



# Barrow-in-Furness

Updating the demographic evidence

November 2017

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## Acknowledgements

Demographic statistics used in this report have been derived from data from the Office for National Statistics licensed under the Open Government Licence v.3.0.

*The authors of this report do not accept liability for any costs or consequential loss involved following the use of the data and analysis referred to here; this is entirely the responsibility of the users of the information presented in this report.*

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# Context & Requirements

- 1.1 Edge Analytics has provided demographic evidence to inform Barrow-in-Furness' Strategic Housing Market Assessment (SHMA)<sup>1</sup>. The evidence examined mid-year population estimates (MYEs) for 2001–2015, plus the official 2014-based population and household projections from the Office for National Statistics (ONS) and Department for Communities and Local Government (DCLG). The analysis considered economic forecasts from Experian and a range of assumptions linking economic and demographic change in Barrow-in-Furness.
- 1.2 Using the evidence, the SHMA has identified an objectively assessed housing need (OAN) for Barrow-in-Furness of 133 for the 2014–2031 plan period. With all demographic indicators suggesting a continued decline in Barrow-in-Furness' population, economic growth forecasts have been a key driver of this OAN assessment.
- 1.3 Since completion of the SHMA, DCLG has published its Housing White Paper detailing a draft methodology<sup>2</sup> for a more standardised approach to the OAN calculation across local authorities in England. As the analysis in this report demonstrates, Barrow-in-Furness' declining population trend results in a 'zero' OAN estimate using the DCLG's proposed methodology.
- 1.4 In this context and with the availability of new demographic and economic statistics, Barrow Borough Council (BBC) has commissioned Edge Analytics to produce an update to its demographic analysis, providing further evidence to the OAN assessment. The update considers Barrow-in-Furness' current 2016 mid-year population estimate, economic assumptions from the Office for Budget Responsibility's (OBR) 2017 labour market analysis<sup>3</sup>, plus latest employment forecasts for the borough from the Cumbria Local Enterprise Partnership (LEP) Cambridge Econometrics model.

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<sup>1</sup> <https://data.barrowbc.gov.uk/dataset/c5f06ce4-c197-4f2d-90ae-7fef71a6c97e/resource/2e676f5f-dee1-4d25-a590-26309bed47d8/download/barrow-2017-shma-addendum-report-final.pdf>

<sup>2</sup> [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/644955/Planning\\_for\\_Homes\\_consultation\\_document.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/644955/Planning_for_Homes_consultation_document.pdf)

<sup>3</sup> <http://cdn.budgetresponsibility.org.uk/OBR-Fiscal-sustainability-report.pdf>

# 2 Demographic Profile

## Population Change

- 2.1 The latest MYE for Barrow-in-Furness estimates a population of 67,321 in 2016, a -0.3% decrease since 2015 and a -6.4% decrease overall since 2001 (Figure 1).

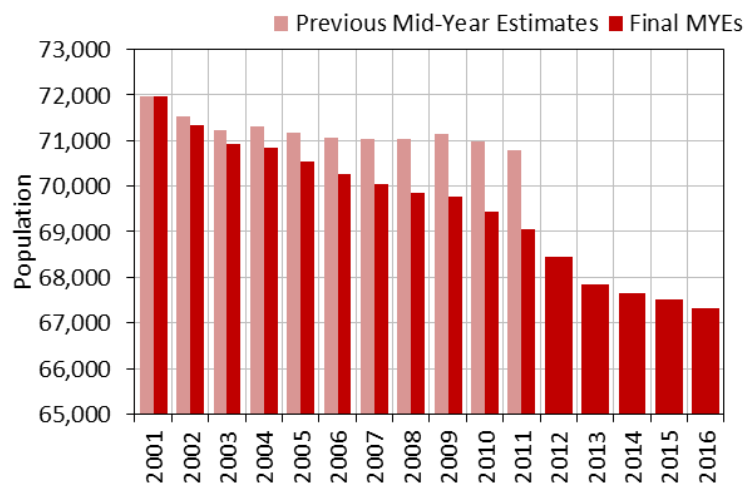
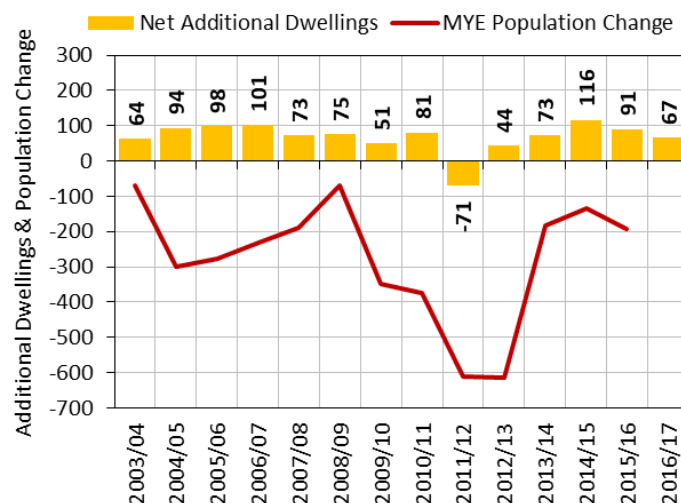


Figure 1: Barrow-in-Furness mid-year population estimates 2001–2016

- 2.2 This decline in population has been associated with modest housing growth in all years since 2003/04, with the exception of 2011/12 (Figure 2). The highest net increase in dwellings occurred in 2014/15 with 116 homes added to the dwelling stock.



Dwellings data source: Barrow Borough Housing Land Statement 2017

Figure 2: Historical net additional dwellings and population change

2.3 The 'components of population change' chart illustrates the drivers of Barrow-in-Furness' population decline under the MYEs, including the 'Unattributable Population Change' (UPC) component resulting from population adjustments following the 2011 Census (Figure 3).

2.4 Internal migration flows have resulted in an annual net outflow in all years except 2003/04, with a particularly large outflow post-2011. Net international migration has varied between small positive and negative contributions to annual population change. Natural change (the difference between births and deaths) has also had a relatively small impact upon annual growth, both positive and negative in recent years.

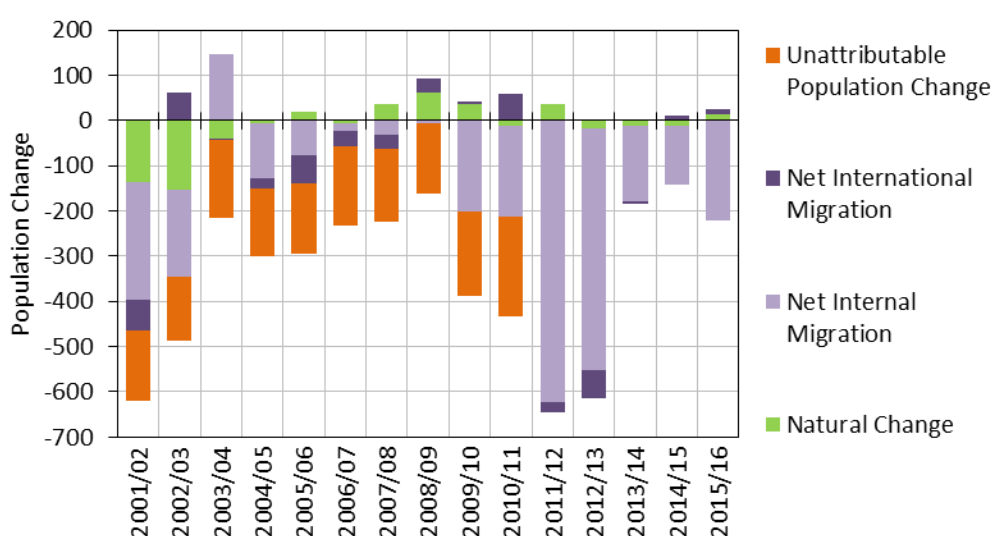


Figure 3: Barrow-in-Furness MYE components of population change

2.5 Barrow-in-Furness' population has aged over the last 15-years. In 2001, the population aged 65+ was equivalent to 17% of the total population (Table 1). By 2016, this had increased to 21%. The Old Age Dependency (OAD) ratio compares the population aged 65+ relative to the 15–64 population. In 2001, the OAD was 26, with the size of the population aged 65+ equivalent to 26% of the 15–64 population total. This had increased to 34 by 2016.

Table 1: Barrow-in-Furness - MYE population age structure 2001, 2011 & 2016

	2001	2011	2016
Aged 65+	17%	19%	21%
Aged 80+	5%	5%	5%
OAD Ratio	26	29	34
Median Age	39	43	45

OAD = Old Age Dependency Ratio (Population Aged 65+/Population Aged 15–64)

- 2.6 The continual net outflow of the younger population through migration, combined with the natural ageing of the resident population, is driving the process of population ageing in Barrow-in-Furness. A continuation of this process has particular implications for the borough's economic aspirations and, by default, its assessment of future housing need.

## Internal Migration

- 2.7 For internal migration, it was the sharp fall in the level of in-migration, coupled with an increase in out-migration that led to a higher net outflow post-2011. In-migration flows have recovered since 2013 but Barrow-in-Furness' net balance remains outward (Figure 4).

