Borough Council of King's Lynn & West Norfolk

King's Lynn and West Norfolk District

CO_2 Emissions Report 2018 to 2019

Table of Contents

1. King's Lynn & West Norfolk 2019 CO_2 District Profile

Table 1: King's Lynn & West Norfolk district CO_2 emissions sector breakdown[1].

Sector	Sector Split	kt CO_2	% of Total Emissions
Industry	Electricity	47.9	2.5
	Gas	345.2	18.1
	Large Industrial Installations	48.7	2.6
	Other Fuels	25.6	1.3
	Agriculture	46.6	2.4
	Total	**514.1**	**27.0**
Commercial	Electricity	54.0	2.8
	Gas	22.0	1.2
	Other Fuels	2.1	0.4
	Total	**78.1**	**4.1**
Public Sector	Electricity	10.2	0.5
	Gas	13.9	0.7
	Other Fuels	1.1	0.1
	Total	**25.2**	**1.3**
Domestic	Electricity	69.1	3.6
	Gas	86.8	4.6
	Other Fuels	80.1	4.2
	Total	**235.9**	**12.4**
Transport	A Roads	198.2	10.4
	Motorways	0.0	0.0
	Minor Roads	157.7	8.3
	Diesel Railways	0.1	0.0
	Other	13.6	0.7

[1] Kt = kilo tonnes; t = tonnes; CO_2 = Carbon Dioxide

	Total	**369.5**	**19.4**
Land Use, Land Use Change & Forestry (LULUCF)	Forest	-88.7	-1.7
	Cropland	724.9	38.5
	Grassland	17.0	0.9
	Wetlands	-1.0	-0.1
	Settlements	21.7	1.1
	Harvested Wood Products	0.0	0.0
	Total (Net Emissions)	**683.8**	**35.9**
2019 Population (‘000s, mid-year estimates)		**151.4**	
Per Capita Emissions (t)		**12.6**	
Area (km^2)		**1,526.9**	
Emissions per km^2 (kt)		**1.2**	
King’s Lynn and West Norfolk Total (kt)		**1,906.8**	

Data Source: BEIS, UK local authority and regional carbon dioxide emissions national statistics, 2005-2019.

1.1 The Department of Business, Energy, and Industrial Strategy (BEIS) publishes local authority area CO_2 emissions statistics every year. As of February 2022, the 2019 data set is the most recent published local authority area estimates. Emissions are allocated on an end-user basis, which means that emissions are distributed to points of consumption of energy (apart from those not energy related). This reflects the total emissions relating to that energy consumption, rather than points of generation (such as power stations).

1.2 CO_2 emissions are split into six sectors: industry, commercial, public sector, domestic, transport and land use, land use change and forestry (LULUCF). Table 1 presents the breakdown of King’s Lynn and West Norfolk emissions, showing that King’s Lynn and West Norfolk emitted 1,906.8 kilo tonnes (kt) of CO_2. The breakdown is as follows:

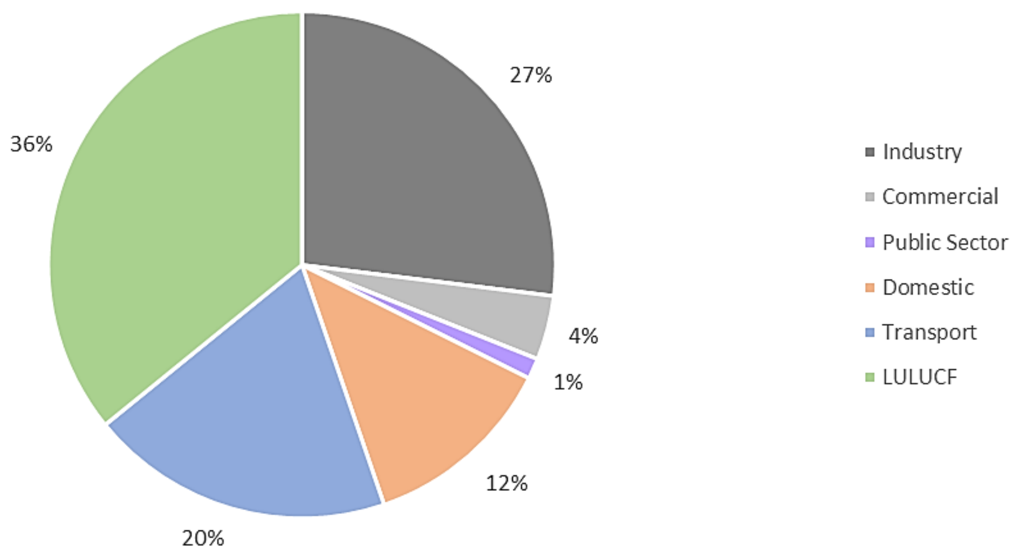
1. Industry: 514.1 kt CO_2
2. Commercial: 78.1 kt CO_2
3. Public Sector: 25.2 kt CO_2
4. Domestic: 235.9 kt CO_2
5. Transport: 369.5 kt CO_2
6. LULUCF: 683.8 kt CO_2

1.3 Within these sectors, emissions data sets are split further to provide a more in-depth view of the emissions sources. As shown in Table 1 (page 3), the five highest emitting sub-sectors are as follows:

1. LULUCF, cropland: 734.9 kt CO_2
2. Industry, gas: 345.2 kt CO_2
3. Transport, A roads: 198.2 kt CO_2
4. Transport, minor roads: 157.7 kt CO_2
5. Domestic, gas: 86.8 kt CO_2

1.4 Figure 1 below highlights the percentage contribution of the six key sub-sectors.

Figure 1: 2019 percentage sector contribution to district CO_2 emissions.



2. Emissions Comparisons: 2019

2.1 Comparative analysis for the 2019 BEIS Norfolk District data highlights that King's Lynn and West Norfolk is still the largest contributor to Norfolk CO_2 emissions King's Lynn and West Norfolk emits 1,018 kt CO_2 more than the closest emitting district (South Norfolk). King's Lynn and West Norfolk also has the highest per capita emissions in Norfolk (12.6 t CO_2). Again, the district with the closest per capita emissions is South Norfolk (6.3 t CO_2). From figure 2 you can identify that King's Lynn and West Norfolk emits the highest amount of CO_2 in the industry, commercial, domestic and LULUCF sectors. King's Lynn and West Norfolk also has the second highest road transport emissions in Norfolk, behind South Norfolk.

