Pembrokeshire Coast National Park

Management Plan (2015-2019)
Local Development Plan 2
(2015-2031)

Background Paper No *: Carbon Sources

March 2018

Pembrokeshire Coast National Park Authority

Contents

1.0 Introduction

1.1 This paper analyses the modelled data for CO_2 emissions produced by the National Atmospheric Emissions Inventory (NAEI) to determine the principal sources of CO_2 in the Pembrokeshire Coast National Park and the surrounding area, and the distribution of those sources.

2.0 Method

2.1 The data source for this investigation is the mapped atmospheric emissions data published by the NAEI. The NAEI is funded by Defra, The National Assembly for Wales, The Scottish Executive and The Department of Environment, Northern Ireland. The NAEI compiles estimates of emissions to the atmosphere from UK sources such as cars, trucks, power stations and industrial plant. These emissions are estimated to help to find ways of reducing the impact of human activities on the environment and our health.

2.2 The data are modelled estimates of emissions of CO_2 for one kilometre square resolution grids covering the whole of the UK, therefore they provide a high degree of geographic detail and allow analysis of emissions even for small areas such as the Pembrokeshire Coast National Park. The estimates are based on an emissions factor (e.g. the amount of CO_2 produced per tonne of coal), multiplied by the activity rate in the one km^2 grid square (e.g. the amount of activity that involves burning coal). A detailed statement of the method used can be found in the document *UK Emission Mapping Methodology: A report of the National Atmospheric Emissions Inventory 2015*[1].

2.3 The data are estimates for 2015, published in the inventory year 2015[2], and are the latest estimates available. The data were downloaded from

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[1] Available from https://uk-air.defra.gov.uk/assets/documents/reports/cat07/1710261436_Methodology_for_NAEI_2017.pdf

[2] The National Atmospheric Emissions Inventory (NAEI) for the United Kingdom presents emissions from 1970 onwards. Each year the time series of emissions is extended by one year. Historic data may also be revised depending on revisions in the:

1. methods used to produce the emission estimates
2. emission factors used (for example, kg of CO2 released per tonne of coal burnt)
3. activity data used (for example, the estimate of distances driven by vehicles on UK roads)

the NAEI website on 29th January 2018 as ArcInfo export grid (ASCII) files. Using QGIS's Raster Zonal Statistics tool, zonal emissions statistics were calculated for the areas of Carmarthenshire, Ceredigion, Pembrokeshire, Pembrokeshire Coast National Park and the area of Pembrokeshire outside of the National Park, and a coastal area surrounding Pembrokeshire (see map 1). It should be noted that the 1km grid size means that many grid squares overlap the boundaries of the analysis areas and therefore the zonal statistics will represent, albeit close, approximations to what would be the true modelled estimate for the areas.

Map 1: Analysis zones

2.4 The area of each of the zones used in analysis was calculated from boundary files using QGIS 2.14.22 (Essen). The total length of roads in each zone was calculated from Ordnance Survey ITN data using QGIS 2.14.22 (Essen). The number of households in each zone is that given by the 2011 Census (number of household spaces with residents) as is

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This means that data presented for a certain year in the most current inventory may differ from that presented for the same year in previous editions.

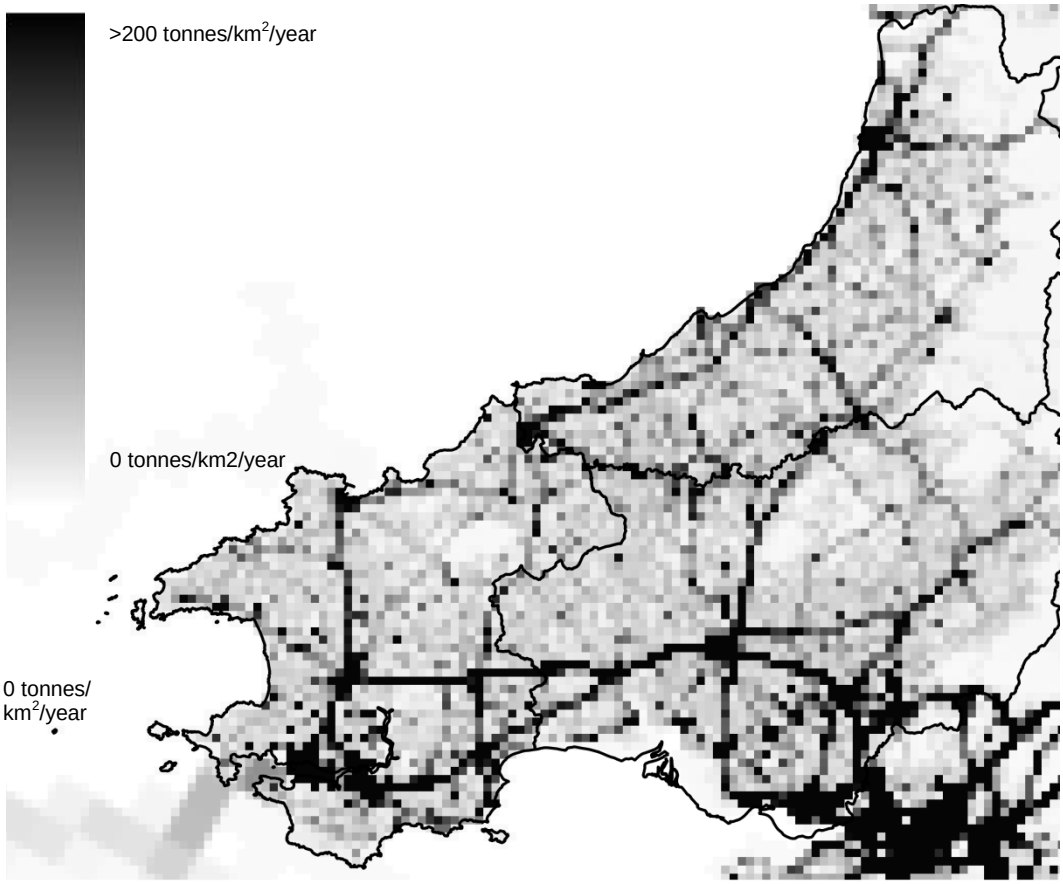
the number of manufacturing jobs (number of people aged 16-74 employed in manufacturing). These variables are presented in table 1.

