Cairngorms
NATIONAL PARK
Pàirc Nàiseanta a' Mhonaidh Ruaidh

PLANNING

Cairngorms National Park Local Development Plan 2020

Strategic Environmental Assessment Scoping Report September 2016

Appendix 2: Environmental Baseline
Topic 1: Climatic Factors

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Topic 1: Climatic Factors

> "*In recent decades, changes in climate have caused impacts on natural and human systems on all continents and across the oceans.*"
>
> Intergovernmental Panel on Climate Change (2014).

Scotland has a temperate climate with cool summers and mild winters. As a whole it is influenced by predominantly westerly depressions alternating with less frequent settled periods. A range of factors, including topography, latitude and altitude, affect these weather systems at a more local level.

Rainfall is spread throughout the year but there are regional differences. For example, the easterly position of the Cairngorms massif results in a climate that is less oceanic, and therefore drier, than the west of Scotland. The mountains exert a noticeable rain shadow effect that reduced the amount of rainfall on the eastern side of the country.

Scotland is currently experiencing climate change, which owing to the global emission of greenhouse gasses, is likely to continue into the future. The effects of this are likely to include:

- hotter, drier summers;
- milder, wetter autumns and winters.
- increased frequency and intensity of extreme rainfall; and
- reduced snowfall.

Past Trends

The 20th and 21st centuries have already seen a rise in average maximum and minimum temperatures throughout Scotland. This trend is reflected in the Cairngorms National Park, as demonstrated by historical data provided by the Breamar weather station (**Figure 4**). Records from the weather station also indicate that the National Park is experiencing a decrease in the number of days of air frost and an increase in annual rainfall (**Figure 5** and **Figure 6**). This is consistent with broader trends across Scotland.

Climate Projections

Climate Change projections are available from The UK Climate Projections (UKCP09) website, which is the leading source of climate information for the UK and its regions. Probabilistic projections are available for high, medium and low emission scenarios at resolutions as fine as 25km^2. It is possible therefore to analyse data for the area in which Braemar sits (Grid Box No. 612) (see **Figure 7** and **Figure 8**). It is recognised that this is a blunt proxy for the National Park as a whole, however it is useful in when taken together with the historic climate data taken from the Braemar Weather Station. How this change relates to the UK as a whole is presented in **Figure 9**, **Figure 10** and **Figure 11**.

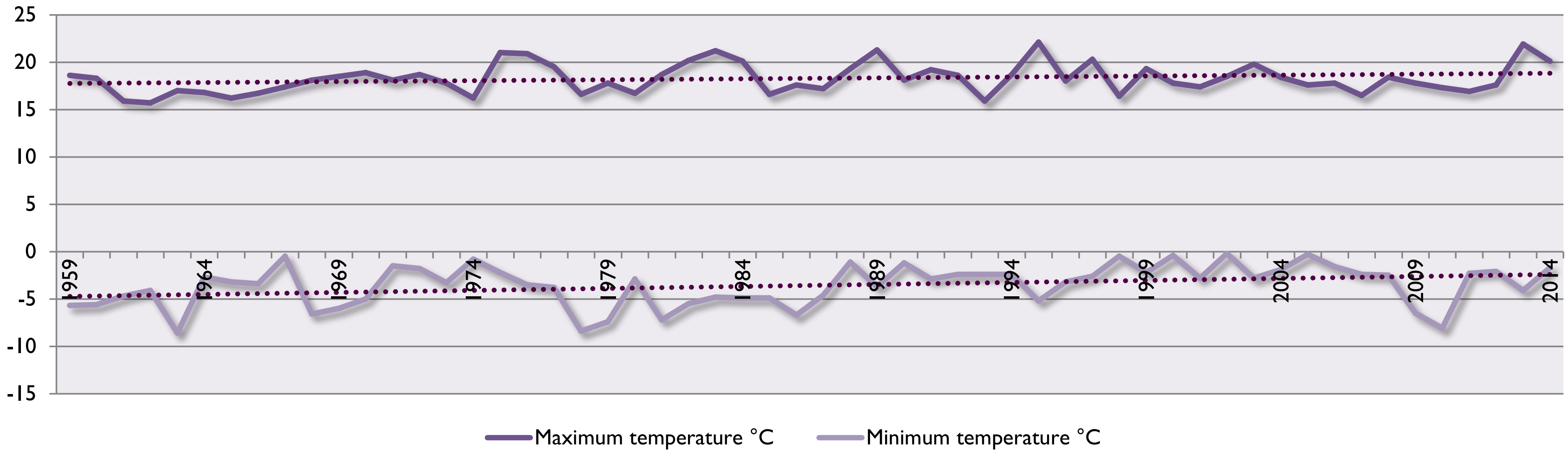

Figure 4 Maximum and minimum annual temperatures at Braemar Weather Station (Met Office, 2015).