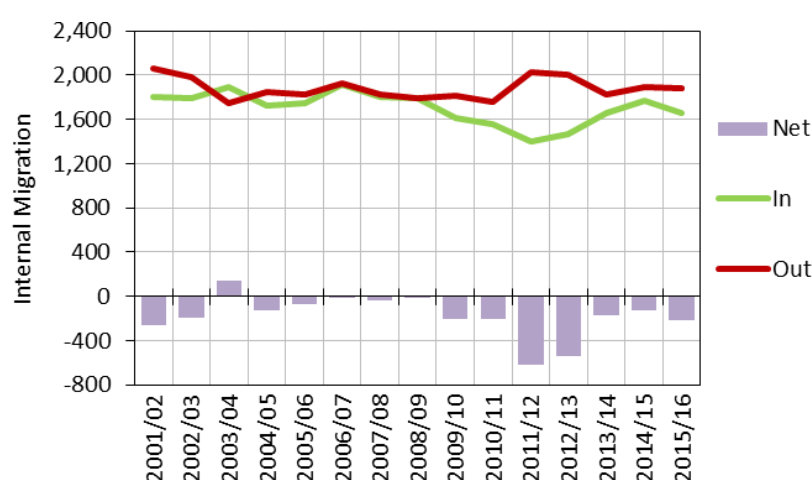


Figure 4: Barrow-in-Furness internal migration flows, 2001/02–2015/16

- 2.8 Barrow-in-Furness's largest net out-migration flows since 2001 have been with South Lakeland, Lancaster, Preston and Carlisle (Figure 5).

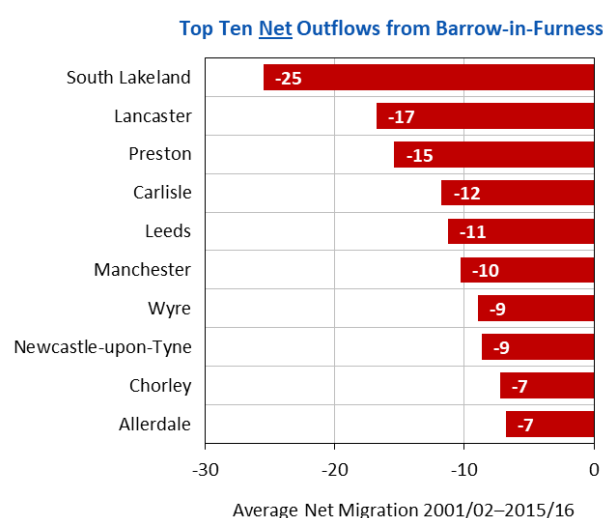


Figure 5: Average net migration outflows from Barrow-in-Furness (2001/02–2015/16)

- 2.9 The age profile of migration reveals that Barrow-in-Furness has experienced significant net outflow in the 15–19 age group, likely associated with student moves to higher education. A smaller return flow is evident in the 20–24 age-group.

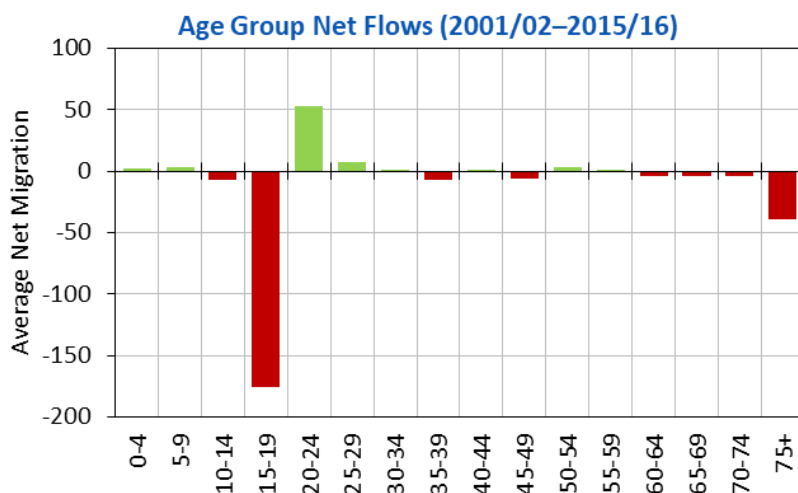


Figure 6: Barrow-in-Furness internal migration age profile  
2001/02–2015/16 (Source: ONS)

## International Migration

- 2.10 Since 2013, National Insurance Number (NINo) registrations have evidenced a sharp increase, peaking in 2015 (Figure 7). Whilst the registration of migrants from Old and New Commonwealth countries has reduced over the historical period, the number of registrations from EU13 and other EU countries has continued to rise.

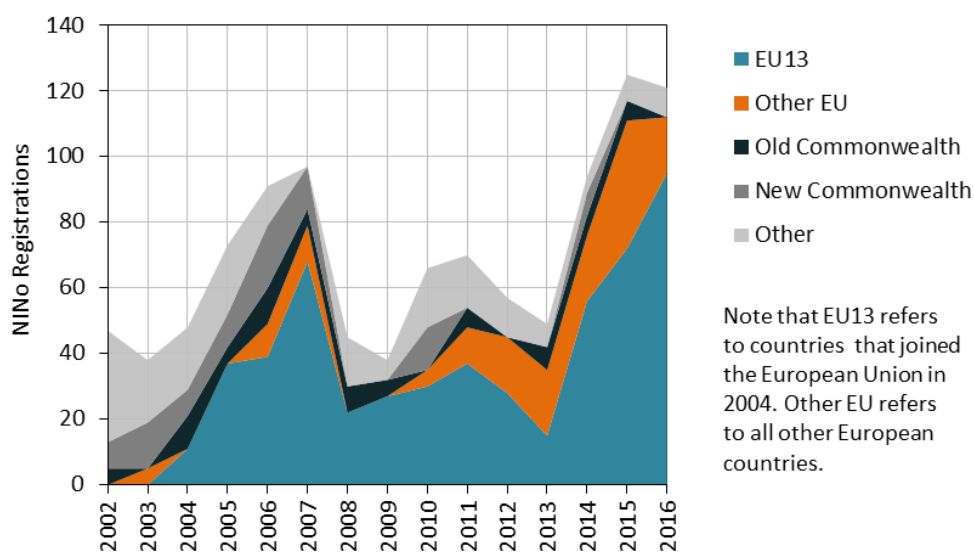


Figure 7: NINo registrations 2002–2016



2.11 Poland, Romania and Bulgaria have been the most significant migrant origins since 2014, with registrations from Spain and Greece of less significance than in previous years (Figure 8). In 2016, Romanians accounted for 50% of total NINo registrations in Barrow-in-Furness, with Poland and Bulgaria accounting for approximately 20% and 9% respectively.

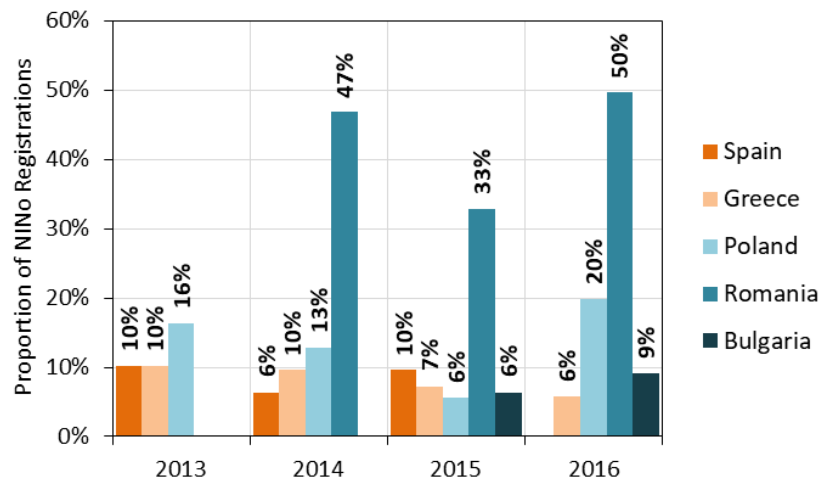


Figure 8: NINo registration numbers by country of origin 2002–2016

# 3 Demographic Forecasts

## Planning Guidance

- 3.1 At present, the Planning Practice Guidance (PPG) states that the DCLG household projections should provide the *“starting point estimate of overall housing need”* (PPG paragraph 2a-015). The 2014-based model is the latest set of household projections from the DCLG, underpinned by the 2014-based sub-national population projection (SNPP). The 2014-based household and population projection models extend over a 2014–2039 projection period.
- 3.2 As a starting point for Barrow-in-Furness, the 2014-based SNPP estimates population decline of -6.0% over the 2016–2031 plan period, resulting in an annual reduction in household numbers of -71 per year.
- 3.3 In September 2017, DCLG published its Housing White Paper detailing a draft methodology for a more standardised approach to OAN calculation across local authorities in England. A three-step approach is proposed to calculating a housing need estimate:
- **Step 1:** The ‘starting-point’ household total is based on DCLG’s 2014-based projection.
  - **Step 2:** An adjustment is applied based on a local affordability ratio.
  - **Step 3:** A 40% ‘cap’ on the level of adjustment is applicable to those local authorities that have adopted Local Plans in the last 5 years or do not currently have a Local Plan.
- 3.4 The DCLG methodology has presented an OAN estimate for each local authority in England for a 2016–2026 plan period (at present there are no guidelines published for Council’s with an extended Local Plan period or a base date prior to 2016). The published OAN figures are ‘household’ estimates and do not take into account vacant properties and second homes in the OAN calculation.
- 3.5 The methodology clearly states that in those areas where *“...projected household growth will be negative...the demographic baseline should be taken as zero”* (DCLG, p10). As a result, the average household decline of -61 per year (2016–2026) for Barrow-in-Furness results in its starting point being set as **zero**. Comparable DCLG figures for all districts within Cumbria are presented in Figure 9.