Zone	Area (km^2)	Total length of roads*	Number of households	Number of manufacturing jobs
Pembrokeshire county	1,650	3055	53,122	4,116
Pembrokeshire Coast National Park	609	899	10,277	665
Pembrokeshire outside the National Park	1,040	2140	42,845	3,451
Carmarthenshire county	2,439	4256	78,829	7,021
Ceredigion county	1,806	2658	31,562	1,695

Table 1: characteristics of analysis zones (*ITN data for: Motorways, A roads, B roads, Minor roads and local streets. Excludes: Private and restricted routes, alley ways and pedestrianized streets)

3.0 All Sources

3.1 Map 2 shows the distribution of total CO_2 emissions from all sources, other than point sources, in southwest Wales.



Map 2: emissions of CO2 in Carmarthenshire, Ceredigion and Pembrokeshire

3.2 Chart 1 shows the CO_2 emissions from all sectors, excluding point sources, per square kilometre of the analysis zone. Chart 2 shows the percentage contribution of each principal sector in each analysis zone.

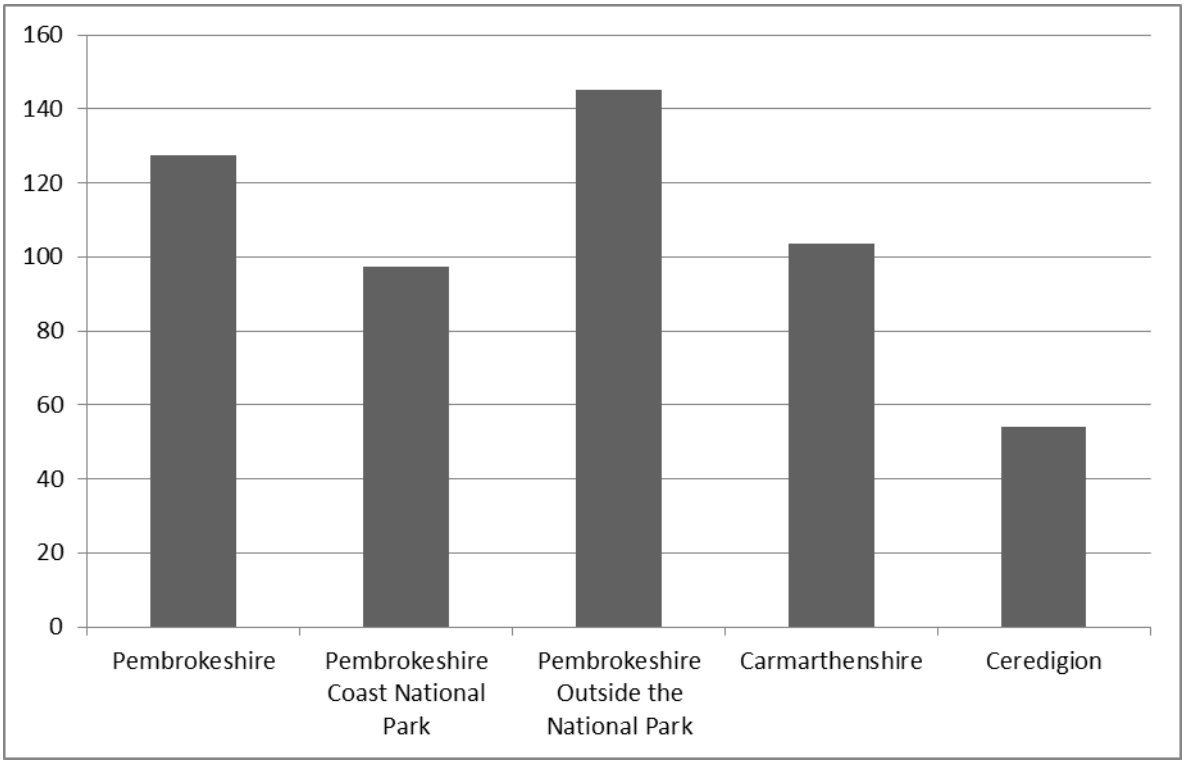


Chart 1: total emissions, excluding point sources, tonnes of carbon per km^2 (NAEI 2015)