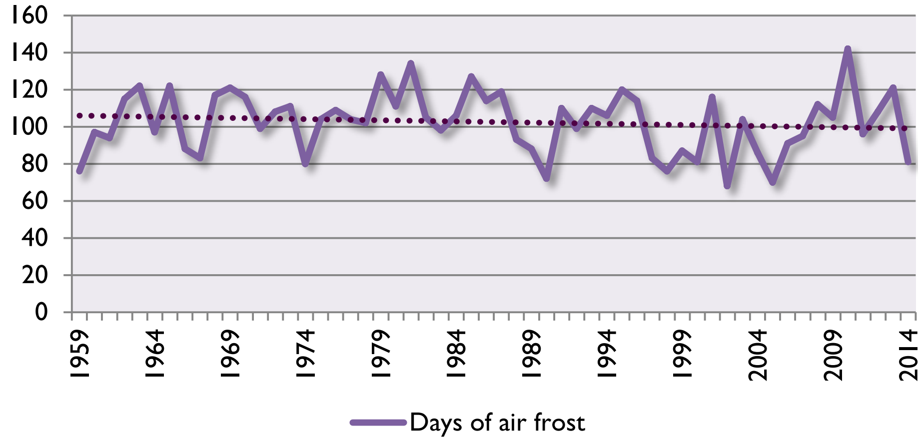

Figure 5 Days of frost at Braemar Weather Station (Met Office, 2015).

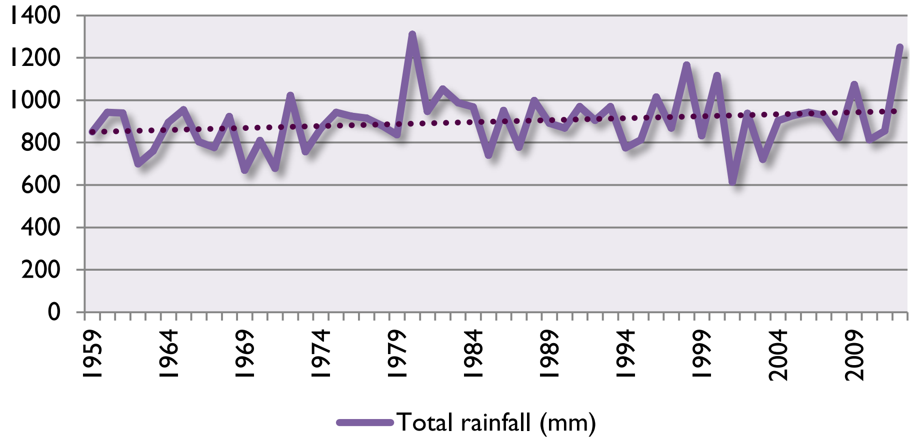

Figure 6 Total Rainfall at Braemar Weather Station (Met Office, 2015).

In summary from the benchmark of 2009, by 2050, under the medium emissions scenario, the central estimate (50% probability level) for Braemar is for a:

- 2.4°C increase in mean annual temperature,
- 2.7°C increase in mean summer temperature,
- 2.1°C increase in mean winter temperature,
- 0.07% increase in mean annual precipitation, but with a
- 13.5% decrease in mean summer precipitation, and a
- 2% decrease in mean winter precipitation.

Although precipitation rates only show a relatively small net annual increase, as well as summer and winter decreases by 2050, it should be noted that this is but a snapshot. Annual precipitation between 2030 and 2059 is projected to be higher, at around 0.3% greater than in 2009.