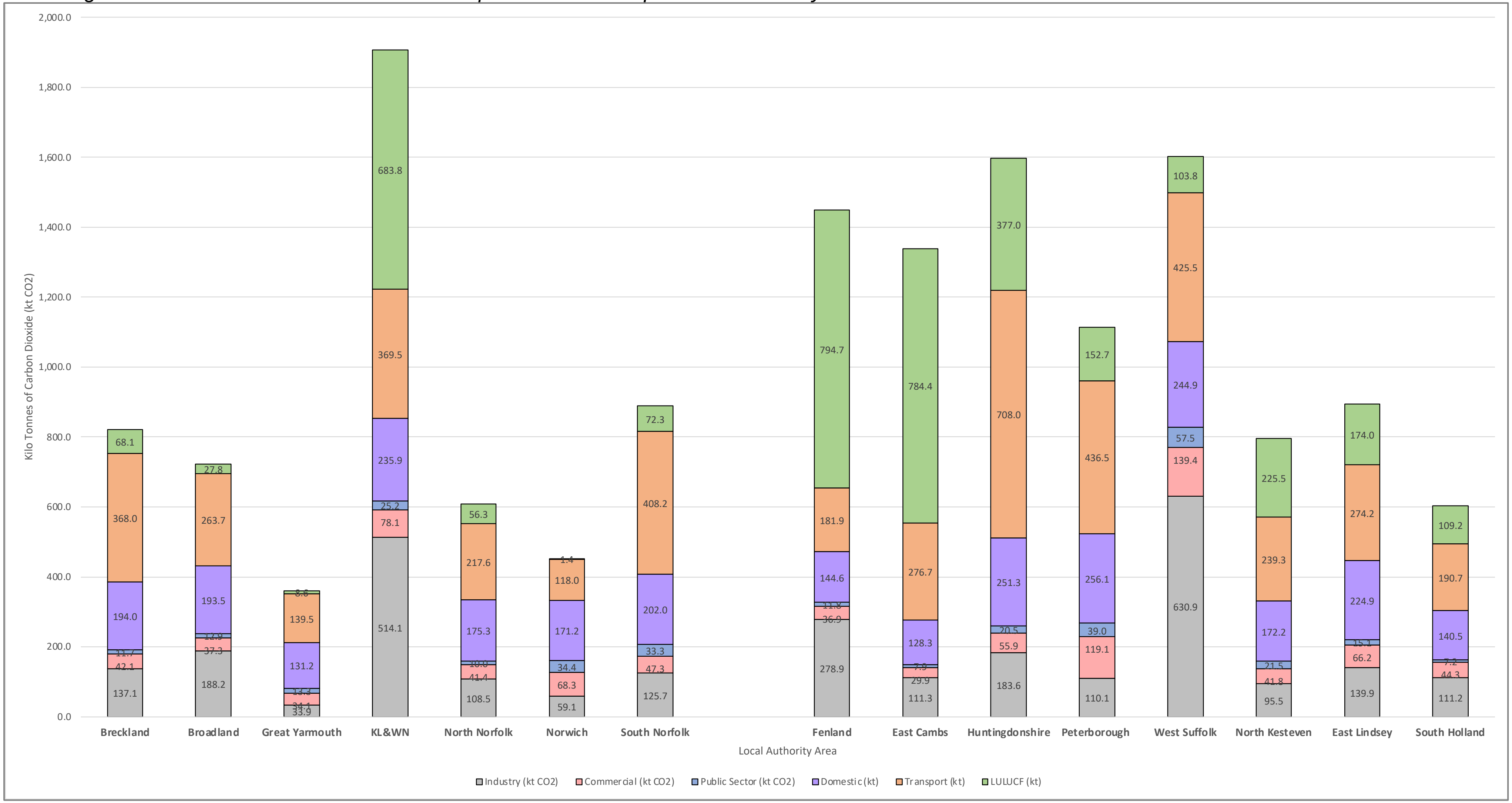
2.2 Overall, King's Lynn and West Norfolk contributes 33.1% to Norfolk emissions. This is 17.7% more than the closest contributor (South Norfolk). King's Lynn and West Norfolk also contributes 44.1% of Norfolk's industry emissions, 22.4% of Norfolk's commercial emissions and 74.5 % of Norfolk's LULUCF emissions.

2.3 Comparative analysis between King's Lynn and West Norfolk and other neighbouring authorities highlights that Fenland, East Cambridgeshire and Huntingdonshire are subject to similar or greater levels of emissions from LULUCF. Additionally, as highlighted in figure 2, several other neighbouring districts have large emissions resulting from LULUCF sector. Within this sector, cropland (drained peatland) contributes a significant share of these emissions, highlighting, the impact of drained peatlands on the LULUCF emissions, and the total emissions contribution of King's Lynn and West Norfolk and other neighbouring districts.

2.4 Additionally figure 2 highlights that overall, the largest contributors to emissions are the LULUCF, Industry and Transport sectors. Norwich is an exception, due to its significantly smaller size, its main emissions are attributed to the domestic sector.