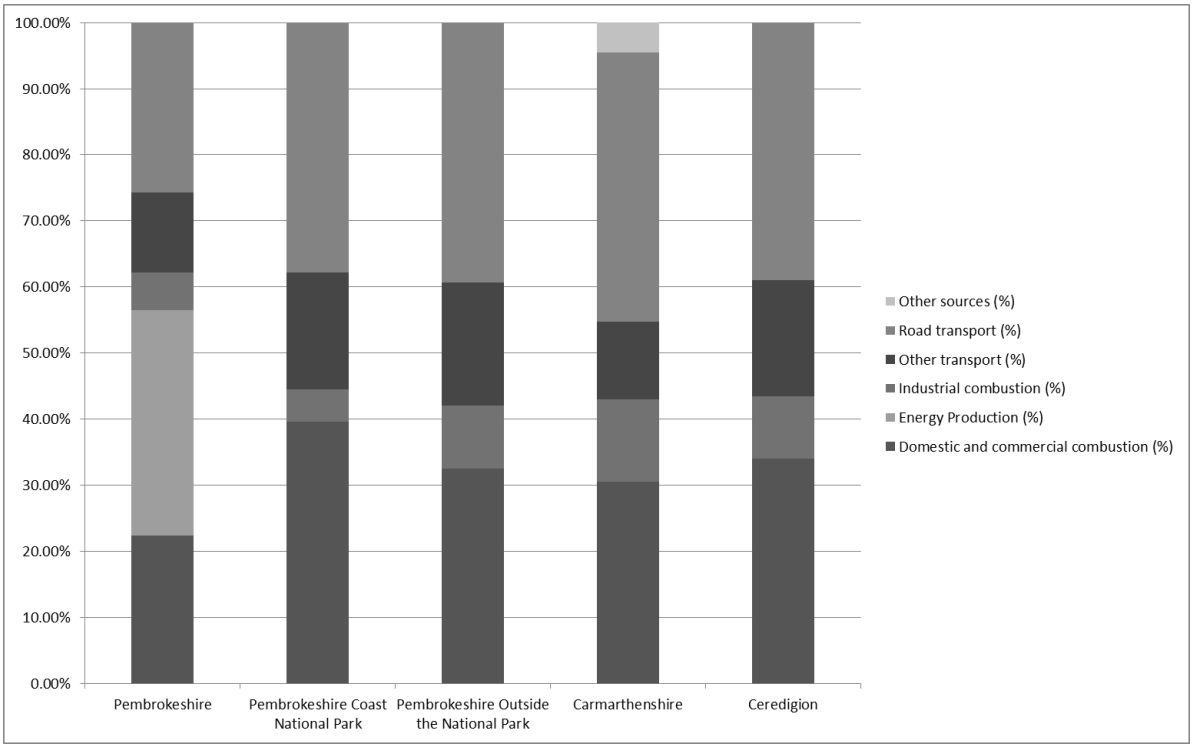


Chart 2: percentage contribution from emission sectors

3.3 The main contributing sectors for CO_2 in the National Park are domestic and commercial combustion; industrial combustion; road transport and other forms of transport. These are now considered in turn. Care should be taken in the interpretation of the maps as the shading scale is not consistent across the maps, it has been selected to show the variation within the map for each sector, not that between the sectors.

4.0 Domestic and commercial combustion

4.1 This sector covers the atmospheric emission produce by combustion in domestic, commercial, institutional and agricultural boilers or generators, for heat or local electricity production. It does not include emissions from centrally generated electricity. Emissions of CO_2 from domestic and commercial combustion per household are shown for each of the analysis zones in chart 3. The distribution of domestic and commercial CO_2 emissions in Pembrokeshire is shown in map 3.