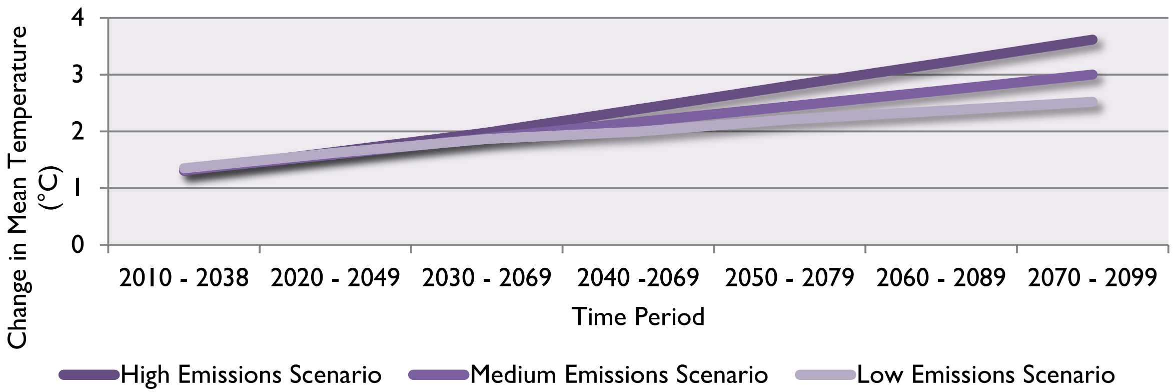

Figure 7 Central estimate for mean change in annual temperature for Grid Box No. 612 (Braemar area).

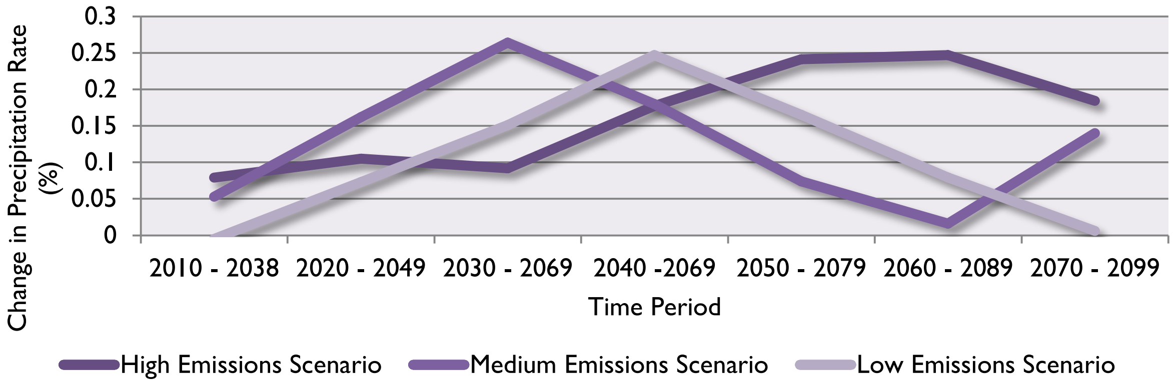

Figure 8 Central estimate for mean change in precipitation for Grid Box No. 612 (Braemar area).

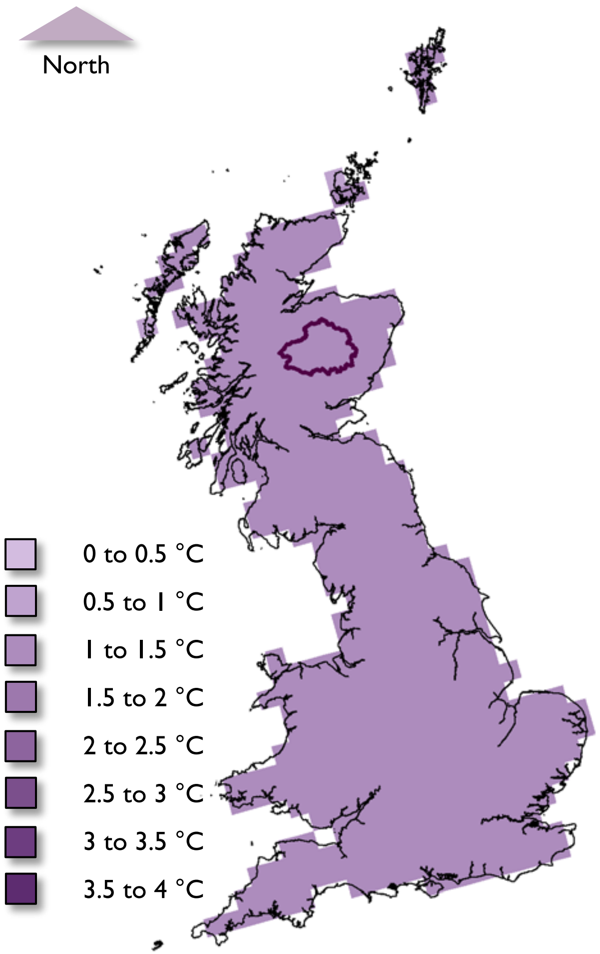

Figure 9 Mean annual temperature increase 2020s. Medium emissions scenario, central estimate.