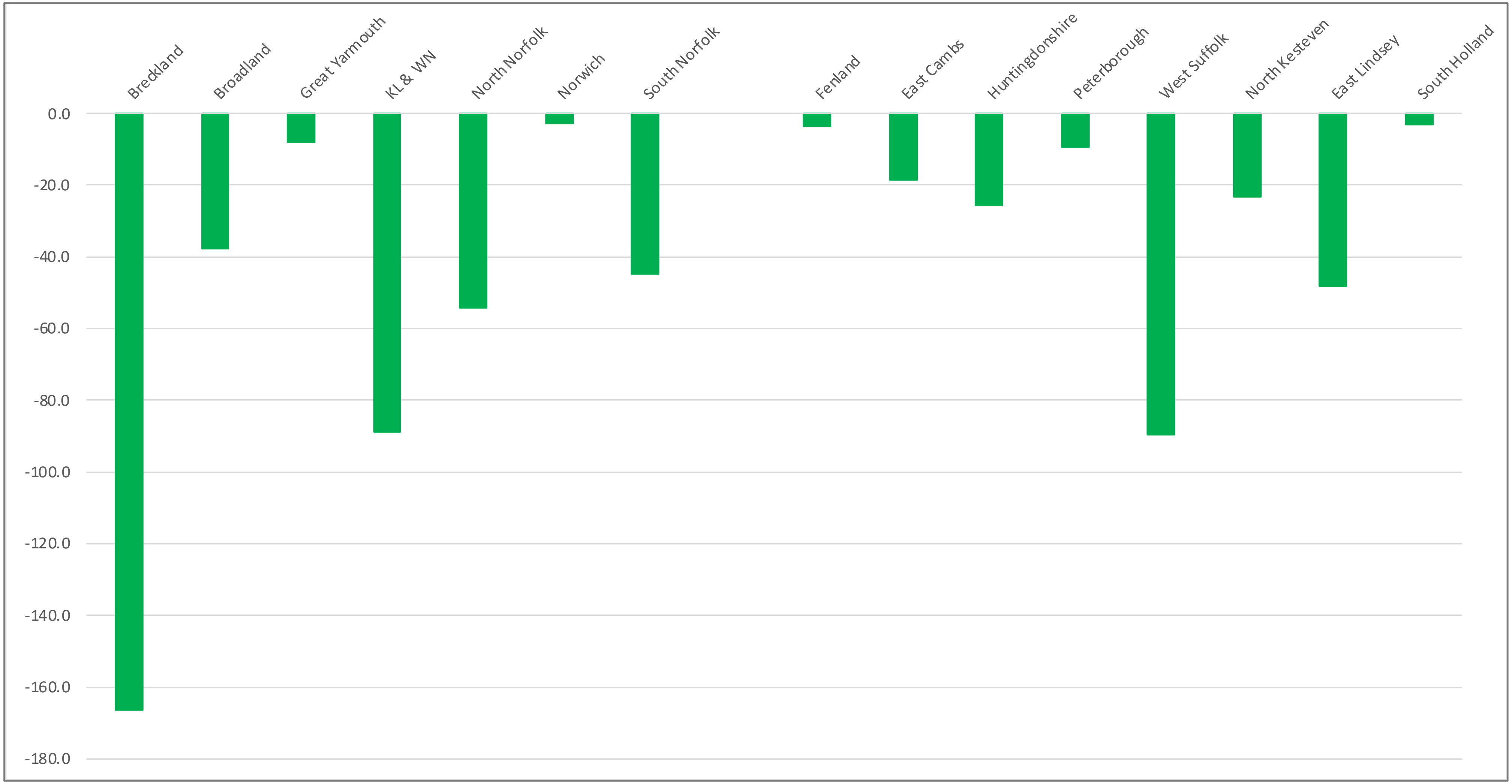
2.5 King's Lynn and West Norfolk also has the second highest carbon sequestration rate of Norfolk districts, emitting -88.7 kt CO_2 in 2019. This is second only to Breckland, which emitted -166.4 kt CO_2 in 2019, because of Thetford Forest. King's Lynn and West Norfolk is followed closely by North Norfolk (-54.1 kt CO_2) and South Norfolk (-44.8 kt CO_2). Figure 3 highlights the sequestration rates of Norfolk's districts, as well as several neighbouring districts.

Figure 2: 2019 Sector CO_2 Emissions Comparisons for Multiple Local Authority Areas.



Data Source: BEIS, UK local authority and regional carbon dioxide emissions national statistics, 2005-2019

Figure 3: 2019 Norfolk and Neighbouring Districts Forestry Sequestration.



Data Source: BEIS, UK local authority and regional carbon dioxide emissions national statistics, 2005-2019.

3. Population and Area Impact on Emissions

3.1 Figure 4 below highlights the relationship between district size (km^2) and emissions per km^2. Norwich, being the smallest sized district in Norfolk, expectedly has the highest emissions per km^2, emitting 11.2 kt CO_2 in 2019. The remaining districts in Norfolk ranged between 2 kt CO_2 and 0.6 kt CO_2 per km^2 in 2019. King's Lynn and West Norfolk emitted 1.2 kt CO_2 per km^2 in 2019, with it being the largest district in Norfolk, measuring 1562.9 km^2.

3.2 Comparing against wider neighbouring districts figure 4 shows that Fenland, East Cambridgeshire, Huntingdonshire are modest in district size (under 900 km^2) yet have relatively large emissions in comparison to North Kesteven and East Lindsey (see figure 2), of which these two districts are very large in size (over 900 km^2).

3.3 When inferring the impact that district size has on emissions per km^2 figure 4 highlights that whilst King's Lynn and West Norfolk is a very large district, multiple other neighbouring districts (South Norfolk, Breckland, North Kesteven and East Lindsey) which also have a large km^2 are shown to have much lower emissions per km^2. South Norfolk emitted 1 kt CO_2, Breckland emitted 0.6 kt CO_2 (although we should note that this district is home to a large CO_2 sink, being Thetford Forest), North Kesteven 0.9 kt CO_2 emitted, and East Lindsey emitted 0.5 kt CO_2. This suggests that a large district size is not a predeterminate to large emissions.