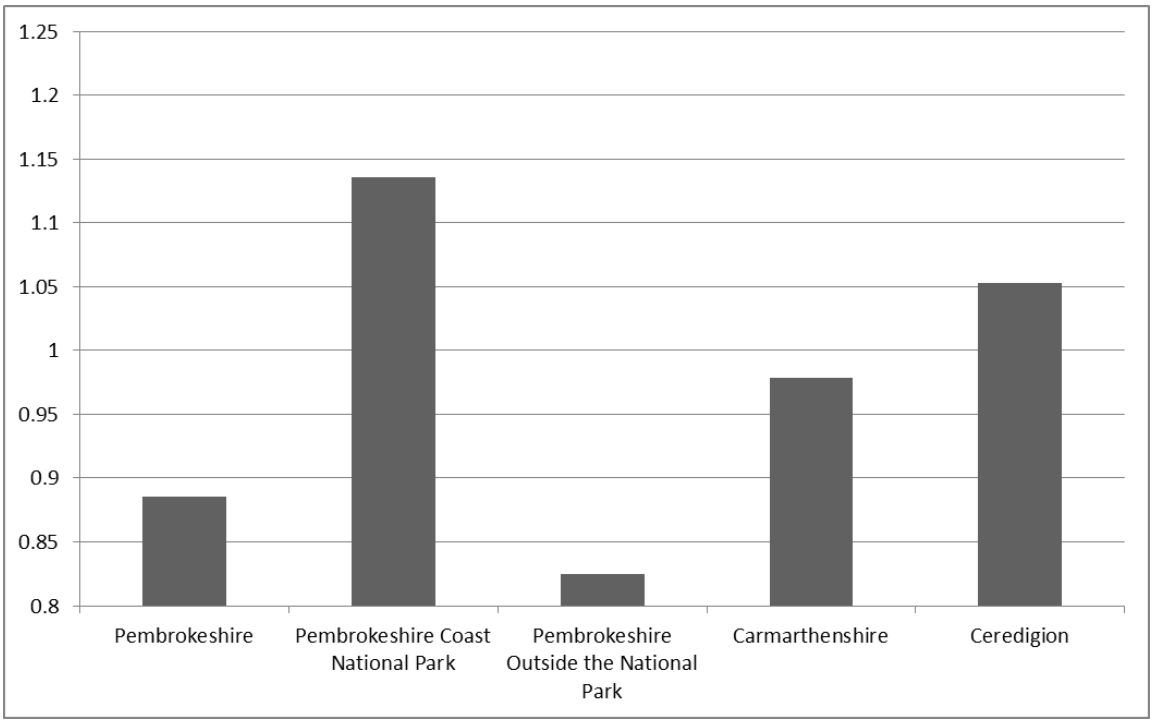
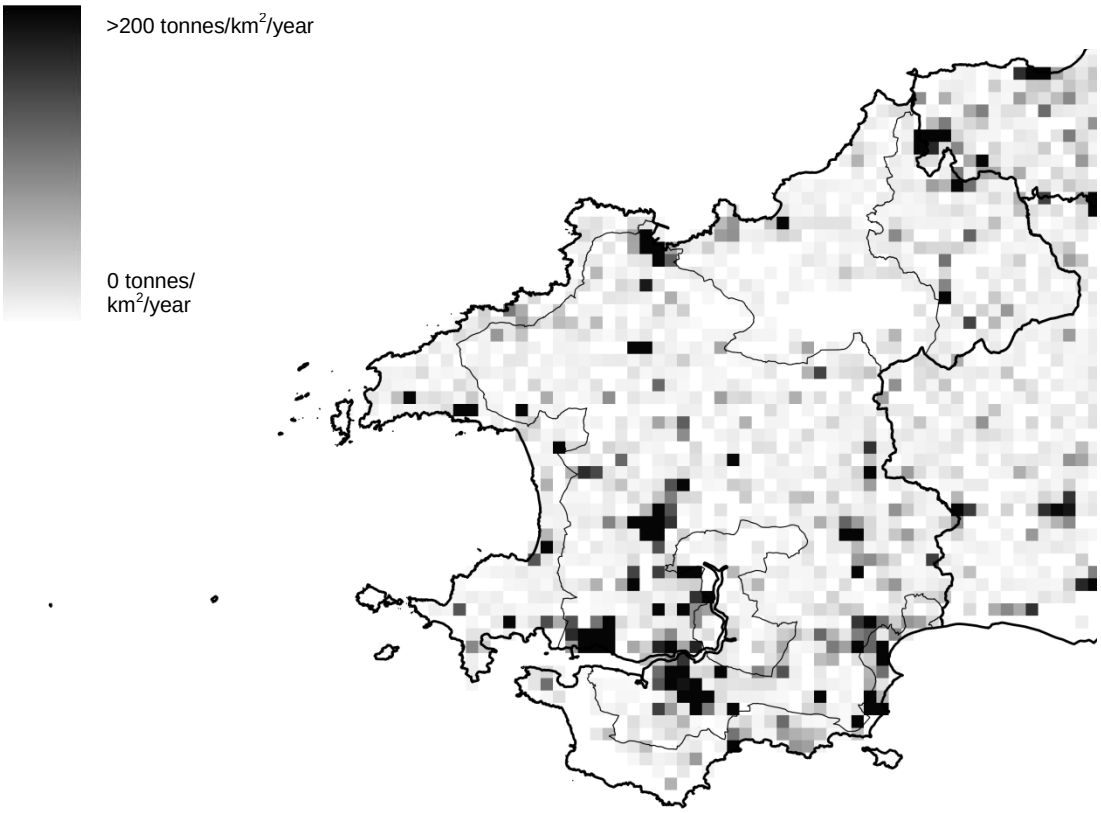


Chart 3: emissions of CO_2 from domestic and commercial combustion, tonnes of carbon per resident household



Map 3: the distribution of CO_2 emissions from domestic and commercial combustion in Pembrokeshire

4.2 As might be expected map 3 shows that domestic and commercial combustion CO_2 emissions match the settlement pattern in Pembrokeshire (population density is an input into the model for this emissions source). The chart shows relatively high rates of emission per resident household in the National Park, reasons for this may include the age and efficiency of households and tourist accommodation.

5.0 Industrial combustion

5.1 This sector includes emissions due to local combustion for heating and electricity in industrial premises and combustion during manufacturing processes. The amount of CO_2 emitted per person employed in manufacturing at the 2011 Census is shown in chart 4; the distribution of emissions from industrial combustion is shown in map 4.