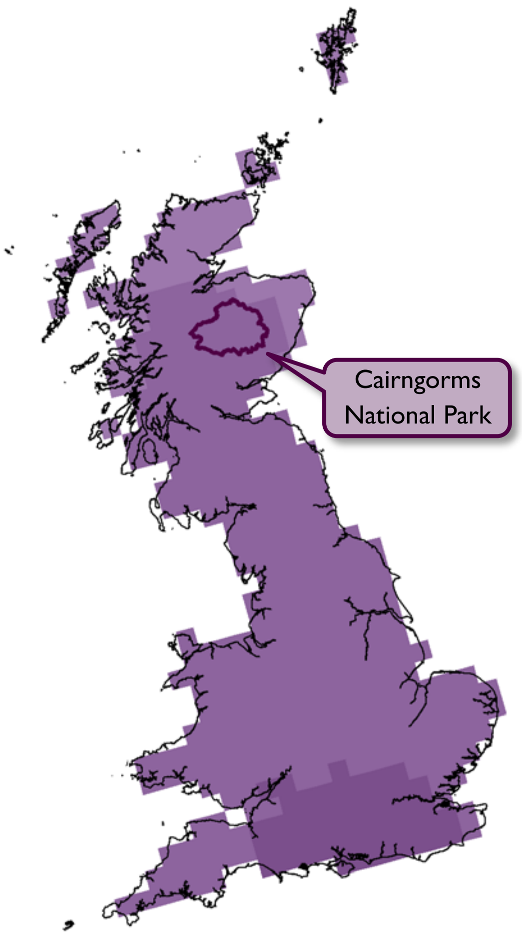

Figure 10 Mean annual temperature increase 2040s. Medium emissions scenario, central estimate.

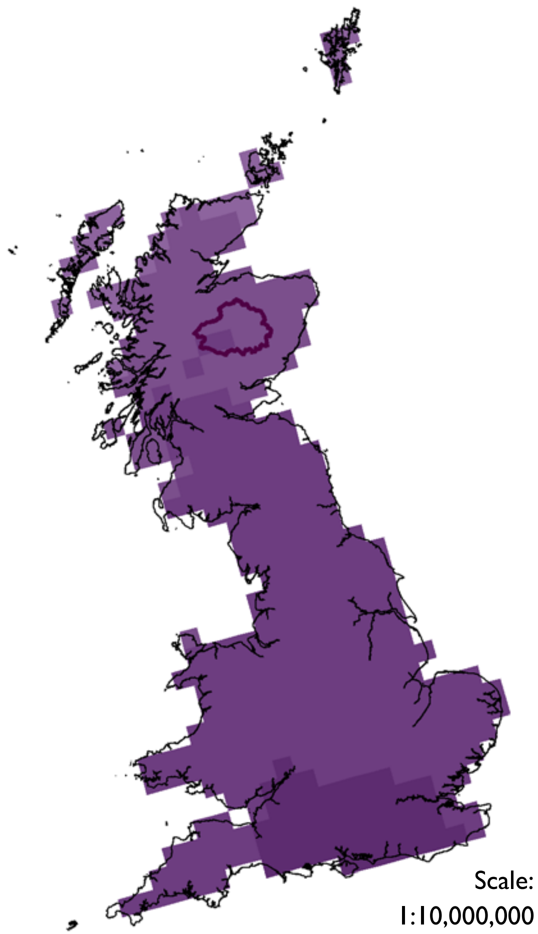

Figure 11 Mean annual temperature increase 2080s. Medium emissions scenario, central estimate.