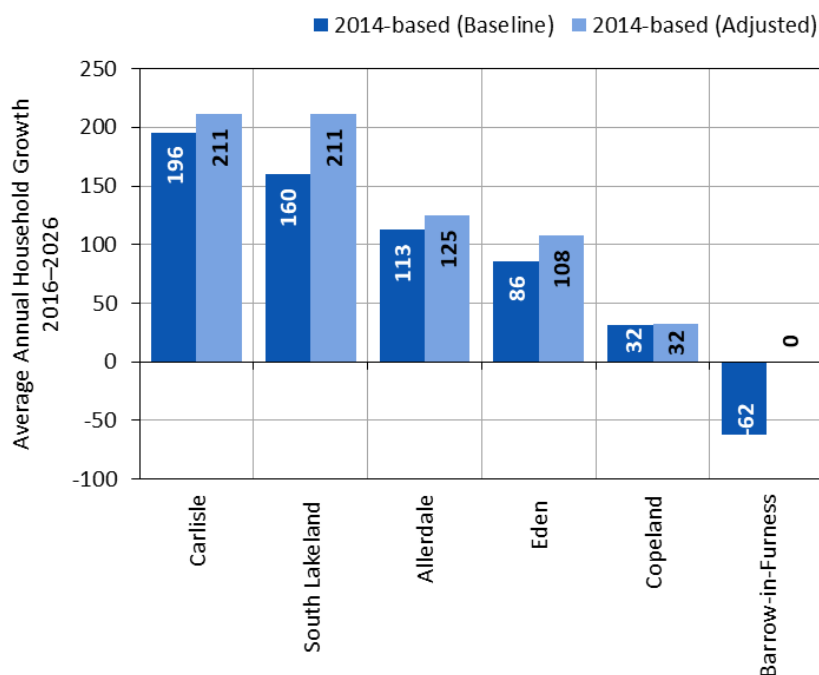


Figure 9: Average annual household growth under the 2014-based household projection model (Baseline) and DCLG methodology (Adjusted) 2016–2026

## Demographic Scenarios

- 3.6 The demographic evidence presented in the previous sections provides context for developing a range of trend-based scenarios which consider variant migration histories. Six trend scenarios are presented, including the 2014-based Sub-National Population Projection (SNPP) ‘benchmark’ for Barrow-in-Furness.
- 3.7 Under all scenarios, excluding the SNPP-2014 which has a 2014 base year, ONS population estimates are included for 2001–2016. Assumptions on fertility, mortality and migration are applied to estimate the population growth and components of change over the forecast period.
- 3.8 The following scenarios have been developed using POPGROUP v4.0 technology:
- **SNPP-2014:** This is the 2014-based SNPP for Barrow-in-Furness and is presented as the ‘benchmark’ scenario
  - **PG 5yr:** Internal migration rates and international migration flow assumptions are based on the last five years of historical evidence (2011/12–2015/16).

- **PG 10yr:** Internal migration rates and international migration flow assumptions are based on the last ten years of historical evidence (2006/07–2015/16). UPC is *included* in international migration assumptions.
- **PG Long Term:** Internal migration rates and international migration flow assumptions are based on the full fifteen year historical period (2001/02–2015/16). UPC is *included* in international migration assumptions.
- **PG Long Term-X:** Internal migration rates and international migration flows assumptions are based on the full fifteen year historical period (2001/02–2015/16). The UPC is *excluded* from international migration assumptions.
- **Net Nil:** Internal and international migration flow assumptions are balanced. Migration flows still occur, however the net flow is zero throughout the forecast period.

3.9 The population growth under each of the scenarios is presented in the form of a chart (Figure 10), with the population change, net migration, natural change and associated household and dwelling growth for the 2016–2031 plan period presented in Table 2. Under each of the scenarios, household and dwelling growth has been estimated using assumptions from the 2014-based household projection model, incorporating a 2011 Census vacancy rate for Barrow-in-Furness of 5.4%.

3.10 The 'benchmark' **SNPP-2014** scenario results in the lowest population growth outcome for Barrow-in-Furness, estimating a decline of -6.0% over the 2016–2031 plan period, with consistent net out-migration and a reduction in the dwelling requirement of 75 per year.

3.11 The alternative trend scenarios result in a lower population decline over the plan period, driven by a reduced annual impact of net out-migration. The **PG 5yr** scenario is most closely aligned to the **SNPP-2014** scenario, based on a similar historical time period but incorporating the latest MYEs in the derivation of its migration assumptions.

3.12 The **PG Long Term**, **PG Long Term-X** and **Net Nil** scenarios result in a less significant population decline, incorporating reduced net out-migration assumptions. Despite the population decline, the changing age profile and estimated household structure of the population, results in an

average annual dwelling *growth* of 20, 41 and 39 for each of these scenarios respectively over the 2016–2031 plan period.

- 3.13 Population decline is a dominant feature of Barrow-in-Furness' recent demographic profile, continuing into the trend-based forecasts presented here. Future economic growth, which might support a reversal of this decline, is a key element of the OAN calculation for the borough.

### Demographic Scenario Outcomes

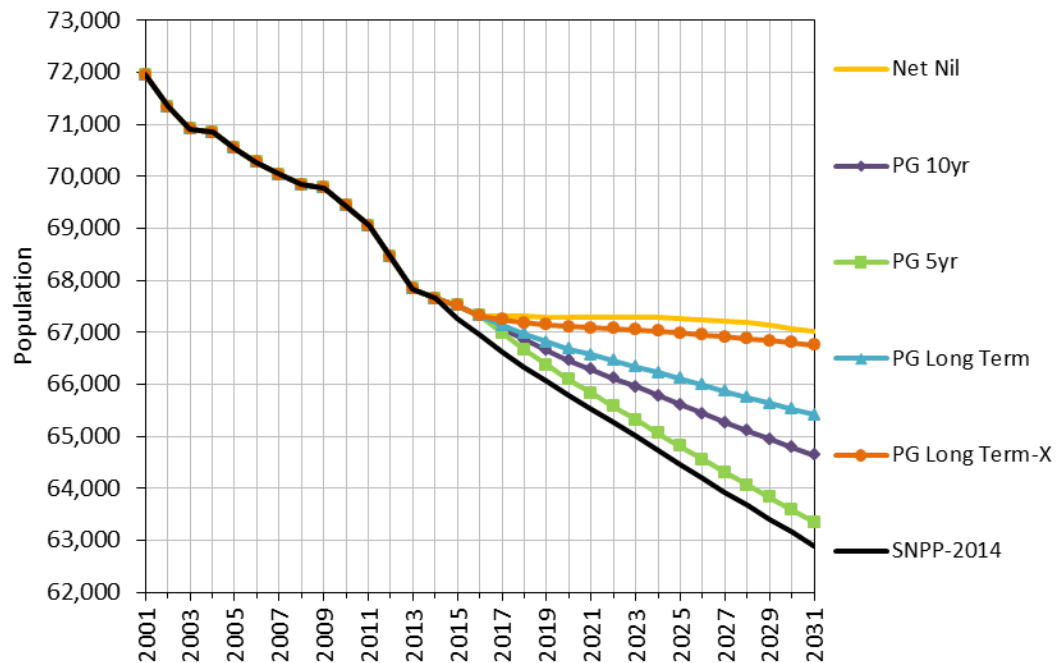


Figure 10: Barrow-in-Furness population change 2001–2031

Table 2: Demographic scenario outcomes 2016–2031

Scenario	Change 2016–2031				Average per year	
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings
Net Nil	-308	-0.5%	548	1.8%	0	39
PG Long Term-X	-569	-0.8%	583	1.9%	-1	41
PG Long Term	-1,911	-2.8%	280	0.9%	-87	20
PG 10yr	-2,689	-4.0%	-212	-0.7%	-141	-15
PG 5yr	-3,971	-5.9%	-977	-3.2%	-205	-69
SNPP-2014	-4,034	-6.0%	-1,065	-3.5%	-219	-75

Scenarios ranked in order of population change.

## Household Formation

- 3.14 Across the UK, younger adult age groups have seen the most significant change in household formation over the last ten years, due to a combination of housing undersupply and affordability issues. In formulating an OAN, PPG recommends that “*alternative assumptions in relation to...household formation rates*” are considered (PPG Paragraph 2a-017) to evaluate a potential ‘reversal’ of this trend.
- 3.15 In the demographic forecasts, the DCLG 2014-based household headship rates (also known as household representative rates) determine the level and profile of household growth by age group and household category. The charts in Appendix B compare headship rate trends for the DCLG’s 2014-based and 2008-based household projection models. The young adult males (25–44) and female (25–34) age groups suggest a lower rate of growth in the 2014-based model compared to the 2008-based equivalent.
- 3.16 To evaluate the effect of changes to young adult household formation over time, ‘*Partial Return*’ headship rates have been generated for Barrow-in-Furness, in which the 2014-based headship rates for the male 25–44 and female 25–34 age groups return to a mid-point between the 2014- and 2008-based rates by 2033<sup>4</sup>:

Table 3: Demographic scenarios average annual dwelling growth 2016–2031

Scenario	Population Change (%)	Average Annual Dwelling Growth 2016–2031	
		2014-based	2014-based Partial Return
PG Long Term-X	-0.8%	41	47
Net Nil	-0.5%	39	45
PG Long Term	-2.8%	20	26
PG 10yr	-4.0%	-15	-9
PG 5yr	-5.9%	-69	-63
SNPP-2014	-6.0%	-75	-69

Note that scenarios are ranked in order of annual dwelling growth change under the 2014-based headship rates. Dwelling growth has been estimated using the 2011 Census vacancy rate for Barrow-in-Furness of 5.4%.