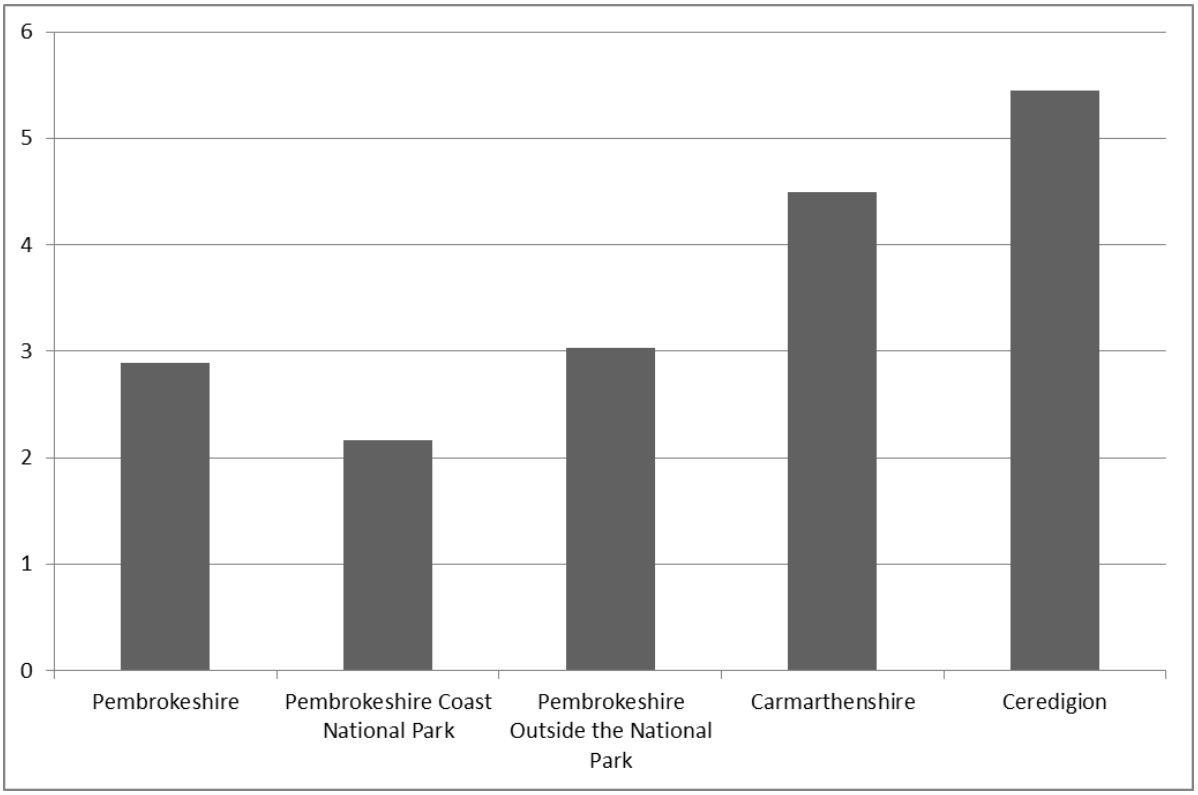
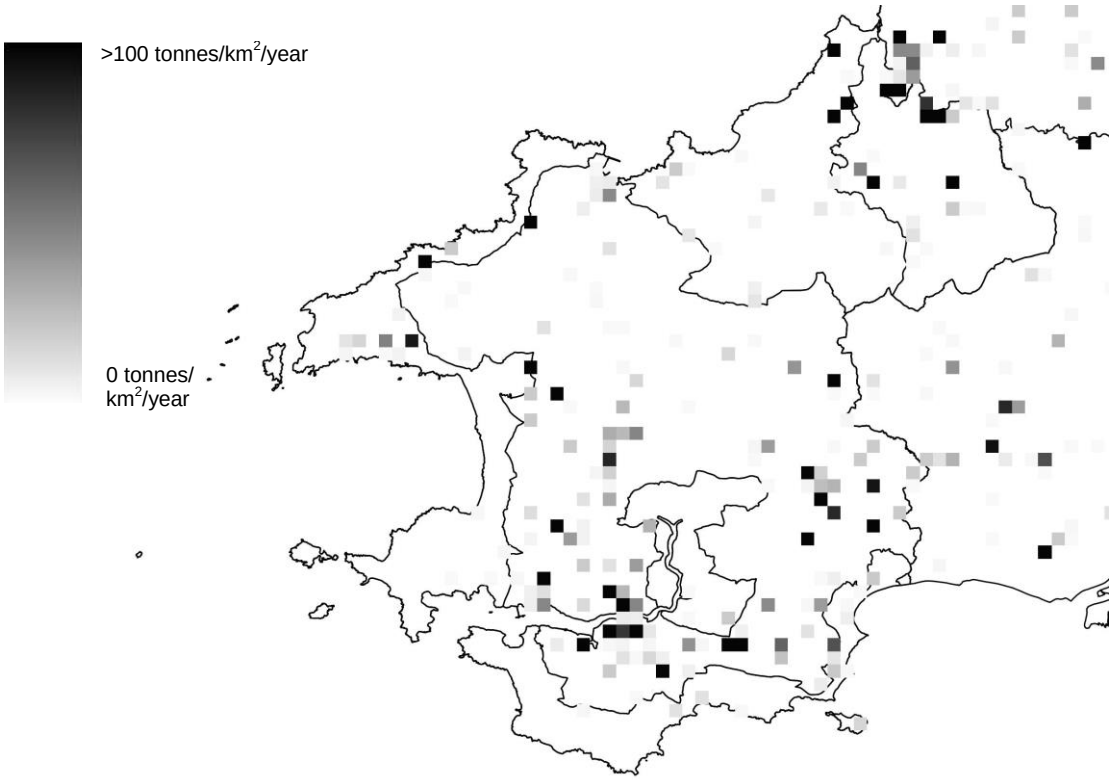


Chart 4: emissions of CO_2 from industrial combustion, tonnes of carbon per person employed in manufacturing



Map 4: the distribution of CO_2 emissions from industrial combustion in Pembrokeshire

6.0 Road transport

6.1 This sector covers all road transportation, including passenger cars and motorcycles and goods vehicles. Chart 6 shows the road transport emissions per kilometre of road; map 6 shows the distribution of road transport emissions.