It should also be noted that the use of the medium emissions scenario combined with the central probability projection represents a relatively conservative picture of the area's possible future climate. Adjusting these variables, particularly the emissions scenario, can lead to more serious projections, which at the time of writing cannot be discounted. Even with the conservative estimates provided in this summary an annual increase in mean temperature of 2.4°C would leave the National Park with some serious challenges to face.

Greenhouse Gas Emissions

The causes of climate change are clearly greater than local in scale and there is a strong global consensus that a reduction in greenhouse gas emissions is needed to avoid some significantly adverse effects. The Climate Change (Scotland) Act 2009 has introduced legislation to reduce Scotland's greenhouse gas emissions by at least 80% by 2050 against a 1990 baseline. In recent years, increasing emphasis has been placed

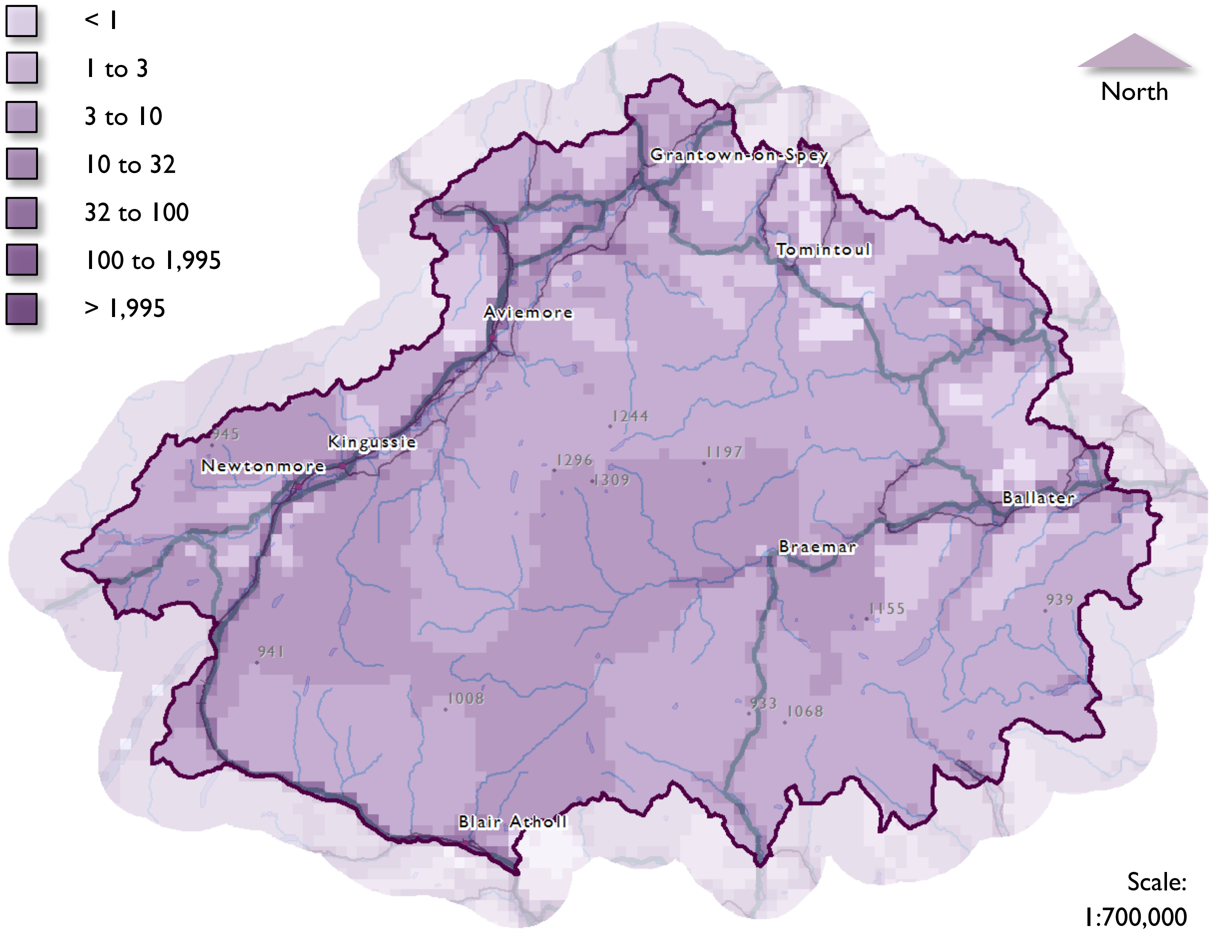

Figure 12 Carbon Dioxide (as Carbon) Emissions in tonnes for the Cairngorms National Park in 2012.

on the role of regional bodies and local government in contributing to energy efficiency improvements, and hence reductions in carbon dioxide emissions. It is clear therefore that the LDP has a role in meeting this target.

