BiGGAR Economics

Wind Farms and Tourism Trends in Scotland

A Research Report

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1 EXECUTIVE SUMMARY

The relationship between the development of the onshore wind energy sector and the tourism sector has been a subject of debate in Scotland over the past fifteen years.

BiGGAR Economics has undertaken this study to understand the relationship, if any, that exists between the development of onshore wind energy and the sustainable tourism sector in Scotland. This is an updated study that has been undertaken as part of the research and development programme of BiGGAR Economics. The topic was selected for the programme since both renewable energy and tourism are important sectors for BiGGAR Economics.

Since 2009, the onshore wind sector has expanded considerably in Scotland, from an installed capacity of 2.0 gigawatts (GW) in 2009 to an installed capacity of 5.3 GW in 2015. Between 2009 and 2015 employment in the sustainable tourism sector in Scotland also grew, by 15%.[1] At the level of the Scottish economy as a whole, this would suggest that both the sustainable tourism sector and the onshore wind sector can coexist and grow.

However, it could be argued that if there were any relationship between the growth of onshore wind energy and tourism, it would be at a more local level. This study therefore considered the evidence at a local authority level and in the immediate vicinity of operational wind farms.

Employment in the sustainable tourism sector grew in the vast majority of local authority areas in Scotland between 2009 and 2015. This growth was often strongest in local authorities where the sector already played a large role in the economy. The growth in onshore wind energy capacity has been greater in some areas of Scotland than in others. Nine local authorities had greater increase in wind energy deployment than the Scottish average. Of these, four also saw a larger increase in sustainable tourism employment than the Scottish average, while five saw less growth than the Scottish average. The analysis presented in this report suggests that, at the local authority level, the development of onshore wind energy does not have a detrimental impact on the tourism sector.

This study also included analysis of local tourism trends within a 15km radius from onshore wind energy sites. The analysis considered 28 wind farms constructed between 2009 and 2015. This found that in the majority of cases sustainable tourism employment performed better in areas surrounding wind farms than in the wider local authority area. There was no pattern, which emerged that would suggest that onshore wind farm development has had a detrimental impact on the tourism sector, even at a very local level.

Overall, the conclusion of this study is that published national statistics on employment in sustainable tourism demonstrates that there is **no relationship between the development of onshore wind farms and tourism employment at the level of the Scottish economy, at local authority level nor in the areas immediately surrounding wind farm development**.

[1] This study has used employment in the sustainable tourism sector (as defined by the Scottish Government) as a measure of the performance of the tourism economy, since service sector levels of employment will be sensitive to changes in tourism numbers and spending.

2 INTRODUCTION

BiGGAR Economics carried out an independent study in 2016 into the impact of the development of onshore wind farms on the Scottish tourism sector. This is an update of the report to analyse the latest available data and statistics.

For copies of this report or for further information please contact Graeme Blackett at BiGGAR Economics by email at graeme@biggareconomics.co.uk.

2.1 About the Authors

BiGGAR Economics works across a number of strategically important sectors for the Scottish economy, including both sustainable tourism and renewable energy, which are identified as key growth sectors in the Scottish Government's Economic Strategy.

This experience has included studies on the employment supported by the onshore wind sector across the UK for Renewable UK in 2012[2] and 2015[3]. In addition, BiGGAR Economics has also considered the socio-economic and tourism implications of individual wind farm proposals across Scotland and elsewhere and is considered an industry leader in this field.

BiGGAR Economics also has significant experience in supporting and studying the tourism sector in Scotland and has assessed the economic impact of cultural venues, golf courses, airports and sporting facilities throughout Scotland and elsewhere.

The study has been undertaken as part of the research and development programme of BiGGAR Economics. The topic was selected for the programme since both renewable energy and tourism are important sectors for BiGGAR Economics.

2.2 The Debate

The development of onshore wind energy and other renewable technologies has the support of the population. Specifically, a series of surveys undertaken by the Department for Business, Energy & Industrial Strategy[4] suggest that:

- support for renewable energy has remained consistent at around 75-80% in the last three years, with support at 77% as of August 2017. Opposition to renewable energy stood at 4%; and
- support for onshore and offshore wind stood at 73% and 80% respectively.