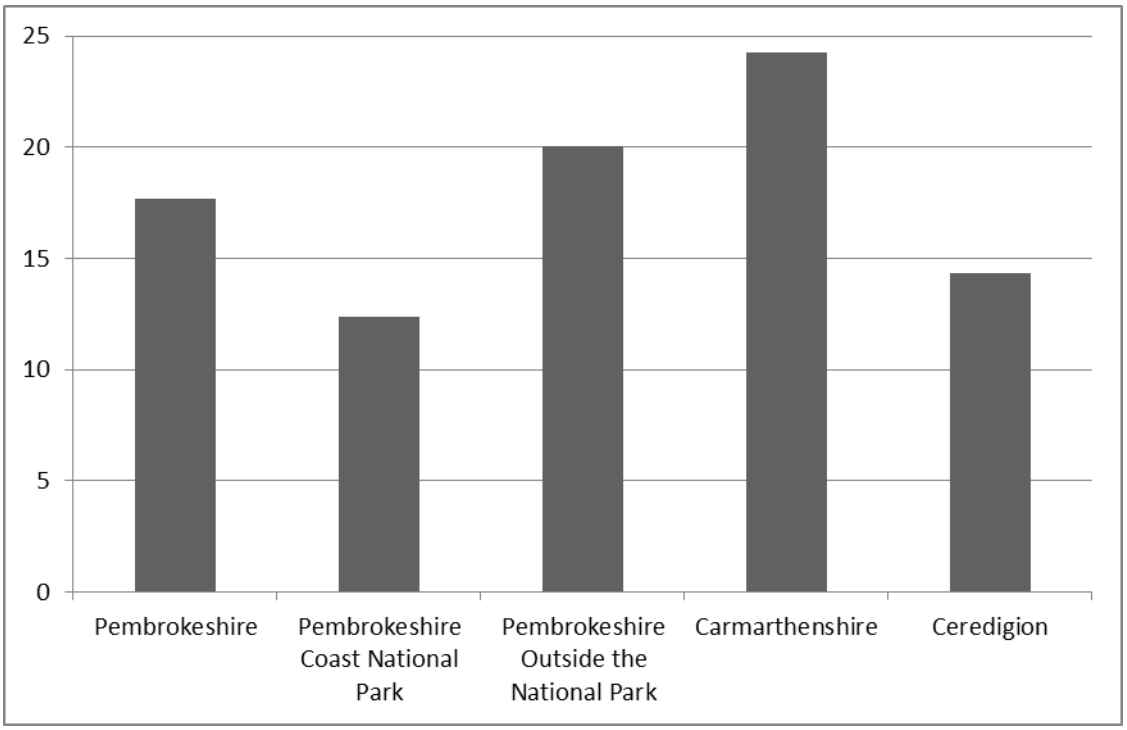
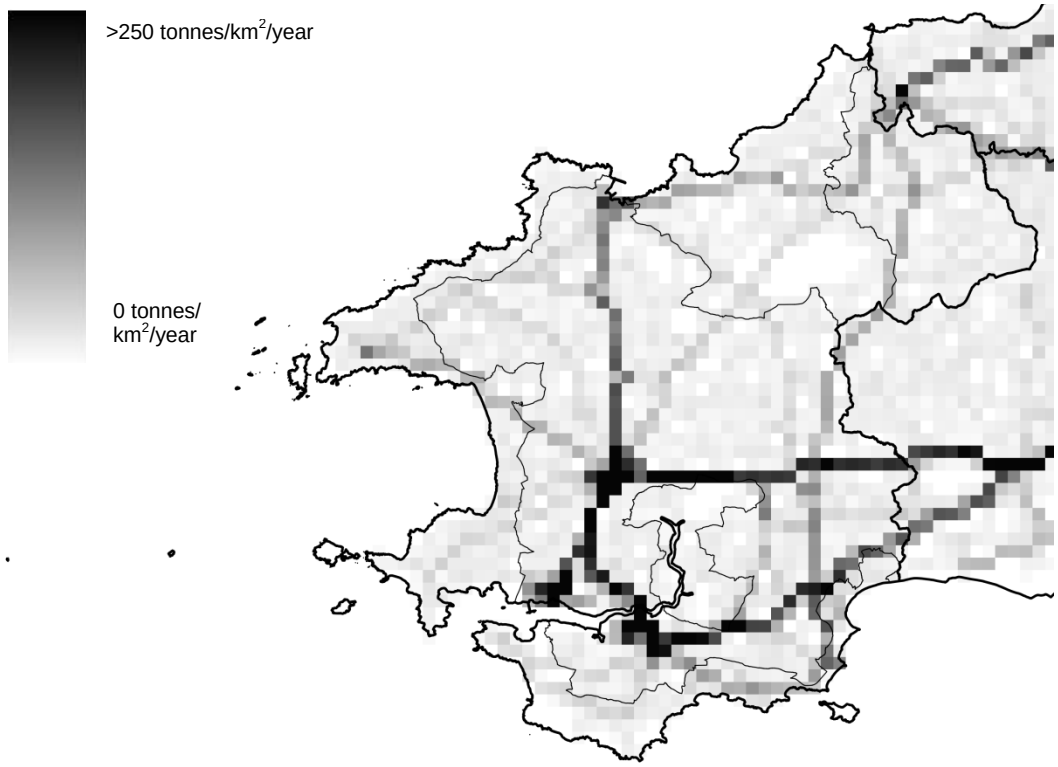