Estimates of carbon dioxide emissions for Local Authority (LA) areas for 2005-2013 are available from The Department for Energy and Climate Change (DECC). Carbon dioxide emissions contribute the greatest proportion of total greenhouse gas emissions in the UK, accounting for around 82% in 2013 (Department of Energy and Climate Change, 2015). Annualised data for the UK's national parks is not available and therefore to get an approximation of the Cairngorms National Park's contribution (**Figure 12**) further assumptions need to be made.

Mid-year population estimates have been used as a proxy for proportionally attributing the emissions of the LAs that cover the National Park's area to the National Park itself. It is recognised that this is a blunt means of estimation, particularly in terms of commercial and transport data; indeed estimates based on estimates should always be treated with caution. However, in the absence of a detailed carbon-audit, the figures presented in **Table 7**, **Figure 13** and **Figure 14** offers a 'best-guess' and a generalised baseline for measurement over the plan period.

Table 7 Estimated CO_2 Emissions for the Cairngorms National Park. Based on Department of Energy and Climate Change (2015).

Year	Industry and Commercial (kt CO_2)	Domestic (kt CO_2)	Road Transport (kt CO_2)	Total (kt CO_2)[3]	Population (mid-year estimate)	Per Capita Emissions (t)
2005	71.7	59.5	48.5	179.8	17,264	11.0
2006	72.3	61.3	49.6	183.3	17.590	11.1
2007	72.0	60.0	50.2	182.2	17,835	10.8
2008	69.7	60.4	48.1	178.2	18,024	10.5
2009	61.6	55.7	47.4	164.6	18,061	9.5
2010	68.9	60.0	47.5	176.4	18,366	10.0
2011	63.3	52.0	46.6	161.8	18,461	9.1
2012	61.2	53.0	45.8	160.0	18,583	8.9
2013	61.1	49.1	45.9	156.7	18,420	8.7

[3] Figures may not sum due to rounding.