However, campaigns against wind farms often receive significant media coverage and wind farm developers are encouraged to consider the impact of proposed wind farms on the tourism sector as part of the planning and environmental impact assessment system.

While tourism impact issues have been tested at many public inquiries (including several where BiGGAR Economics has provided expert witness evidence), there

[2] BiGGAR Economics (May 2012), Onshore Wind Direct and Wider Economic Benefits, DECC/RenewableUK
[3] BiGGAR Economics (April 2015), Onshore Wind Direct and Wider Economic Benefits, RenewableUK
[4] Department for Business, Energy & Industrial Strategy (August 2017), Energy and Climate Change Public Attitudes Tracker

have been no examples to date of proposed wind farms being refused permission on the grounds of tourism impacts.

2.3 The Facts

In order to consider the real implications for the onshore wind sector it is necessary to consider the empirical data that is available and not solely rely on anecdotal evidence. Accurate and reliable data is available on:

- The numbers of wind farms, the numbers of turbines, the installed energy generating capacities and the timing of developments in each local authority (from the Department for Business, Energy and Industrial Strategy's Renewable energy planning database);
- The health of the tourism sector in each local authority, with local authority data available on employment in the sustainable tourism sector from 2009-15 (from the National Statistics Business Register and Employment Survey). VisitScotland publishes data on the volume and value of tourism in Scotland; however, this data is not available at individual local authority level and in any case is a measure of spending, whilst employment levels are a measure of the economic impact of that spending; and
- The health of the tourism sector in each Scottish data zone (groups of 2001 Census output areas that have populations of between 500 and 1,000 household residents). As with the local authorities, data is available on employment in sustainable tourism sectors from 2009-15 (from the National Statistics Business Register and Employment Survey). The availability of data from much smaller areas therefore allows an examination of whether wind farms impact tourism at a more local level.

This report makes use of this data to examine the evidence for any link between the development of onshore wind farms and tourism.

2.4 Report Structure

The rest of the report is structured as follows:

- Section 3 provides data on trends in sustainable tourism employment in Scotland and by local authority area;
- Section 4 outlines the growth in onshore wind farms installed in Scotland by local authority area;
- Section 5 analyses the trends in sustainable tourism employment from 2009-15, within a 15km radius of the 28 wind farms with a capacity of at least 10MW that were constructed in 2010-14. These trends are compared with the overall trend in Scottish sustainable tourism employment in this timeframe;
- Section 6 presents the conclusions of this analysis;
- Section 7 provides an appendix with some of the data that was used in this analysis; and
- Section 8 provides an appendix considering and responding to some of the criticisms of the previous study.

3 TOURISM IN SCOTLAND

The discussion surrounding the role of wind farms on the wider economy often highlights the important role that the sustainable tourism sector plays within the Scottish economy. It is designated as one of the six Growth Sectors identified by the Scottish Government and makes a significant contribution to the Scottish economy.[5] This chapter provides an overview of employment trends in the sustainable tourism sector within Scotland.

3.1 Sustainable Tourism Employment

The two most frequently referenced organisations that produce statistics for the Scottish tourism sector are VisitScotland and the ONS. VisitScotland produces statistics on the number of UK and overseas visitors to Scotland and their spending. However, the VisitScotland statistics are not available at local authority level. Other statistics are available on tourism accommodation occupancy rates and on tourist attraction visitor numbers; but the coverage and statistical robustness of this data as indicators of tourism at the local authority area varies across Scotland.

The most accurate indicators of the health of the tourism industry at a local level are perhaps the figures on employment in 'sustainable tourism' industries, where the Scottish Government defines the sectors that form this category. The data can be found from the annual Business Register and Employment Survey (BRES) and extracted from the National Online Manpower Information Service (NOMIS). The figures used in this study consider the years between 2009 and the latest available year 2015. Analysis of the Business Register and Employment Survey indicates that overall in Scotland in 2015 there were 217,000 jobs in sustainable tourism, which is an increase of 15% since 2009. Table 3.1 summarises these trends across the sub-sectors of sustainable tourism.