Chart 6: emissions of CO_2 from road transport, tonnes of carbon per kilometre of road



Map 6: the distribution of CO_2 emissions from road transport in Pembrokeshire

7.0 Other transport / the offshore area

7.1 This sector includes emissions from aviation, railways, shipping, military off-road transport and mobile machinery. Chart 7 shows emissions from other transport per km^2, map 7 shows the distribution of other transport emissions.

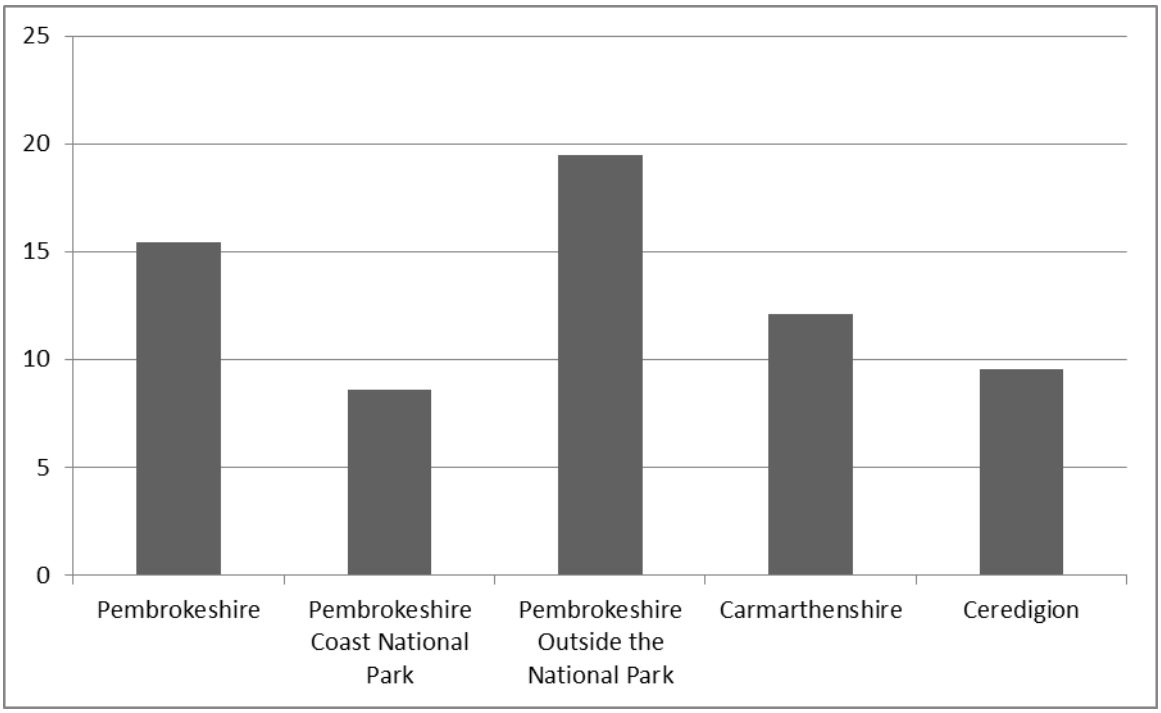
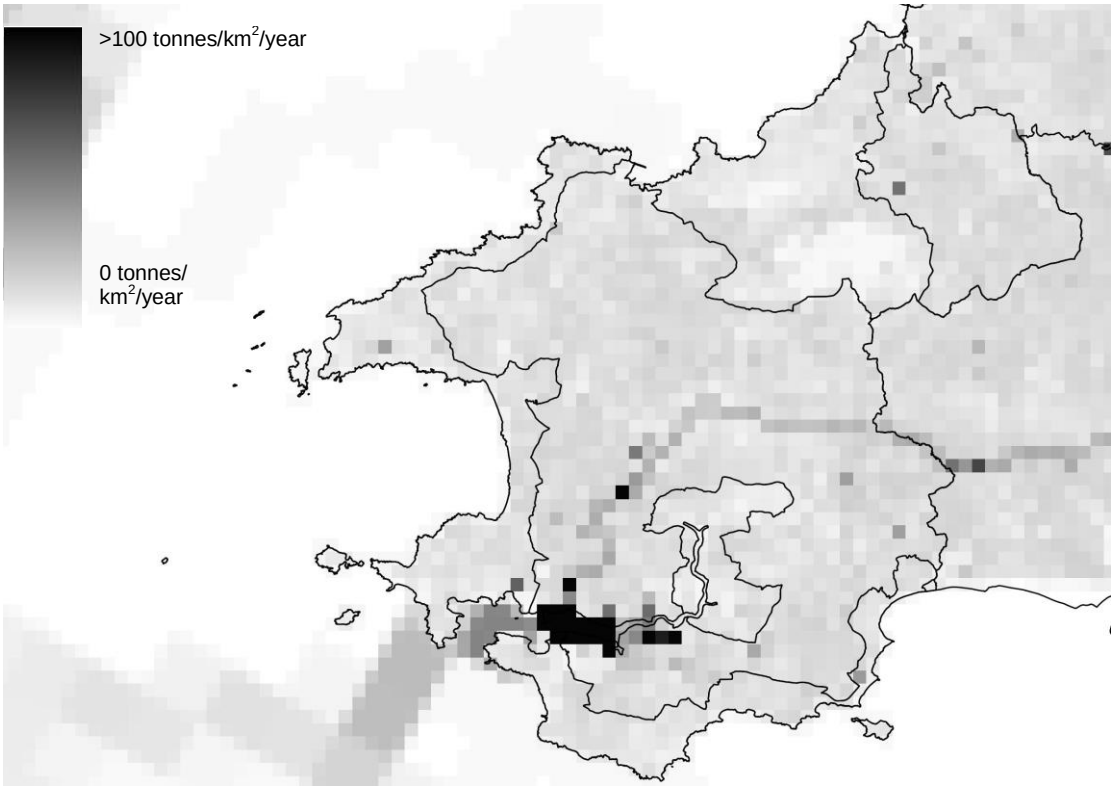