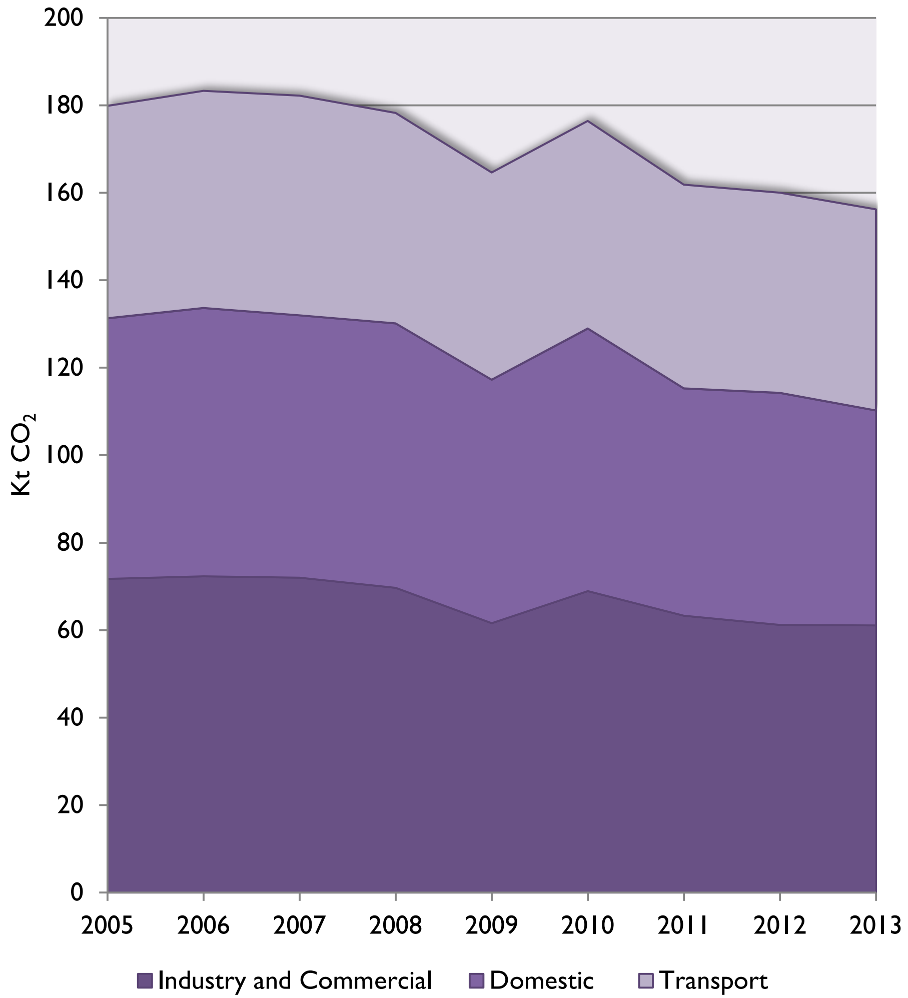

Figure 13 Estimated CO_2 Emissions for the Cairngorms National Park by sector.

Based on Department of Energy and Climate Change (2015).

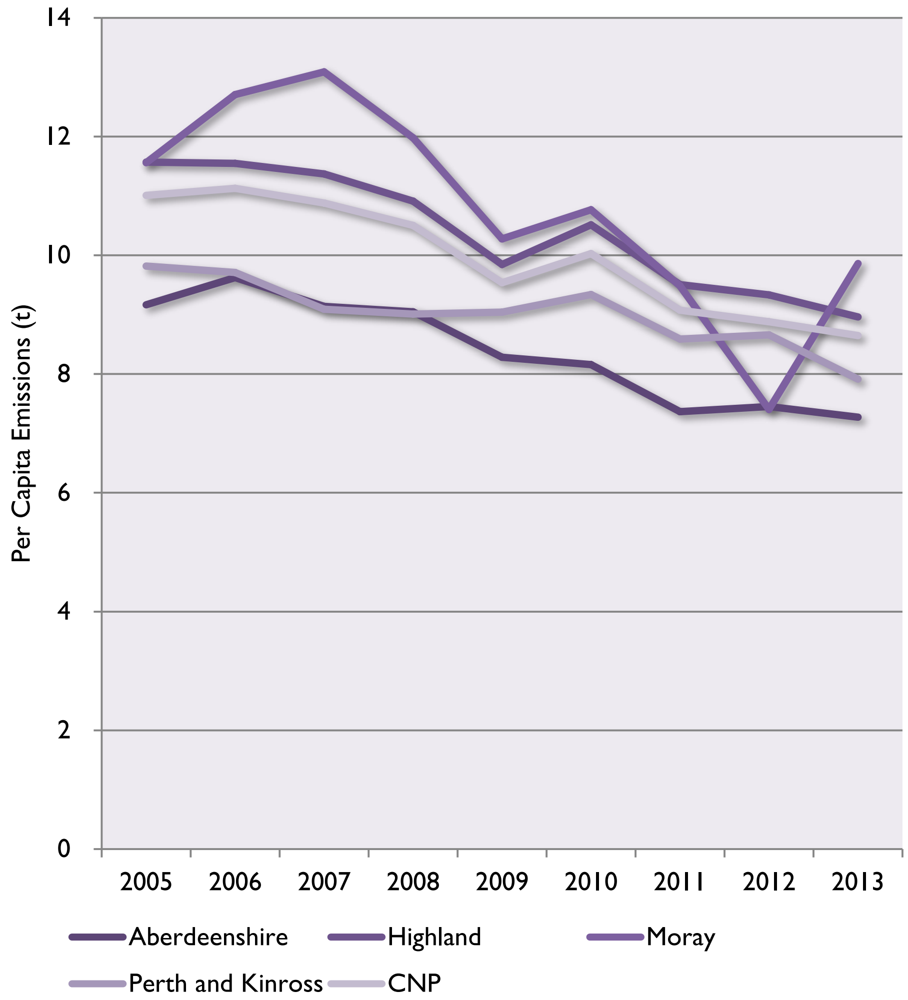

Figure 14 Estimated Per Capita CO_2 Emissions for the Cairngorms National Park by Local Authority.