- 3.17 The application of the ‘*Partial Return*’ headship rate sensitivity to each of the demographic scenarios increases the annual dwelling growth by approximately +6 dpa (2016–2031), increasing

<sup>4</sup> Headship rates are returned by 2033, broadly aligning with the LPEG methodology.

the maximum average annual dwelling growth range under the trend scenarios from **41** using the unadjusted headship rates to **47**.

## Vacancy Rate

- 3.18 The 2011 Census recorded a dwelling vacancy rate of 5.4% for Barrow-in-Furness, a 0.5 percentage point reduction from the 2001 Census. This is lower than the county vacancy rate of 7.4%, however higher than the regional rate of 4.3%.
- 3.19 In recognition that Barrow-in-Furness has a relatively high vacancy rate, a sensitivity scenario has been developed in which the rate reduces from the 2011 Census value of 5.4% to the regional rate of 4.3% by the end of the plan period. This considers the potential impact of the Council adopting a policy initiative to reduce vacant properties in the borough over the plan period.
- 3.20 In reducing the vacancy rate, the annual dwelling growth requirement under each of the demographic scenarios reduces by approximately 19-20 dpa over the 2016–2031 plan period. This reduces the maximum average annual dwelling growth from **41** under the core scenarios to **21** under the vacancy rate sensitivity scenarios.



# 4 Economic Growth

## Aligning Economic and Demographic Change

- 4.1 It is evident from the borough's demographic profile, that if past trends were to continue over the plan period, its population would result in an annual decline, with a household growth starting point of zero under the DCLG's new methodology. To support a reversal of this decline, an economic-led approach to OAN development is a key consideration.
- 4.2 The alignment of demographic and economic model forecasts is challenging due to different methodologies, data inputs and assumptions. Under the demographic scenarios developed in POPGROUP, it is possible to derive the size and structure of the labour force and the level of employment that an implied level of population change could support.
- 4.3 There are three key factors that link population and economic change: (1) economic activity rates; (2) unemployment rates; (3) a commuting ratio. Any changes to these assumptions will alter the size of the labour force and thus the level of employment that can be supported.
- 4.4 Forecasting changes to age-specific economic activity rates is a challenging proposition, particularly as many local authorities are faced with an ageing population. Economic activity rates determine the size of the resident labour force. Future economic activity rates are a key consideration in seeking to align demographic and economic growth. The Office for Budget Responsibility (OBR) has undertaken analysis of market trends in its 2017 Fiscal Sustainability Report<sup>5</sup>. Included within its analysis is a forecast of changing economic activity rates at national level for both males and females, extending to a long-term, 2066 forecast horizon.
- 4.5 In applying these OBR (2017) adjustments to local level economic activity rate statistics, it is evident that whilst there are adjustments to account for change in the SPA and an ageing population, the overall aggregate economic activity rate (16–89) for Barrow-in-Furness is estimated to decline, from 59.8% in 2016 to 56.8% by 2031.

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<sup>5</sup> [http://cdn.budgetresponsibility.org.uk/FSR\\_Jan17.pdf](http://cdn.budgetresponsibility.org.uk/FSR_Jan17.pdf)

- 4.6 The unemployment rate and commuting ratio determine the balance between the labour force and associated level of employment. Changes to each of these will alter the level of employment that can be supported.
- 4.7 The unemployment rate, determines the proportion of the labour force that is unemployed and as a result, the proportion that is employed. Unemployment rates in Barrow-in-Furness have varied over the 2004–2016 period, ranging from 4.8% in 2004 to 9.6% in 2011. In 2016, the unemployment rate for Barrow-in-Furness was recorded at 5.6%.
- 4.8 The commuting ratio determines the balance between the resident number of ‘workers’ (i.e. the employed labour force) and the level of employment that is in Barrow-in-Furness. A commuting ratio greater than 1.00 indicates a net out-commute (i.e. the number of resident workers in an area is greater than the number of jobs); whilst a commuting ratio less than 1.00 indicates a net in-commute (i.e. the level of employment is greater than the number of workers). The 2011 Census suggested a balanced commuting ratio for Barrow-in-Furness (i.e. the number of resident workers and employment was similar).
- 4.9 Applying the OBR changes to the borough’s economic activity rates over its plan period, whilst maintaining a fixed unemployment rate and commuting ratio, the annual employment growth that could be supported by the population change under each of the six demographic scenarios has been estimated (Figure 11).

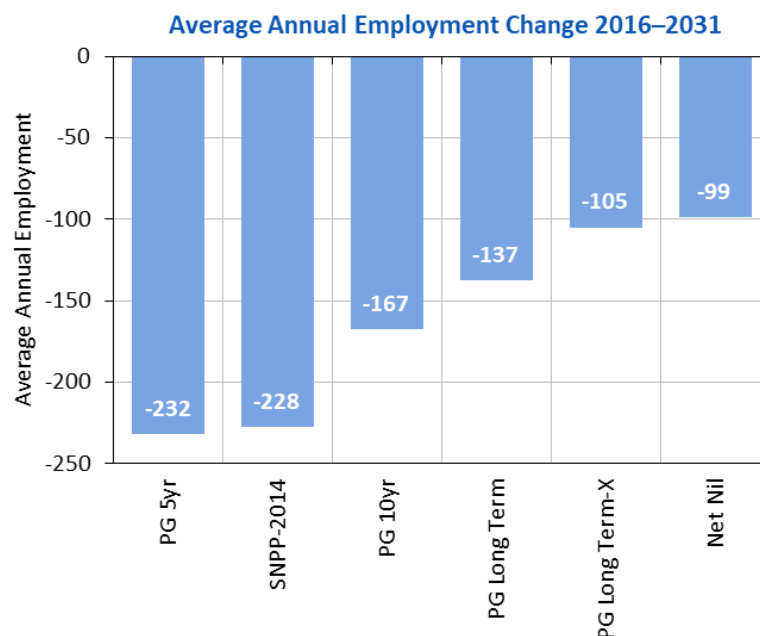


Figure 11: Barrow-in-Furness average annual employment change (2016–2031)

- 4.10 Each of the six scenarios results in population decline over the plan period, with significant ageing of the population profile. Coupled with the economic assumptions, these population growth trajectories would suggest an annual reduction in employment of between -232 and -99 per year (**PG 5yr** and **Net Nil** scenarios respectively).

## Economic Growth Forecasts

- 4.11 In the analysis undertaken in March 2017, two variations of the Experian (2016) employment forecasts were presented, assuming an average annual employment growth of +93 and +173 per year over the 2015/16–2030/31 forecast period<sup>6</sup>; significantly higher than that estimated for the demographic scenarios above.
- 4.12 A more up-to-date and post ‘Brexit’ economic forecast for Barrow-in-Furness is considered here, using data from the Cumbria Local Enterprise Partnership (LEP) Cambridge Econometrics model and key local employers. The employment forecast reflects the trajectory of growth expected in the borough, taking account of the anticipated change at key employment sites, specifically BAE Systems.
- 4.13 The ‘Baseline’ forecast for Barrow-in-Furness estimates an average employment growth of +355 per year to 2019/20. However, recognising that this growth may be only temporary, an annual decline in the borough’s employment total is anticipated to 2026/27, with a small annual increase thereafter (Figure 12). Over the full 2016–2031 plan period, the annual change in employment averages at -84 per year.

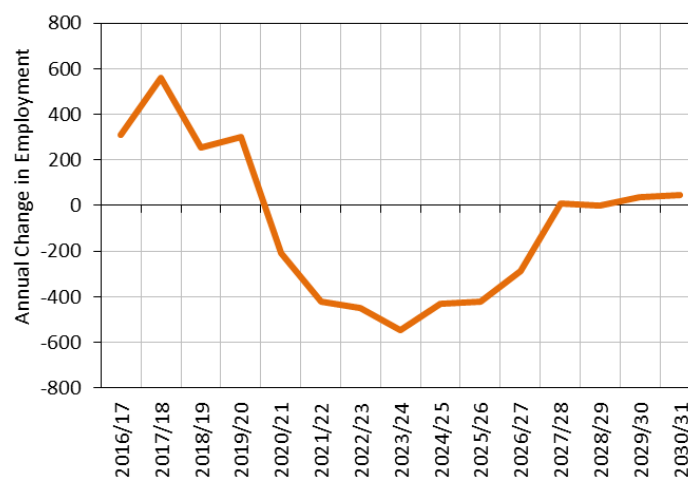


Figure 12: Annual change in employment (2016/17–2030/31)

<sup>6</sup> Note that the 2016 MYE was not published at the time of the analysis.

## Employment-led Scenario

- 4.14 Under the **Baseline** forecast, the annual change in employment over the 2016–2031 plan period, underpinned by the OBR assumptions on economic activity rates and fixed unemployment and commuting factors, results in a population growth of 0.2%. This population growth is driven by a small annual net in-migration flow (Table 4).
- 4.15 For comparison, if **Zero Change** in employment is assumed from 2016/17 onward, the level of population growth is higher than under each of the demographic scenarios (3.6%), primarily driven by increased net migration to maintain the current level of employment (Table 4).
- 4.16 Under the **Employment-led Baseline** scenario, the estimated change in population results in an average annual dwelling growth of +52 dpa over the 2016–2031 plan period (Table 4). Under the **Employment-led Zero Change** scenario, a higher average annual dwelling growth of +119 dpa is estimated to support the forecast level of population growth (2016–2031).