Tourism businesses gain from local resident expenditure in addition to tourism spending, and therefore both resident spending and tourism spending will support employment in these sectors. Previous research by BiGGAR Economics in the Stirling Council area found that approximately half of all spending in sustainable tourism businesses in Stirling was from residents and half was from visitors. This study investigates sustainable tourism trends across Scotland between 2009 and 2015. It is reasonable to assume that the effects of changes in tourism spending will be reflected by changes in sustainable tourism employment. Indeed, those industries that tend to rely more on tourist spending, such as holiday and short stay accommodation and camping grounds, recreational vehicle parks and trailer parks, showed strong growth during this time period.

[5] Sustainable Tourism in this report is the Growth Sector as defined by the Scottish Government http://www.gov.scot/Topics/Statistics/Browse/Business/Publications/GrowthSectors

Table 3.1 – Sustainable Tourism Employment in Scotland by Sub-Sector

Sub-Sector	Number Employed, 2015	Change 2009-15	% Change 2009-15
Hotels and similar accommodation	53,000	4,000	8.2%
Holiday and other short-stay accommodation	3,650	800	28.1%
Camping grounds, recreational vehicle parks and trailer parks	2,500	250	11.1%
Restaurants and mobile food service activities	89,000	23,000	34.8%
Beverage serving activities	37,000	-4,000	-9.8%
Tour operator activities	1,250	-500	-28.6%
Other reservation service and related activities	1,200	255	27.0%
Museum activities	4,500	500	12.5%
Operation of historical sites and buildings and similar visitor attractions	2,250	1,250	125.0%
Botanical and zoological gardens and nature reserve activities	1,750	-250	-12.5%
Operation of sports facilities	14,000	1,000	7.7%
Other sports activities (not including activities of racehorse owners)	4,000	2,000	100.0%
Activities of amusement parks and theme parks	500	-100	-16.7%
Other amusement and recreation activities	2,250	0	0.0%
Total Sustainable Tourism Employment	216,850	28,205	15.0%