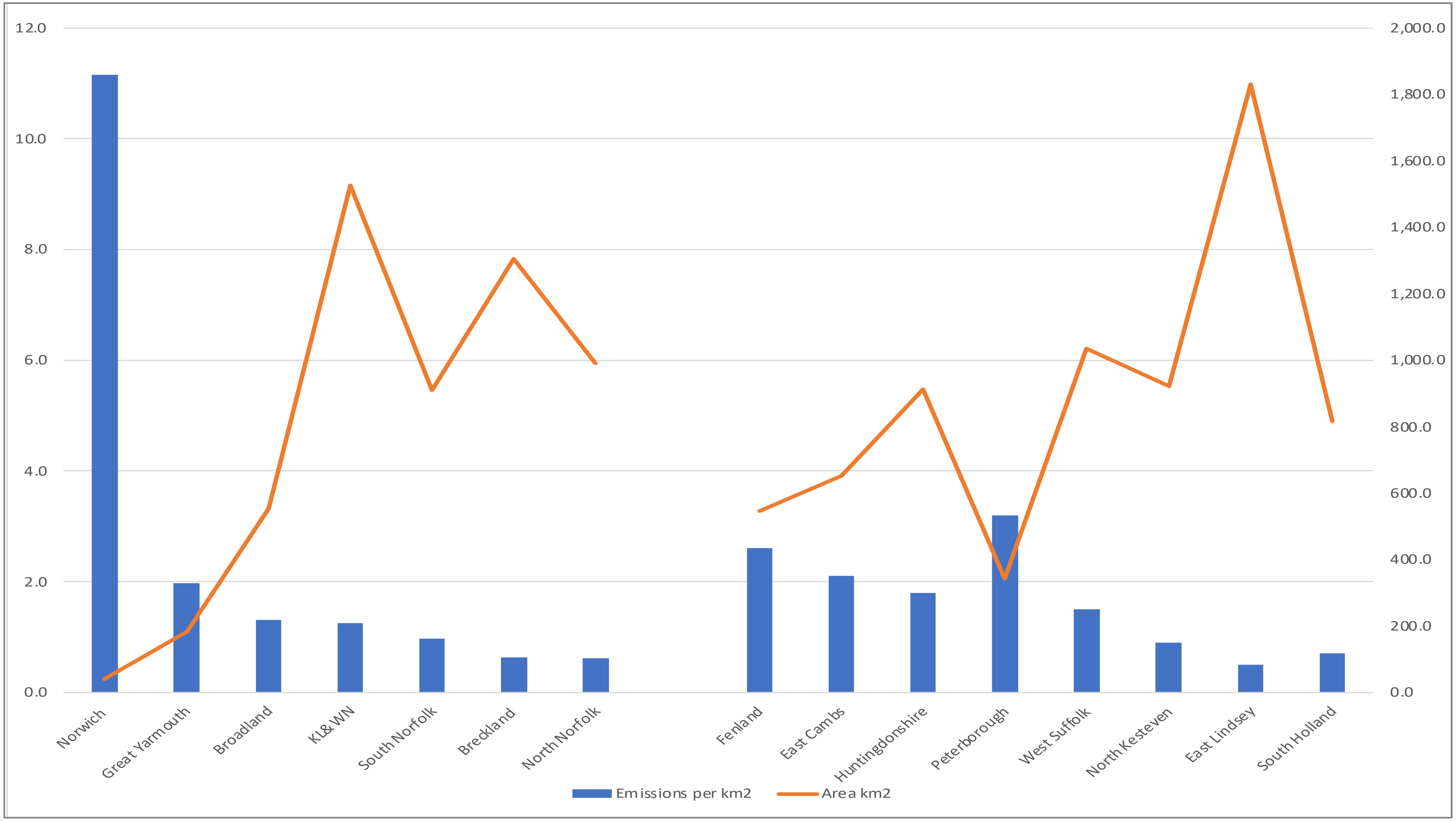
3.4 Figure 5 (page 11) highlights the relationship between population and per capita emissions. King's Lynn and West Norfolk has the highest per capita emissions (12.6 t CO_2) and largest population in Norfolk (151,400). The remaining districts range between 6.3 t CO_2 and 3.2 t CO_2 for 2019. Norwich has the smallest per capita emissions (2.3 t CO_2) whilst having the third largest population in Norfolk (140,600).

3.5 Comparing against wider neighbouring districts, figure 5 shows that Fenland and East Cambridgeshire have larger per capita emissions that King's Lynn and West Norfolk, with smaller populations. North Kesteven and East Lindsey in contrast have similar populations to Fenland and East Cambridgeshire, although per capita emissions are more than 50% lower.

3.6 When inferring the impact that population has on emissions per capita and emissions generally, figure 5 highlights that population is not a predeterminate to high emissions. South Norfolk, Breckland, Broadland and Norwich all have populations between 130,000 and 150,000 yet, emissions that are more than 50% lower than King's Lynn and West Norfolk's.

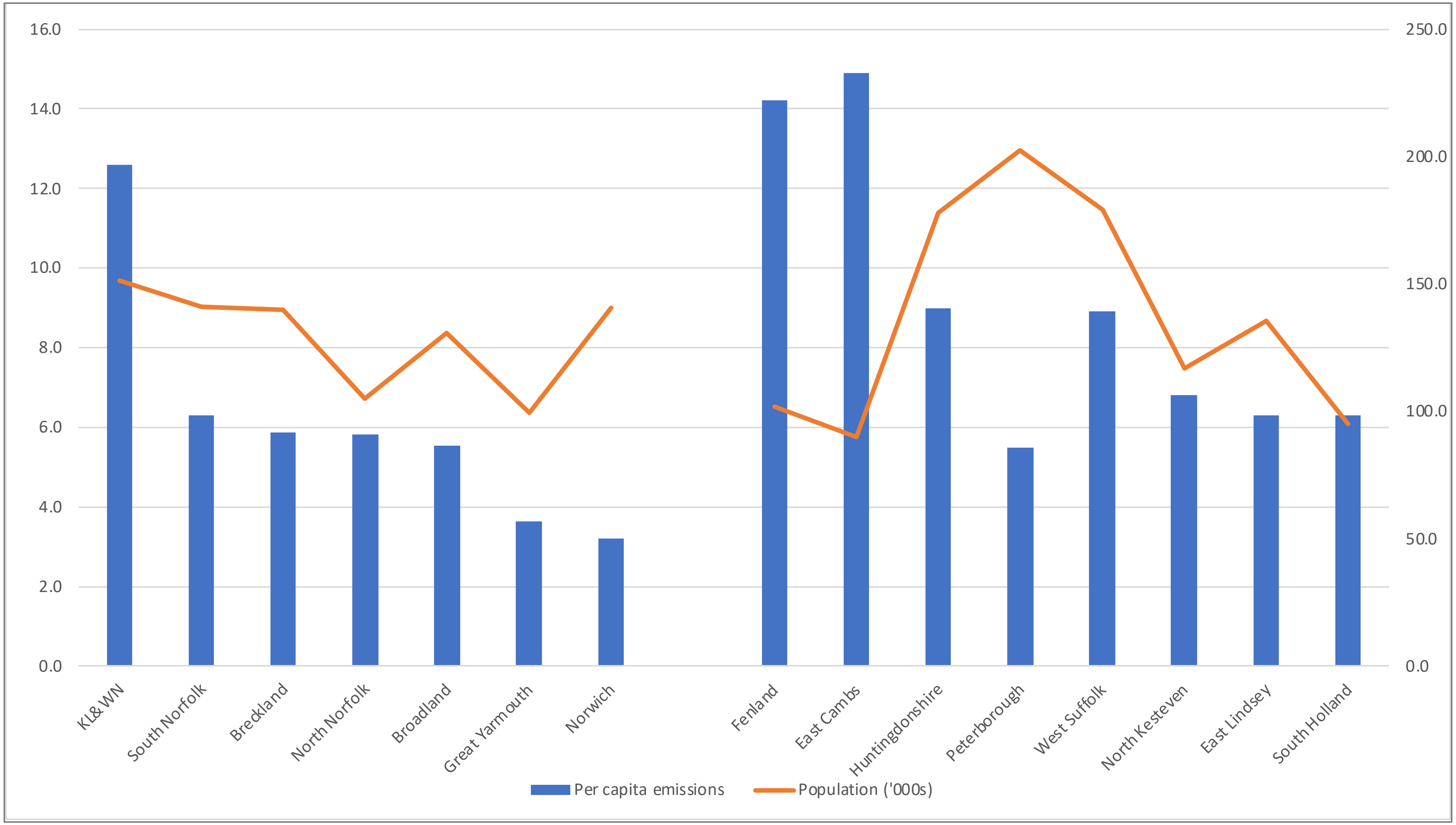
3.7 What we can infer is that the specific characteristic of each district has a more likely impact of emissions. For instance, King's Lynn and West Norfolk, Fenland and East Cambridgeshire have high LULUCF emissions (see figure 2) because of the drained fenlands. King's Lynn and West Norfolk also has a significant industrial sector, contributing to its high total and per capita emissions.