### Employment-led Scenario Outcomes

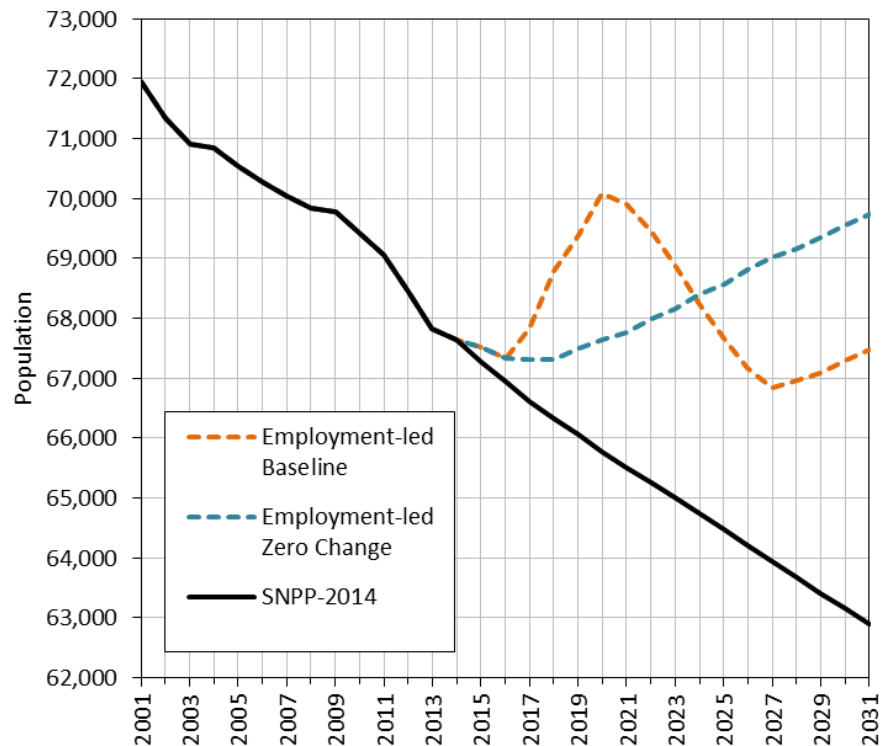


Figure 13: Barrow-in-Furness population change (2001–2031)

Table 4: Employment-led & SNPP-2014 scenarios 2016–2031

Scenario	Change 2016–2031				Average per year	
	Population Change	Population Change %	Households Change	Households Change %	Net Migration	Dwellings
Employment-led Zero Change	2,413	3.6%	1,693	5.5%	166	119
Employment-led Baseline	157	0.2%	733	2.4%	20	52
SNPP-2014	-4,034	-6.0%	-1,065	-3.5%	-219	-75

Note: Household change estimated using assumptions from the 2014-based household projection model.

# 5 Summary & Conclusion

- 5.1 Barrow-in-Furness' draft SHMA has identified an OAN of +133 dpa for the 2014–2031 plan period. The OAN was informed by an economic-led scenario that assumed an annual jobs growth target of +173 per year (2015/16–2030/31), with accompanying assumptions for the borough's commuting ratio and its economic activity rates.
- 5.2 Since the completion of the draft SHMA and prior to the submission of the Council's Local Plan, DCLG has published its Housing White Paper detailing a draft methodology for a more standardised approach to OAN calculation across local authorities in England. On the assumption that no local authority can have a target that implies a decline in housing numbers, the DCLG has assigned a zero dpa target for Barrow-in-Furness over the 2016–2026 period.
- 5.3 In addition to the new DCLG evidence, the 2016 MYEs have been published, providing an additional year of data on population change in Barrow-in-Furness. Furthermore, the OBR has published its new labour market analysis and a new economic forecast from the Cumbria LEP Cambridge Econometrics model has been considered alongside local evidence on future employment change.
- 5.4 In seeking to review its OAN and consider the latest demographic and economic evidence, a revised suite of population and economic growth forecasts has been presented for Barrow-in-Furness.

## Results

- 5.5 The demographic scenarios estimate a decline in Barrow-in-Furness' population over the 2016–2031 plan period, driven by the combined impact of an annual net out-migration flow and an ageing population.
- 5.6 Dwelling growth under the demographic scenarios ranges from -75 to +41 dpa over the 15-year plan period. Under the new DCLG methodology guidelines, the starting point OAN target for the borough zero dpa.

- 5.7 The latest economic forecast for the borough estimates an average annual employment change of -84 per year over the 2016–2031 plan period. Assuming no change in unemployment and commuting, plus OBR changes to economic activity rates, results in population change of 0.2% and an estimated growth of +52 dpa.
- 5.8 An assumption of ‘zero change’ in employment over the plan period, results in a higher level of population change (3.6%), with an estimated annual dwelling growth of +119 dpa over the plan period. This level of population and dwelling growth is higher than that estimated under the demographic scenarios.

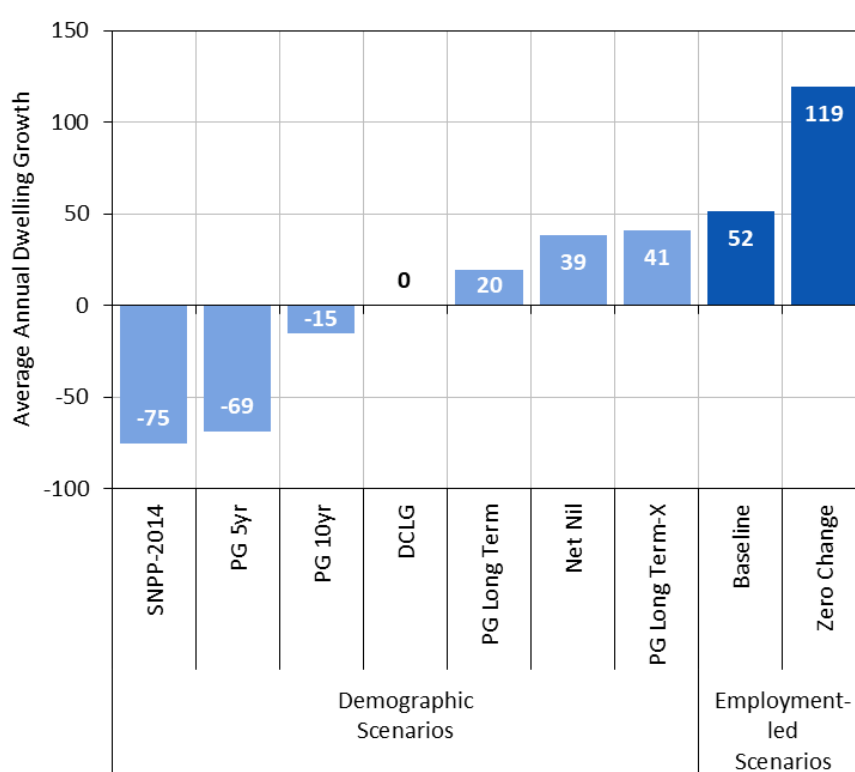


Figure 14: Average annual dwelling growth 2016–2031

- 5.9 The potential impact of higher household formation in the younger age groups has also been considered under the demographic and economic-led scenarios. This would result in the dwelling growth range increasing by approximately +6 per year under the ‘*Partial Return*’ headship rates. Conversely, if the council were to reduce its vacancy rate to the regional average over the plan period, the annual dwelling growth estimated under each of the scenarios would reduce by approximately 19–20 dpa.

5.10 In comparison to the new evidence presented here, the Council's original OAN estimate of 133 dpa would appear high. This total was driven by an anticipated annual employment growth profile for the borough that was considerably higher than that estimated in the latest evidence. Scenarios of demographic change based upon recent trends suggest a continued decline in the borough's population, with the DCLG's 'zero' OAN benchmark reflecting this. Whilst the latest employment forecasts do not suggest substantial growth in Barrow-in-Furness' economy over the plan-period, they do estimate a more positive dwelling growth requirement for the borough to 2031. The Council should reconsider its draft SHMA findings in the light of the new evidence presented here.



# Appendix A

## POPGROUP Methodology

### Forecasting Methodology

- A.1 Evidence is often challenged on the basis of the appropriateness of the methodology that has been employed to develop growth forecasts. The use of a recognised forecasting product which incorporates an industry-standard methodology (a cohort component model) removes this obstacle and enables a focus on assumptions and output, rather than methods.
- A.2 Demographic forecasts have been developed using the POPGROUP suite of products. POPGROUP is a family of demographic models that enables forecasts to be derived for population, households and the labour force, for areas and social groups. The main POPGROUP model (Figure 15) is a cohort component model, which enables the development of population forecasts based on births, deaths and migration inputs and assumptions.
- A.3 The Derived Forecast (DF) model (Figure 16) sits alongside the population model, providing a headship rate model for household projections and an economic activity rate model for labour-force projections.
- A.4 For further information on POPGROUP, please refer to the Edge Analytics website (<http://www.edgeanalytics.co.uk/>).

