pproj1009.pdf

Rural 'amenity' etc:

http://www.cabe.org.uk/publications/making-the-invisible-visible
http://www.rspb.org.uk/ourwork/policy/health/