Chart 7: emissions of CO_2 from other transport, tonnes of carbon per km²

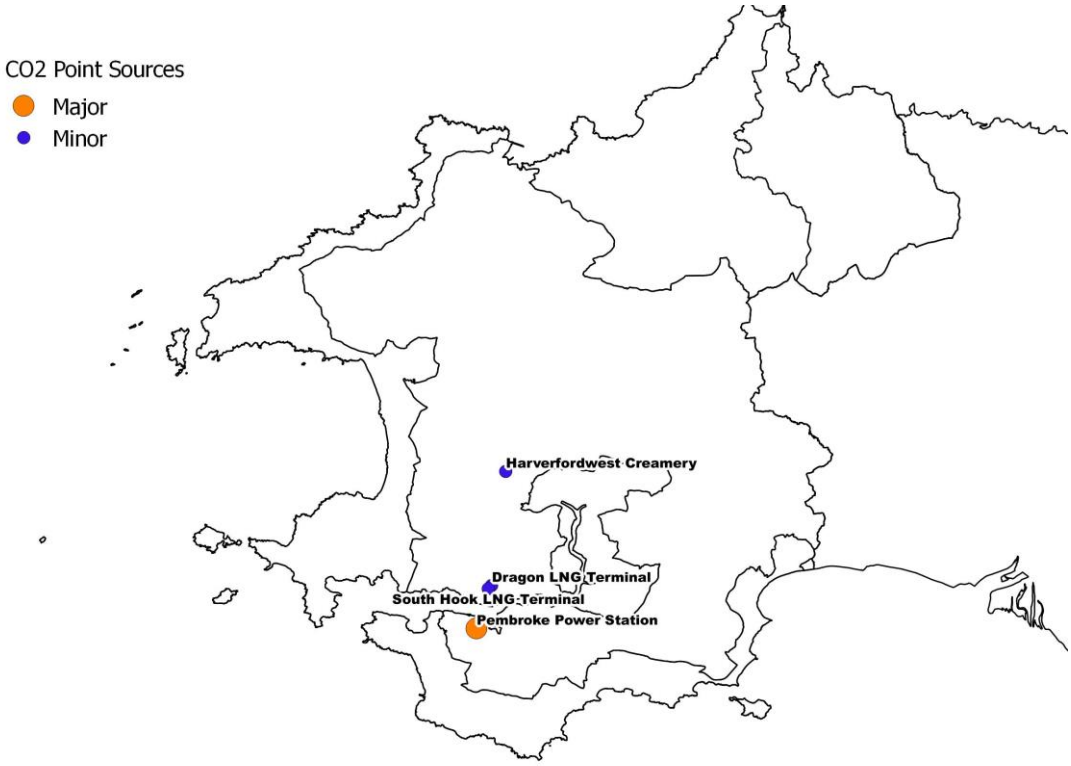


Map 7: the distribution of CO_2 emissions from other transport sources in Pembrokeshire and offshore

8.0 Point sources

8.1 There is one major point source of CO_2 in Pembrokeshire, Pembroke Power Station, which emits an estimated 1,088,512 tonnes of CO_2 per annum. This represents more than five times the total modelled emissions for Pembrokeshire as an area (excluding all point sources).

8.2 There a further three minor point sources in the County of note these are: South Hook LNG terminal (~82162 tonnes of CO_2 per annum), Dragon LNG (~43467 tonnes of CO_2 per annum) and First Milk and Cheese Ltd (~2007 tonnes of CO_2 per annum).



Map 8: point sources of CO_2

9.0 Discussion & conclusions

9.1 In the Pembrokeshire Coast National Park, as in Pembrokeshire as a whole, the dominant sources of CO_2 are road transport, combustion in domestic and commercial premises, and other transport.

9.2 The relatively high emissions from other transport sources offshore is likely to be due to shipping activity around Milford Haven and indicates the importance of shipping as a source of CO_2.

9.3 Pembrokeshire's single major point source of CO_2, Pembroke Power Station, emits just over five times the amount of CO^2 as all other sources combined.

10.0 Local Development Plan Replacement Implications

10.1 Factual updates/changes required:

- Footnote on the first page of the Climate Change Chapter – Update the sources of emissions listed in this footnote.