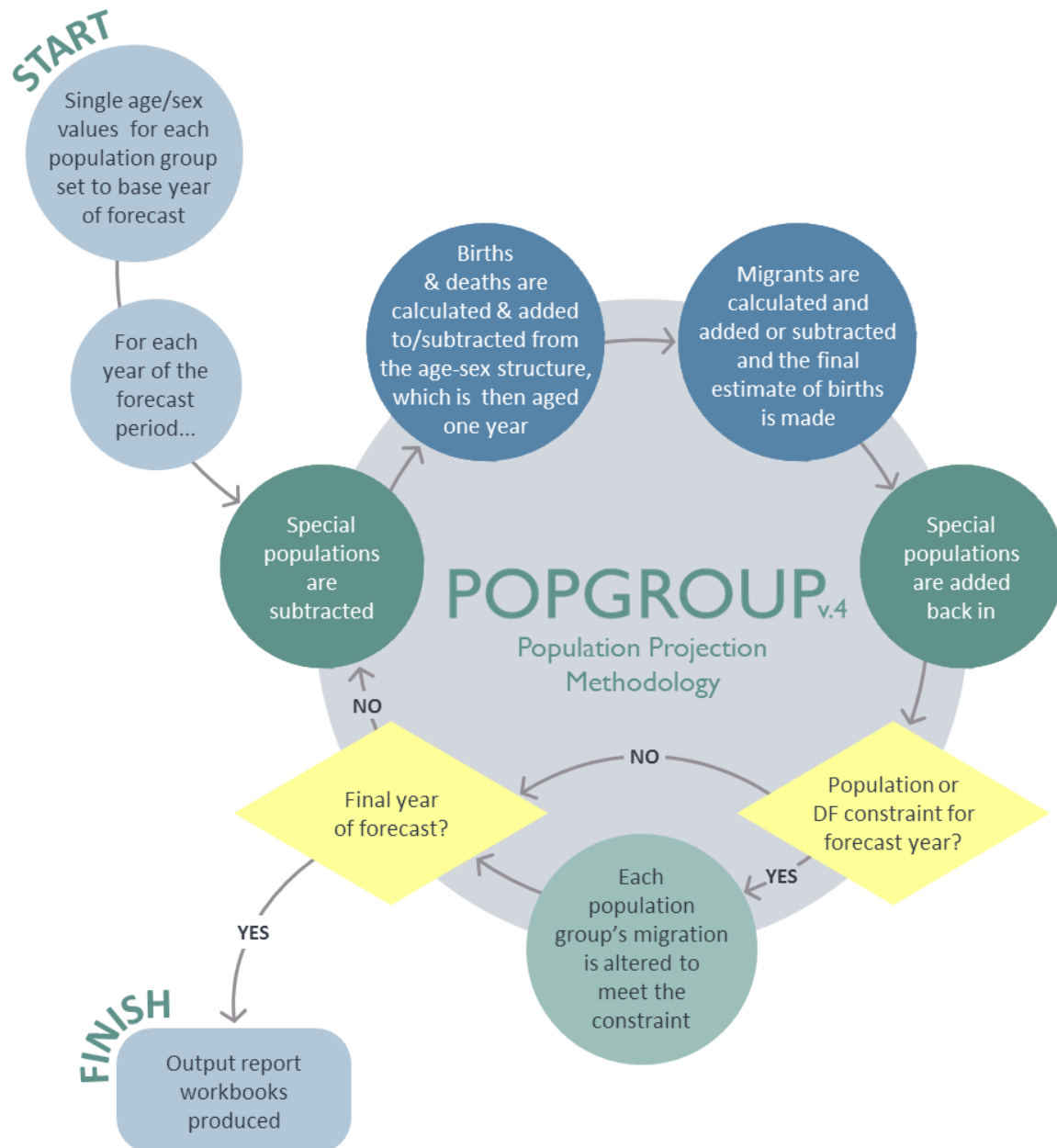
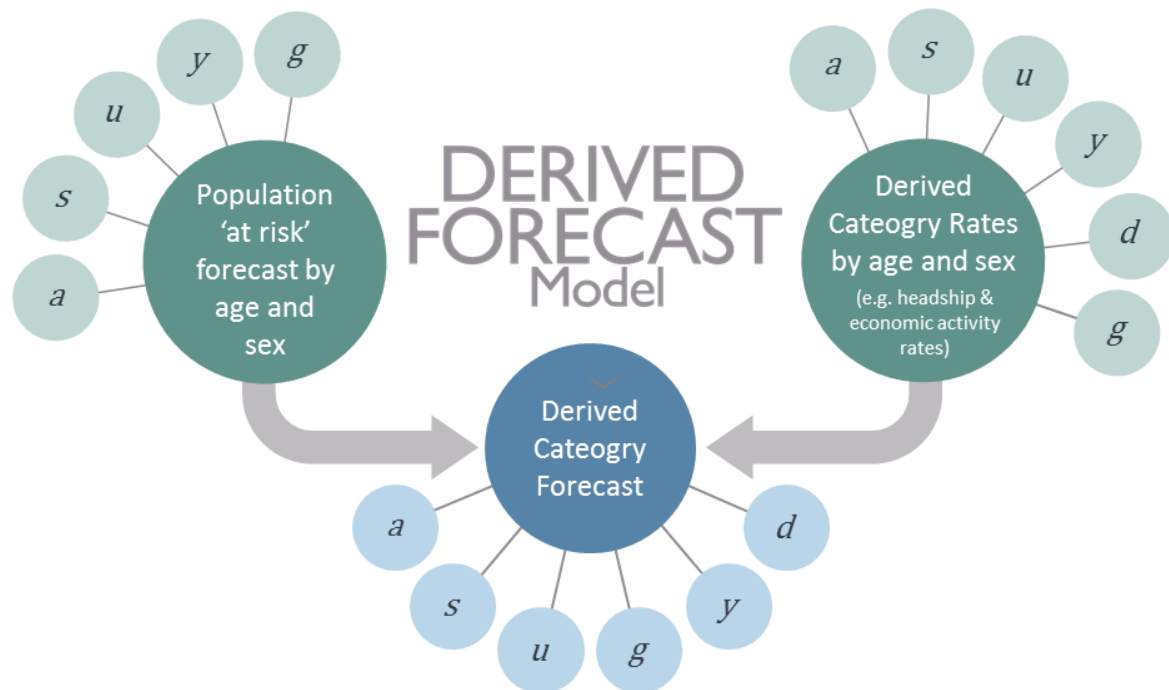


Figure 15: POPGROUP population projection methodology



$$D_{a,s,u,y,d,g} = \frac{P_{a,s,u,y,g} R_{a,s,u,y,d,g}}{100}$$

<i>D</i>	Derived Category Forecast	<i>y</i>	Year
<i>P</i>	Population 'at risk' Forecast	<i>d</i>	Derived category
<i>R</i>	Derived Category Rates	<i>g</i>	Group (usually an area, but can be an ethnic group or social group)
<i>a</i>	Age-group		
<i>s</i>	Sex		
<i>u</i>	Sub-population		

Figure 16: Derived Forecast (DF) methodology

# Appendix B

## Data Inputs & Assumptions

### Introduction

- B.1** Edge Analytics has developed a suite of demographic scenarios for Barrow-in-Furness using POPGROUP v.4 and the Derived Forecast model. The POPGROUP suite of demographic models draw data from a number of sources, building an historical picture of population, households, fertility, mortality and migration on which to base its scenario forecasts. Using historical data evidence for 2001–2016, in conjunction with information from ONS sub-national population projections (SNPPs) and DCLG household projections, a series of assumptions have been derived which drive the scenario forecasts.
- B.2** The following scenarios have been produced:
- SNPP-2014
  - Net Nil
  - PG 5yr
  - PG 10yr
  - PG Long-Term
  - PG Long-Term-X
  - Employment-led Baseline
  - Employment-led Zero Change
- B.3** In the following sections, a narrative on the data inputs and assumptions underpinning the scenarios is presented.

## Population, Births & Deaths

### Population

- B.4** In each scenario, historical population statistics are provided by the mid-year population estimates (MYEs), with all data recorded by single-year of age and sex. These data include the revised MYEs for 2002–2010, which were released by the ONS in May 2013. The revised MYEs provide consistency in the measurement of the components of change (i.e. births, deaths, internal migration and international migration) between the 2001 and 2011 Censuses.

- B.5 In the **SNPP-2014** scenario, the historical MYEs are used up to 2014. From 2014, future population counts are provided by single-year of age and sex to ensure consistency with the trajectory of the ONS 2014-based SNPP.
- B.6 In the other scenarios, the historical MYEs are used up to 2016.

## Births & Fertility

- B.7 In each scenario, historical mid-year to mid-year counts of births by sex have been sourced from the ONS MYEs.
- B.8 In the **SNPP-2014** scenario, historical births are used from 2001/02 to 2013/14. From 2014/15, future counts of births are specified, to ensure consistency with the 2014-based official projection.
- B.9 In all other scenarios, historical births are used from 2001/02 to 2015/16. From 2016/17, an area-specific age-specific rate (ASFR) schedule, derived from the ONS 2014-based SNPP, is included in the POPGROUP model assumptions. Long-term assumptions on changes in age-specific fertility rates are taken from the ONS 2014-based SNPP.
- B.10 In combination with the 'population-at-risk' (i.e. all women between the ages of 15–49), the area-specific ASFR and future fertility rate assumptions provide the basis for the calculation of births in each year of the forecast period (i.e. from 2016 onwards).

## Deaths & Mortality

- B.11 In each scenario, historical mid-year to mid-year counts of deaths by 5-year age group and sex have been sourced from the ONS MYEs.
- B.12 In the **SNPP-2014** scenario, historical deaths are used from 2001/02 to 2013/14. From 2014/15, future counts of deaths are specified, to ensure consistency with the 2014-based official projection.
- B.13 In all other scenarios, historical deaths are used from 2001/02 to 2015/16. From 2016/17, an area-specific age-specific mortality rate (ASMR) schedule, derived from the ONS 2014-based SNPP, is included in the POPGROUP model assumptions. Long-term assumptions on changes in age-specific mortality rates are taken from the ONS 2014-based SNPP.