Figure 4: 2019 Norfolk and Neighbouring Districts size (km^2) against Emissions per km^2.



Data Source: BEIS, UK local authority and regional carbon dioxide emissions national statistics, 2005-2019.

Figure 5: 2019 Norfolk and Neighbouring Districts per Capita Emissions Against Population.



Data Source: BEIS, UK local authority and regional carbon dioxide emissions national statistics, 2005-2019.

4. King's Lynn and West Norfolk CO_2 Emissions Change: 2005 - 2019

4.1 Industry:

Industry CO_2 emissions have seen a decline of 32.7 kt CO_2 from 2018 to 2019. This equates to a 6% decrease in CO_2 emissions. Figure 6 highlights the change in industry emissions since 2005, with emissions peaking in 2010 and then observing a steady decline to 2019 levels. Unfortunately, CO_2 emissions are still 144.8 kt CO_2 above the all-time low level of 369.3 kt CO_2, recorded in 2016. This reduction is attributed to a reduction in emissions from industry gas usage, followed by a here subsequent increase in emissions for 2017 from the same source. Unfortunately, BEIS don't provide a detailed breakdown of which industrial installations caused this change. Emissions are however, currently 36.7% below the all-time high of 812.0 kt CO_2 in 2010.

4.2 Commercial:

Commercial CO_2 emissions have decreased by 15.1 kt CO_2 from 2018 to 2019. This is a 16.2% decrease in emissions. Figure 7 highlights the change in commercial emissions since 2005, with emissions peaking in 2012 and then observing a sharp decline to 2019 levels. Commercial emissions have seen an annual decrease since their all-time high of 210.5 kt CO_2 in 2012. Emissions are 62.9% below the all-time high of 210.6 kt CO_2 from 2012.

4.3 Public Sector:

Public sector CO_2 emissions reduced by 3.3 kt CO_2 from 2018 to 2019. This is an 11.6% reduction. Figure 8 highlights the change in public sector emissions since 2005, with emissions peaking in 2012 and then observing a sharp decline to 2019 levels. This follows the reduction trend seen in public sector emissions since 2017 and is 52.8% below the all-time high of 53.4 kt CO_2 seen in 2012.

4.4 Transport:

Transport CO_2 emissions have stayed relatively consistent from 2005 to 2019, fluctuating from a high of 396.2 kt CO_2 in 2007 to a low of 353.1 kt CO_2 in 2012. Whilst CO_2 emissions have decreased from 2018 to 2019, this was a decrease of 5.1kt CO_2 (5.6%). Emissions remain 16.4 kt CO_2 above the all-time low. Figure 9 highlights the change in transport emissions since 2005, with emissions peaking in 2007 and then observing a shallow decline to all-time low levels in 2012, followed by a steady increase until 2017. Since 2017, a decline in transport emission can be observed.

4.5 Domestic:

Domestic CO_2 emissions continued its steady decreasing trend, hitting a new all-time low in 2019 with CO_2 emissions of 235.9 kt CO_2. This is a 3.7% reduction from 2018 and a 43.1% reduction from its all-time high in 2006. Figure 10 highlights the change in domestic emissions since 2005, with emissions peaking in 2006 and then observing a steady decline to 2019 levels.

4.6 LULUCF:

Historical LULUCF emissions have seen the greatest changes since the 2019 data's improved methodology. Emissions estimates are now greater than previously estimated, with emissions from LULUCF now becoming the biggest contributor to district emissions. The overall trend is stagnant, with emissions sitting at 685.6 kt CO_2 in 2005 to 683.8 kt CO_2 in 2019. This is only a 0.3% reduction. LULUCF emissions increased from 2018 to 2019 by 1.8 kt CO_2 (0.3%). Figure 11 highlights the change in LULUCF emissions since 2005, with emissions staying relatively constant with minor fluctuations over 14 years.

4.7 Total:

Total CO_2 emissions saw a decrease from 2018 levels, to King's Lynn and West Norfolk's second lowest levels on record. 2019 emissions of 1,906.8 kt CO_2 records a 3.2% (63.6 kt CO_2) reduction in total CO_2 emissions.

Overall, there has been a 15% reduction in emissions since 2005. Emissions have followed a steady declining trend since peaking in 2010 at 2,505.3 kt CO_2, reducing by 23.9% to their current levels at 1,906.7 kt CO_2 (see figure 12, page 16). However, total emissions are still 81 kt CO_2 higher than 2016's all-time low of 1,828.8 kt CO_2.

Figure 6: Industry CO_2 emissions trends.

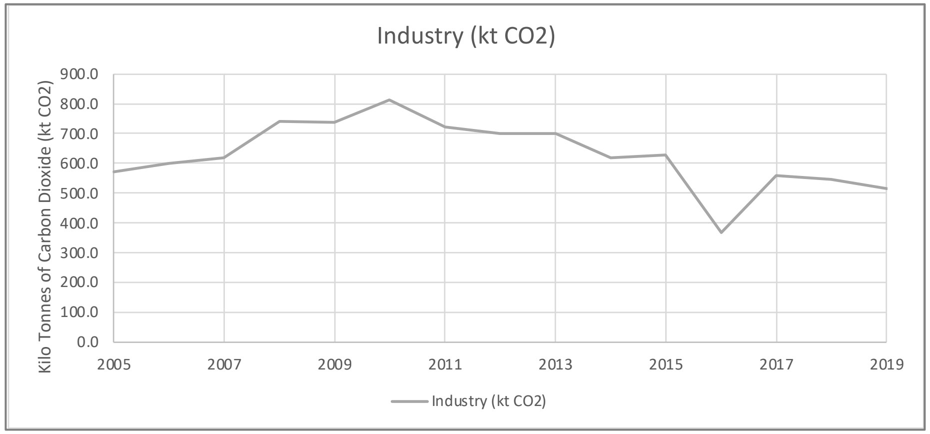


Figure 7: Commercial CO_2 emissions trends.