Emissions from motorways, diesel railways, land use, land use change and forestry and EU ETS industrial installations are absent from the national dataset, while for the purpose of the estimates in this document, emissions for 'Large Industrial Installations' have been removed while emissions from gas, a fuel source that is only available via private supply the National Park, have been subsumed as a generalised source of emissions into the overall 'Industry and Commercial' and 'Domestic' categories of the table. The energy consumed by the comparatively high number tourists and visitors to the National Park have not been adjusted for. It should also be noted that estimating the population of the National Park is not a simple task either as data-zone[4] boundaries do not exactly match the National Park's boundary. Further information on the methodology used to identify boundaries and statistical areas used in the analysis of the Cairngorms National Park can be found in **Appendix 3.**

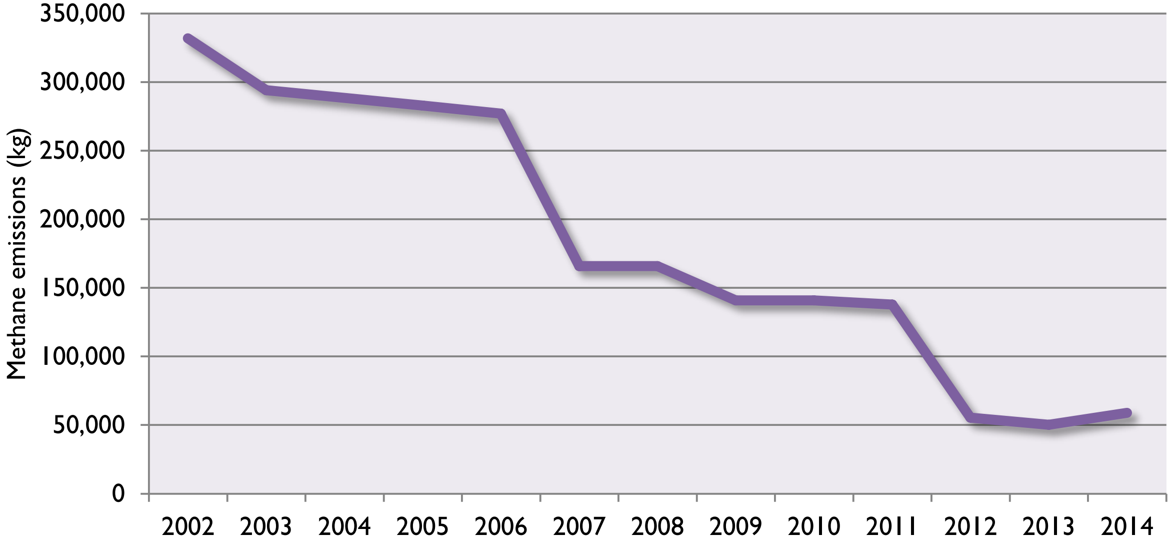

Figure 15 Estimated levels of methane released from Granish Landfill Site, Aviemore 2002-2014 (Source: http://apps.sepa.org.uk/SPRIPA/Search/ViewReturn.aspx?returnId=29355).

The most recently available data relates to 2012, and estimates that per capita emissions in the National Park are 8.9 tonnes of CO_2, which is above the Scottish average of 6.8 tonnes of CO_2 per capita. This may be attributed to the deeply rural nature of the National Park and the consequent reliance on private motor vehicles as a mode of transport (see **Figure 60** to **Figure 74** and **Figure 166** and **Figure 167**). Nevertheless, there is an indication that per capita emissions are on a downward trend, which is consistent with the national situation.

This is supported by information from the only facility within the National Park that contributes towards the Scottish Pollutant Release Inventory (SPRI) - Granish Landfill site, which is operated by the Highland Council (**Figure 15**). Estimates of the site's methane emissions are available as far back as 2002, with data suggesting a net decrease of 273,100 kg from that year.

[4] The data zone is the key small-area statistical geography in Scotland.

Key Messages

Climate change is set to affect the Cairngorms National Park with the UK's climate projections offering a central estimate of a 2.4°C increase in mean annual temperature.

The drivers of climate change are greater than the National Park, however it is estimated that the Park is contributing towards a nationwide reduction in GHG emissions with per capita emissions falling to 8.9 tonnes in 2011.

The LDP may have an effect on GHG, particularly through its influence over the scale and location of development. Design policies may also play a role, as the implementation of food design should consider the energy efficiency of buildings as an integral factor.

Inter-relationships with other topics