- B.14 In combination with the ‘population-at-risk’ (i.e. the whole population), the area-specific ASMR and future mortality rate assumptions provide the basis for the calculation of deaths in each year of the forecast period (i.e. from 2016 onwards).

## Migration

### Internal Migration

- B.15 In each scenario, historical mid-year to mid-year estimates of internal in- and out-migration by 5-year age group and sex have been sourced from the ‘components of population change’ files that underpin the ONS MYEs. These internal migration flows are estimated using data from the Patient Register (PR), the National Health Service Central Register (NHSCR) and the Higher Education Statistics Agency (HESA).
- B.16 In the **SNPP-2014** scenario, historical counts of internal in and out-migrants are used from 2001/02 to 2013/14. From 2014/15, future counts of migrants are specified, to ensure consistency with the 2014-based official projection.
- B.17 In the **Net Nil** scenario, historical counts of internal in and out-migrants are used from 2001/02 to 2015/16. From 2016/17, the internal in- and out-migration net flows are set to zero in each year in the forecast period (i.e. in- and out-migration still occur but the net balance is zero).
- B.18 In the **PG** scenarios, historical counts of internal in and out-migrants are used from 2001/02 to 2015/16. From 2016/17, future internal migration flows are based on the area-specific historical migration data. In the **PG 5yr** scenario, a *five* year internal migration history is used (2011/12 to 2015/16). In the **PG 10yr** scenario, a *ten* year history is used (2006/07 to 2015/16). In the **PG Long-Term** and **PG Long Term-X** scenarios, a fifteen-year internal migration history is used (2001/02 to 2015/16).
- B.19 In the **PG** alternative trend scenarios, the relevant historical time period is used to derive the age-specific migration rate (ASMigR) schedules, which are then used to determine the future number of in- and out-migrants.
- B.20 In the case of internal in-migration, the ASMigR schedules are applied to an external ‘reference’ population (i.e. the population ‘at-risk’ of migrating into the area). This is different to the other components (i.e. births, deaths, internal out-migration), where the schedule of rates is applied to

the area-specific population (i.e. the population 'at-risk' of migrating out of the area). The reference population is defined by considering the areas which have historically contributed the majority of migrants into the area. In the case of Barrow-in-Furness, it comprises all districts which cumulatively contributed 70% of migrants into the Cumbria LEP over the 2008/09–2015/16 period.

- B.21** In the **Employment-led** scenarios (**Baseline** and **Zero Change**), historical counts of internal in and out-migrants are used from 2001/02 to 2015/16. From 2016/17, these scenarios then calculate their own internal migration assumptions to ensure an appropriate balance between the population and the targeted increase in the number of jobs that is defined in each year of the forecast period. A higher level of net internal migration will occur if there is insufficient population and resident labour force to meet the forecast number of jobs. In the **Employment - led** scenarios, the profile of internal migrants is defined by an ASMigR schedule, derived from the ONS 2014-based SNPP.

## International Migration

- B.22** Historical mid-year to mid-year counts of immigration and emigration by 5-year age group and sex have been sourced from the 'components of population change' files that underpin the ONS MYEs. Any 'adjustments' made to the MYEs to account for asylum cases are included in the international migration balance.
- B.23** In all scenarios, future international migrant counts are specified.
- B.24** In the **SNPP-2014** scenario, historical counts of migrants are used from 2001/02 to 2013/14. From 2014/15, the international in- and out-migration counts are drawn directly from the 2014-based official projection.
- B.25** In the **Net Nil** scenario, historical counts of international in and out-migrants are used from 2001/02 to 2015/16. From 2016/17, the international in- and out-migration net counts are set to zero in each year in the forecast period (i.e. in- and out-migration still occur but the net balance is zero).
- B.26** In the **PG** scenarios, historical counts of international in and out-migrants are used from 2001/02 to 2015/16. From 2016/17, future international migration counts are based on the area-specific historical migration data. In the **PG 5yr** scenario, a five year international migration history is

used (2011/12 to 2015/16). In the **PG 10yr** scenario, a ten year history is used (2006/07 to 2015/16). In the **PG Long Term** and **PG Long Term-X** scenarios, a fifteen-year history is used (2001/02 to 2015/16). In all **PG** scenarios, an ASMiGR schedule of rates is derived from the relevant migration history and is used to distribute future counts by single year of age.

**B.27** Implied within the international migration component of change in the **PG 5yr**, **PG 10yr** and **PG Long Term** scenarios is an 'unattributable population change' (UPC) figure, which ONS identified within its latest mid-year estimate revisions. The POPGROUP model has assigned the UPC to international migration as it is the component with the greatest uncertainty associated with its estimation. In the **PG Long Term-X** scenario, the UPC adjustment is excluded from the international migration assumptions.

**B.28** In the **Employment-led** scenarios (**Baseline** and **Zero Change**), historical counts of international in and out-migrants are used from 2001/02 to 2015/16. From 2016/17, international migration counts are taken from the ONS 2014-based SNPP (i.e. counts are consistent with the **SNPP-2014** scenario). An ASMiGR schedule of rates from the ONS 2014-based SNPP is used to distribute future counts by single year of age.

## Households & Dwellings

**B.29** The 2011 Census defines a household as:

*“one person living alone, or a group of people (not necessarily related) living at the same address who share cooking facilities and share a living room or sitting room or dining area.”*

**B.30** In POPGROUP, a dwelling is defined as a unit of accommodation which can either be occupied by one household or vacant.

**B.31** In all scenarios, the household and dwelling implications of the population growth trajectory have been evaluated through the application of headship rate statistics, communal population statistics and a dwelling vacancy rate. These data assumptions have been sourced from the 2001 and 2011 Censuses and the 2008-based and 2014-based household projection model from the DCLG. The 2014-based model was released by the DCLG in July 2016, and is underpinned by the 2014-based SNPP from ONS.



## Household Headship Rates

- B.32 A household headship rate (also known as household representative rate) is the *“probability of anyone in a particular demographic group being classified as being a household representative”*<sup>7</sup>.
- B.33 The household headship rates used in the POPGROUP modelling have been taken from the latest DCLG 2014-based household projection model, which is underpinned by the ONS 2014-based SNPP. The DCLG household projections are derived through the application of projected headship rates to a projection of the private household population. The methodology used by DCLG in its household projection models consists of two distinct stages:
- **Stage One** produces the national and local authority projections for the total number of households by sex, age-group and relationship-status group over the projection period.
  - **Stage Two** provides the detailed ‘household-type’ projection by age-group, controlled to the previous Stage One totals.
- B.34 In POPGROUP, the Stage One headship rates have been applied by 5-year age group, sex and relationship status. Three sets of headship rates have been applied to each scenario (Figure 17):
- **2014-based:** DCLG 2014-based headship rates
  - **2014-based Partial Return:** From 2014, the DCLG 2014-based headship rates for the 25–44 male and 25–34 female age groups return to a ‘mid-point’ between the 2008-based and 2014-based rate by 2033. No adjustments have been made to the other age groups.

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<sup>7</sup> Household Projections 2014-based: Methodological Report. Department for Communities and Local Government (February 2015). <https://www.gov.uk/government/statistics/2012-based-household-projections-methodology>