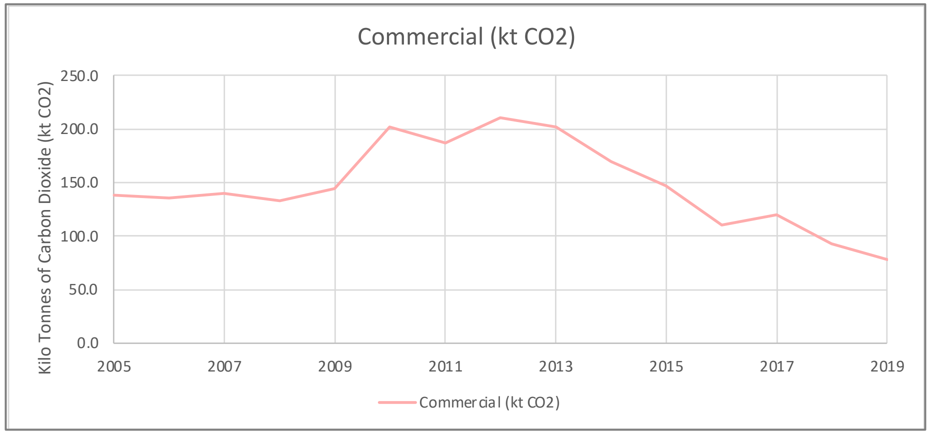


Figure 8: Public Sector CO_2 emissions trends.

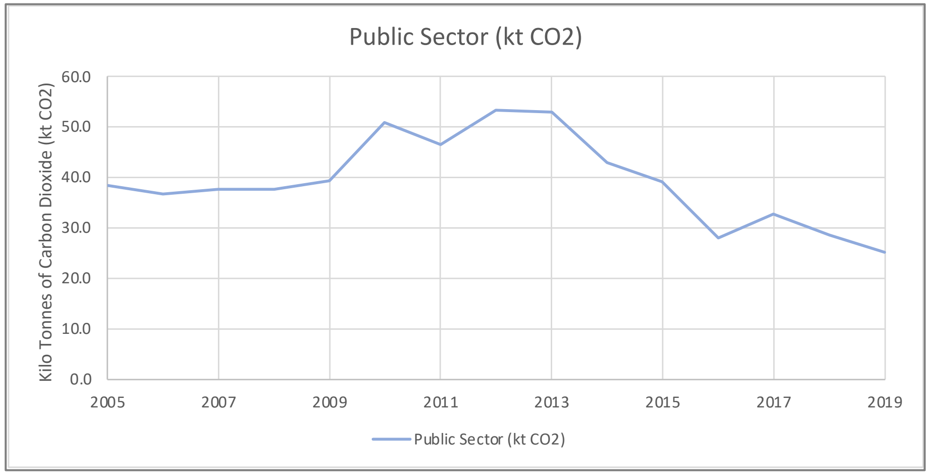


Figure 9: Transport CO_2 emissions trends.

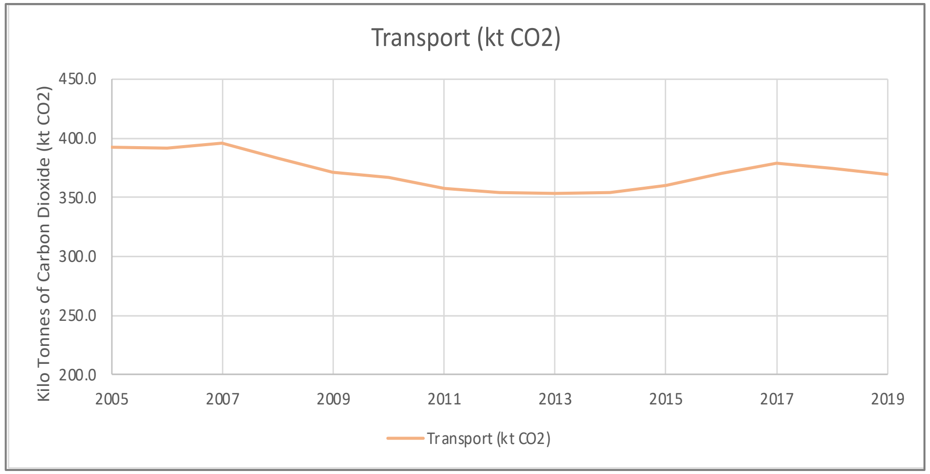


Figure 10: Domestic CO_2 emissions trends.

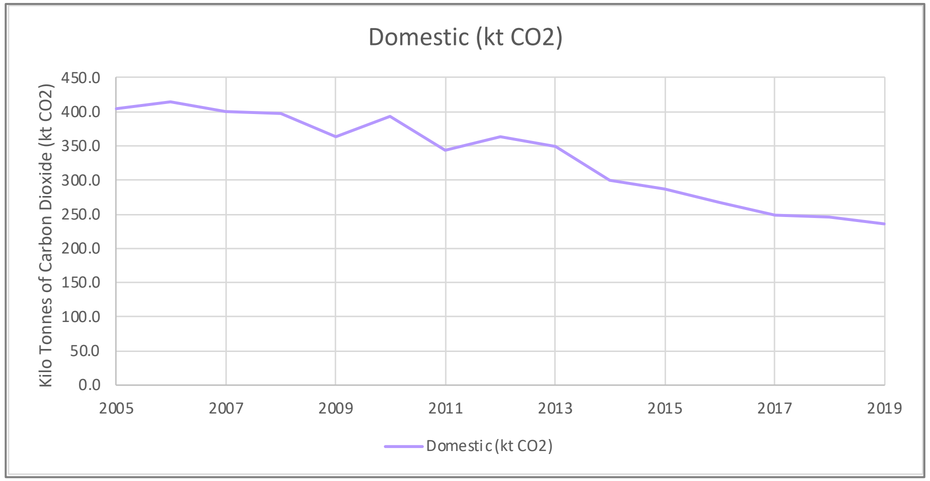


Figure 11: LULUCF CO_2 emissions trends.