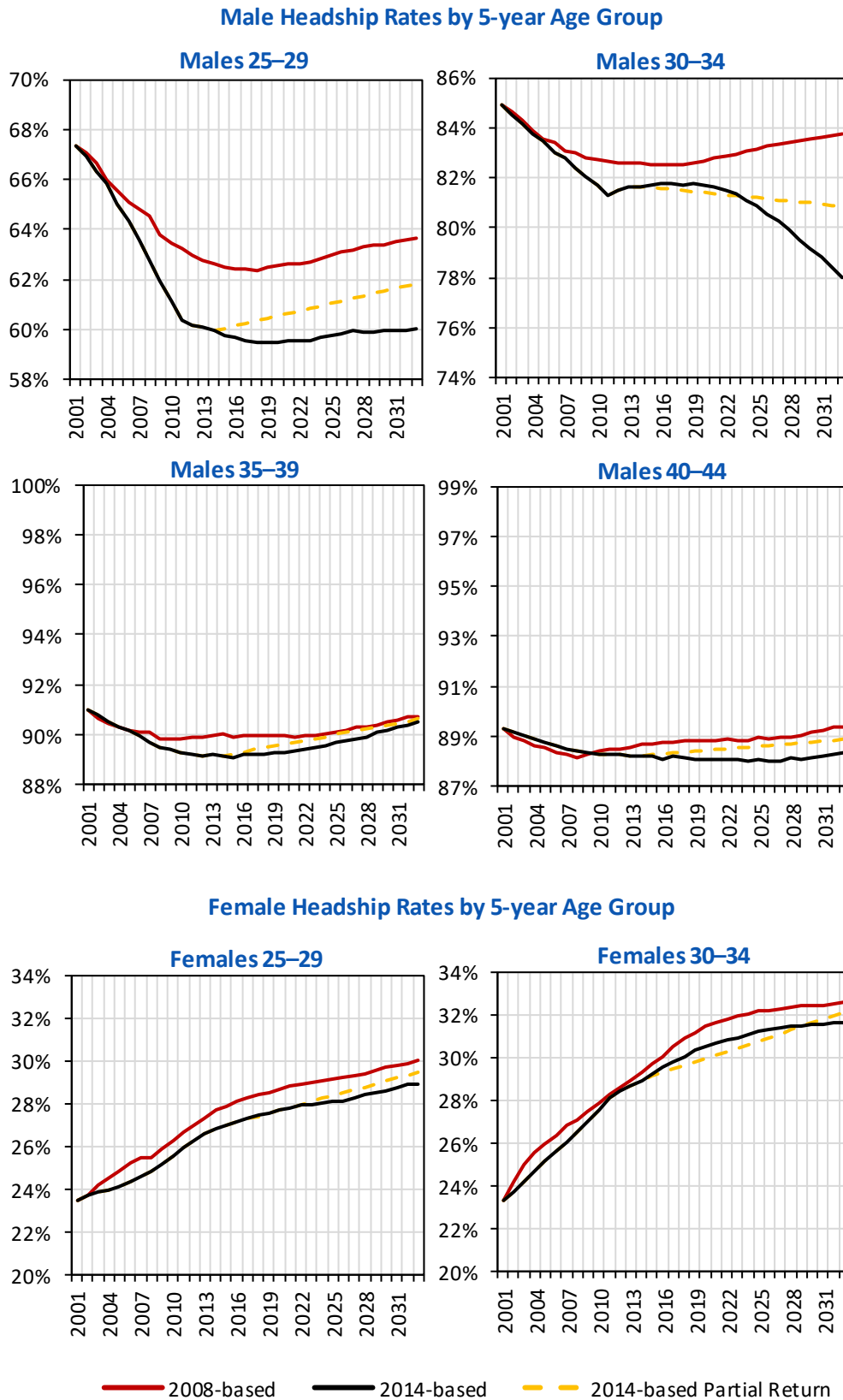


Figure 17: Headship rate sensitivities

## Communal Population Statistics

- B.35** Household projections in POPGROUP exclude the population ‘not-in-households’ (i.e. the communal/institutional population). These data are drawn from the DCLG 2014-based household projections, which use statistics from the 2011 Census. Examples of communal establishments include prisons, residential care homes and student halls of residence.
- B.36** For ages 0–74, the number of people in each age group not-in-households is fixed throughout the forecast period. For ages 75–85+, the proportion of the population not-in-households is recorded. Therefore, the population not-in-households for ages 75–85+ varies across the forecast period depending on the size of the population.

## Vacancy Rate

- B.37** The relationship between households and dwellings is modelled using a ‘vacancy rate’, sourced from the 2011 Census<sup>8</sup>. The vacancy rate is calculated using statistics on households (occupied household spaces) and dwellings (shared and unshared).
- B.38** Under all scenarios except the vacancy rate sensitivity, a rate of 5.4% for Barrow-in-Furness has been applied, fixed throughout the forecast period. Under the vacancy rate sensitivity scenario, the rate decreases from the 2011 census value of 5.4% in 2014 to 4.3% by 2031. Using the vacancy rate, the ‘dwelling requirement’ of each household growth trajectory has been evaluated.

## Economic Assumptions

### Economic Activity Rates

- B.39** The level of labour force participation is recorded in the economic activity rates. Economic activity rates by five year age group (ages 16–89) and sex have been derived from Census statistics.
- B.40** The Office for Budget Responsibility (OBR) has undertaken analysis of labour market trends in its 2017 Fiscal Sustainability Report<sup>9</sup>. Included within its analysis is a forecast of changing economic

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<sup>8</sup> Census Table KS401EW: Dwellings, household spaces and accommodation type

<sup>9</sup> [http://cdn.budgetresponsibility.org.uk/FSR\\_Jan17.pdf](http://cdn.budgetresponsibility.org.uk/FSR_Jan17.pdf)

activity rates for males and females, extending to a long-term 2066 forecast horizon. This forecast has been used to generate economic activity rates for Barrow-in-Furness, with adjustments made to all age groups (Figure 18). The economic activity rate adjustments have been applied in all demographic and employment-led scenarios.

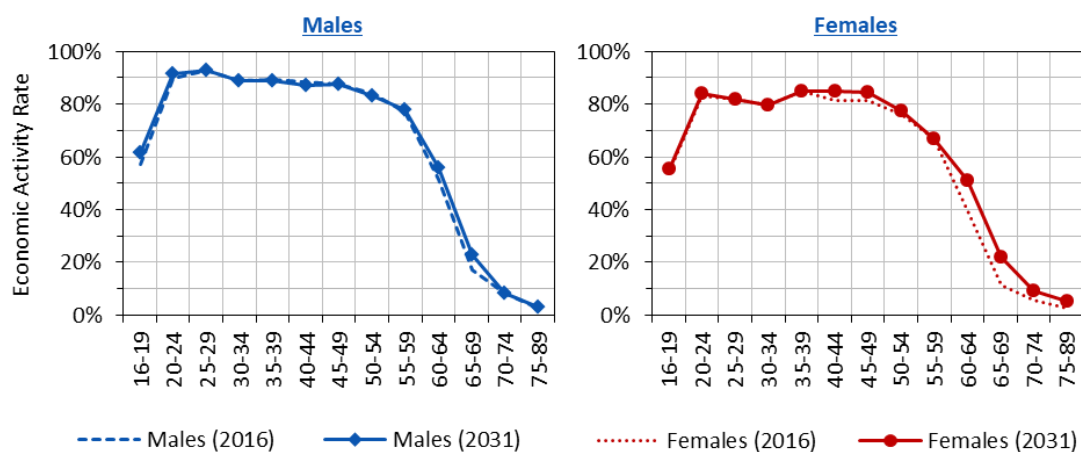


Figure 18: OBR economic activity rate profile for Barrow-in-Furness

## Commuting Ratio

**B.41** Commuting flows are the relationship between the number of workers living in Barrow-in-Furness and the employment available. The 2011 Census recorded 31,344 workers in Barrow-in-Furness, with 83.9% of these both living and working in the borough. Approximately 2,695 (8.6%) of the workers live in Barrow-in-Furness and work in South Lakeland, with 705 (2.2%) commuting to Copeland.

Table 5: Barrow-in-Furness 2011 census commuting flows: workers (ages 16+)

Where do people who <u>live</u> in Barrow-in-Furness work?			Source: ONS
Live	Work	Number	%
<b>Barrow-in-Furness</b>	Barrow-in-Furness	26,292	83.9%
	South Lakeland	2,695	8.6%
	Copeland	705	2.2%
	Carlisle	260	0.8%
	Offshore	207	0.7%
	Lancaster	177	0.6%
	Allerdale	170	0.5%
	Eden	130	0.4%
	Scotland	71	0.2%
	Other	637	2.0%
<b>Workers</b>		<b>31,344</b>	<b>100.0%</b>

Table 6: Barrow-in-Furness 2011 census commuting flows: employment (ages 16+)

Where do people who <u>work</u> in Barrow-in-Furness live?			Source: ONS
Live	Work	Number	%
Barrow-in-Furness	Barrow-in-Furness	26,292	83.5%
South Lakeland		3,324	10.6%
Copeland		526	1.7%
Allerdale		278	0.9%
Carlisle		218	0.7%
Lancaster		198	0.6%
Other		642	2.0%
Employment		31,478	100.0%

**B.42** In terms of employment, the majority of the jobs are taken up by the local workforce (83.5%), with 10.6% (3,324) travelling from South Lakeland. A smaller proportion (1.7%) live in Copeland and commute to Barrow-in-Furness for employment.

**B.43** In the 2011 Census, Barrow-in-Furness had a relatively balanced number of workers and jobs, resulting in a balanced commuting ratio of 1.00. This balance between the number of workers and jobs changed marginally compared to 2001, in which a small net outward commuting ratio of 1.01 was evident.

Table 7: Barrow-in-Furness Census travel-to-work commuting ratios, ages 16+

Barrow-in-Furness		2001 Census	2011 Census
<b>Workers</b>	<i>a</i>	28,793	31,344
<b>Jobs</b>	<i>b</i>	28,591	31,478
<b>Commuting Ratio</b>	<i>a/b</i>	<b>1.01</b>	<b>1.00</b>

Note: 2001 data from Census Table *T101 – UK Travel Flows* ; 2011 data from Census Table *WU02UK - Location of usual residence and place of work by age* .

B.44 In all demographic and employment-led scenarios, a fixed commuting ratio of 1.00 has been applied throughout the forecast period.

## Unemployment Rate

B.45 The unemployment rate, together with the commuting ratio, controls the balance between the size of the labour force and the number of jobs available within an area. In all scenarios, historical unemployment rates are defined up to 2016 (Figure 19), and remain fixed at the current value throughout the forecast period.

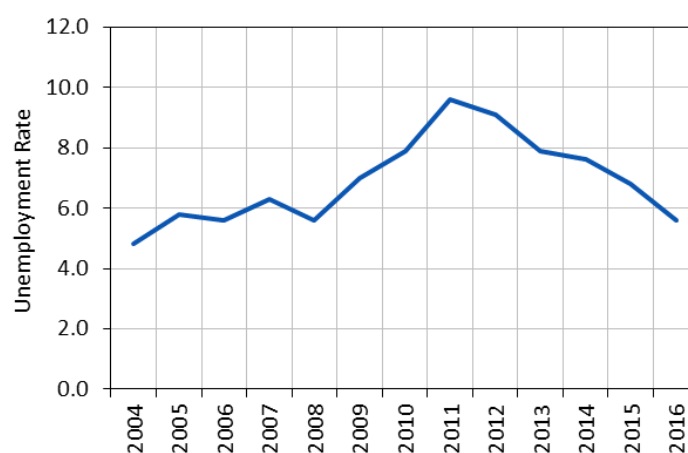


Figure 19: Barrow-in-Furness' historical unemployment rate 2004–2016