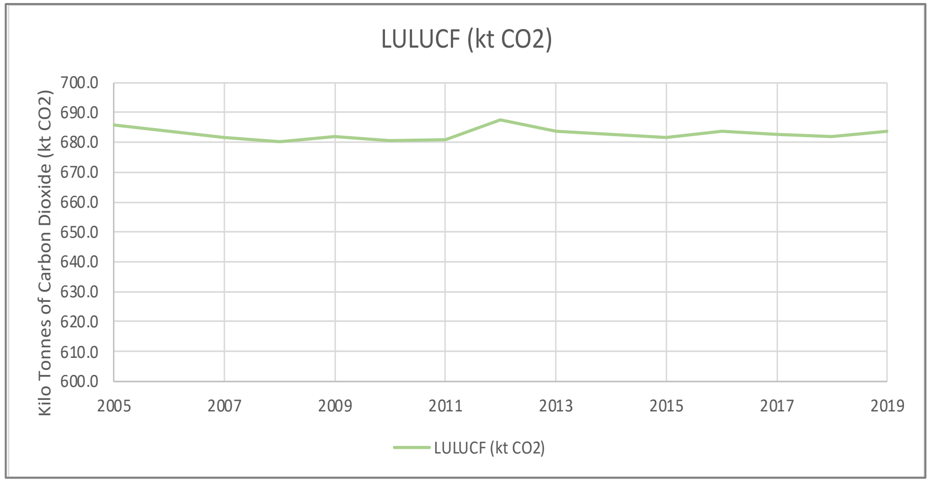
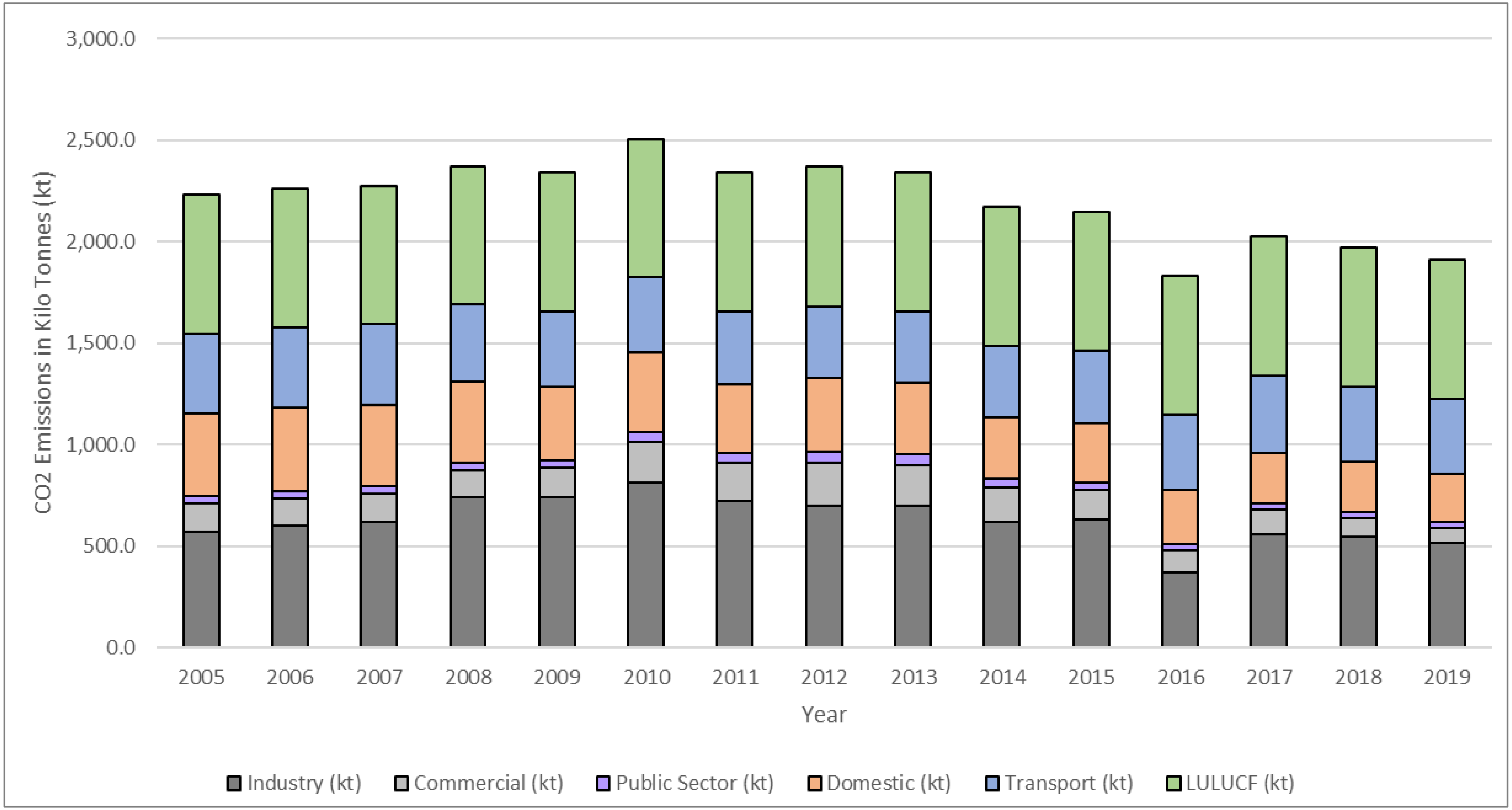


Figure 12: Yearly CO_2 emissions trends in King's Lynn and West Norfolk.



Data Source: BEIS, UK local authority and regional carbon dioxide emissions national statistics, 2005-2019

5. Land Use Land Use Change and Forestry Emissions Update

5.1 There have been some changes to the methodology used by BEIS, of which the largest effects can be seen in the LULUCF sector. The previous release in 2020 highlighted King's Lynn and West Norfolk's emissions from LULUCF at 80.9 kt CO_2 for 2018. Following the BEIS funded wetlands supplement project, historical emissions estimated from LULUCF have been revised upwards to 682 kt CO_2 in 2018 (a 643% increase). 2019 emissions from the LULUCF sector are, therefore, substantially higher, and more impactful than initially reported

5.2 King's Lynn and West Norfolk's LULUCF emissions come mainly from the cropland subsector, which is a result of the drained peatlands in our district. BEIS highlight the below changes and revisions to cropland emissions as follows:

> *"For some Local Authorities, a large change in emissions/removals for the LULUCF sector has been observed between years in the Local CO2 dataset … The most significant impacts on the time-series for total net emissions are associated with the emission of carbon from cropland soil".*

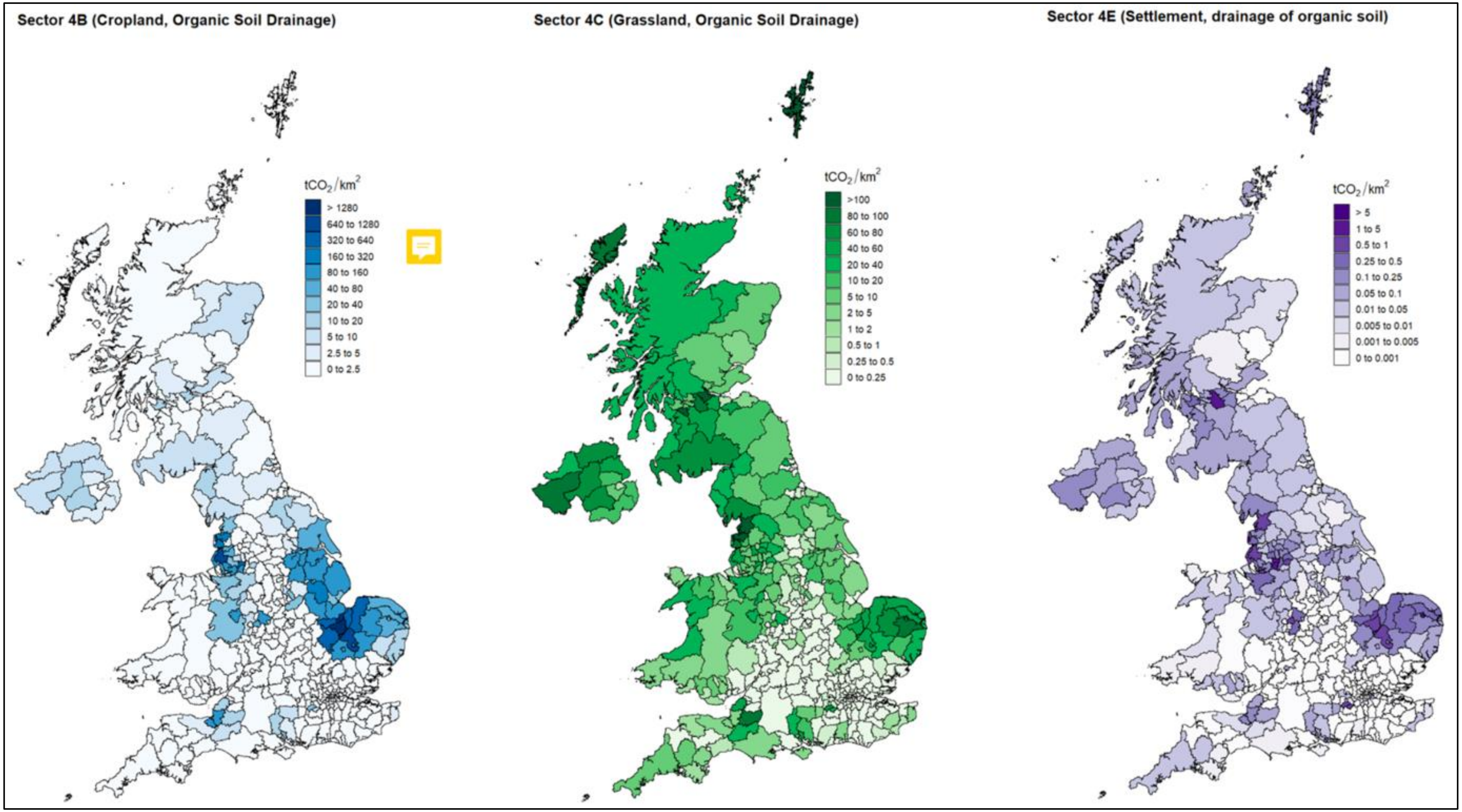
5.3 Whilst historical emissions from LULUCF have changed, it is important to stress that the now larger recorded emissions have always been there. These updated emissions are now just being recorded and reported more accurately, due to the improved calculation methodology.

5.4 LULUCF emissions in King's Lynn and West Norfolk are mainly for the cropland subsector, which is the lowland drained peat from our fenlands. These areas of land were drained centuries ago prior to our knowledge and understanding of the effect drained peatlands have on climate change.

5.5 LULUCF emissions are not a result of our current agricultural processes. LULUCF refers only to the natural process by which the drained peat oxidises and releases emissions. Agriculture emissions are reported in the industry sector.

5.6 Figure 4 below demonstrates the estimated CO_2 emissions distribution CO_2/km^2 from organic soil drainage in the UK. Figure 4 highlights how King's Lynn and West Norfolk is one of the highest emitters of CO_2 from organic soil drainage in the UK.

Figure 13: 2019 emissions distribution from organic soil drainage



Data Source: BEIS, Mapping carbon emissions and removals for the land use, land-use change & forestry sector, 2019.

6. Conclusion

6.1 Throughout the six emissions sectors, CO_2 emissions have seen a 3.2% decrease from 2018 to 2019 figures. The largest reduction of 12% was seen in the commercial sector, with the second highest reduction of 11.6% coming in the public sector. Despite a reduction in the transport sector, this was only by 1.4%, continuing the largely stable CO_2 emissions trend in this sector. Despite reductions across all five of the six sectors (LULUCF seeing a 0.3% increase), 2019 CO_2 emissions are still sitting above the all-time low emissions level of 2016.

6.2 The total CO_2 emissions figure has decreased from 2018 to 2019, to their second lowest ever level of 1,906.8 kt CO_2. Although the CO_2 emissions reductions seen in 2019 is a positive step towards a low carbon future, CO_2 emissions have failed to reduce to similar levels seen in 2016.

6.3 The national calculation methodology for LULUCF was revised with emissions subsequently rising from a 14-year average of 84.8 kt CO2 to a 14-year average of 682.7 kt CO2. These emissions have always been there, we now just have improved ways of calculating LULUCF emissions, providing a better picture of the challenge. LULUCF now contributes the largest proportion of our district emissions.