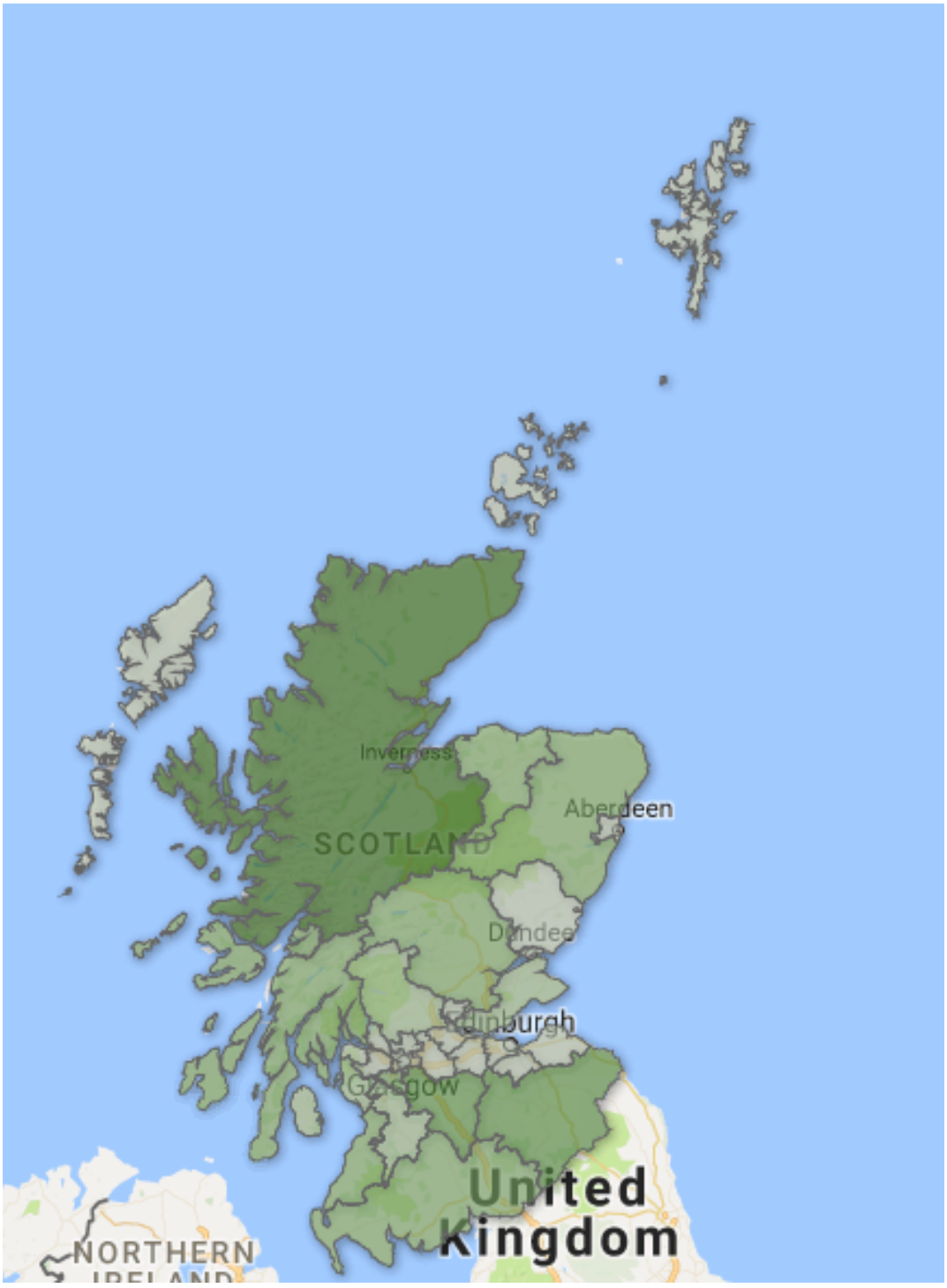
Source: ONS (2017), Business Register and Employment Survey, 2009-15

3.2 Trends across Local Authorities

Within Scotland there is variation in the importance of the tourism industry across the local authorities. Table 7.1 in Appendix A shows the different levels of employment in sustainable tourism across Scotland's local authority areas and the proportion of total employment in each area that is related to sustainable tourism. This demonstrates the significant variation across local authorities in the proportion of the local workforce employed in the sustainable tourism sectors. The local authorities with the greatest reliance on employment in sustainable tourism are also predominantly rural areas.

The area with the highest concentration of sustainable tourism workers is Argyll and Bute and the other local authorities with a greater reliance employment in sustainable tourism are also largely rural areas. The cities of Edinburgh and Glasgow have the highest number of employees in absolute terms; however these cities have a wide range of sectors that are very active and therefore the relative importance of the sustainable tourism sector in these cities is not as great as it is in more rural areas.

Figure 3-1 – Density of Sustainable Tourism Employment



Source: ONS (2017), Business Register and Employment Survey

There have also been variations in changes to sustainable tourism employment across local authority areas. Across Scotland, between 2009 and 2015 the level of sustainable tourism employment grew by 15%. Overall, 27 out of 32 local authority areas experienced an increase in sustainable tourism industry employment and 8 local authorities experienced an average growth of over 20% over this time period.

Local authorities in which sustainable tourism accounts for a high proportion of employment have seen the greatest growth in employment. For example, the sustainable tourism sector accounts for 17% of employment in Argyll and Bute and between 2009 and 2015 employment grew by 22%.

Since the share of tourist related activities as a percentage of all employment does appear to reflect locations where tourist's are more likely to visit, it might suggest that tourist expenditures has grown at a faster rate than residential expenditures, highlighting the importance of the sector to the economy.

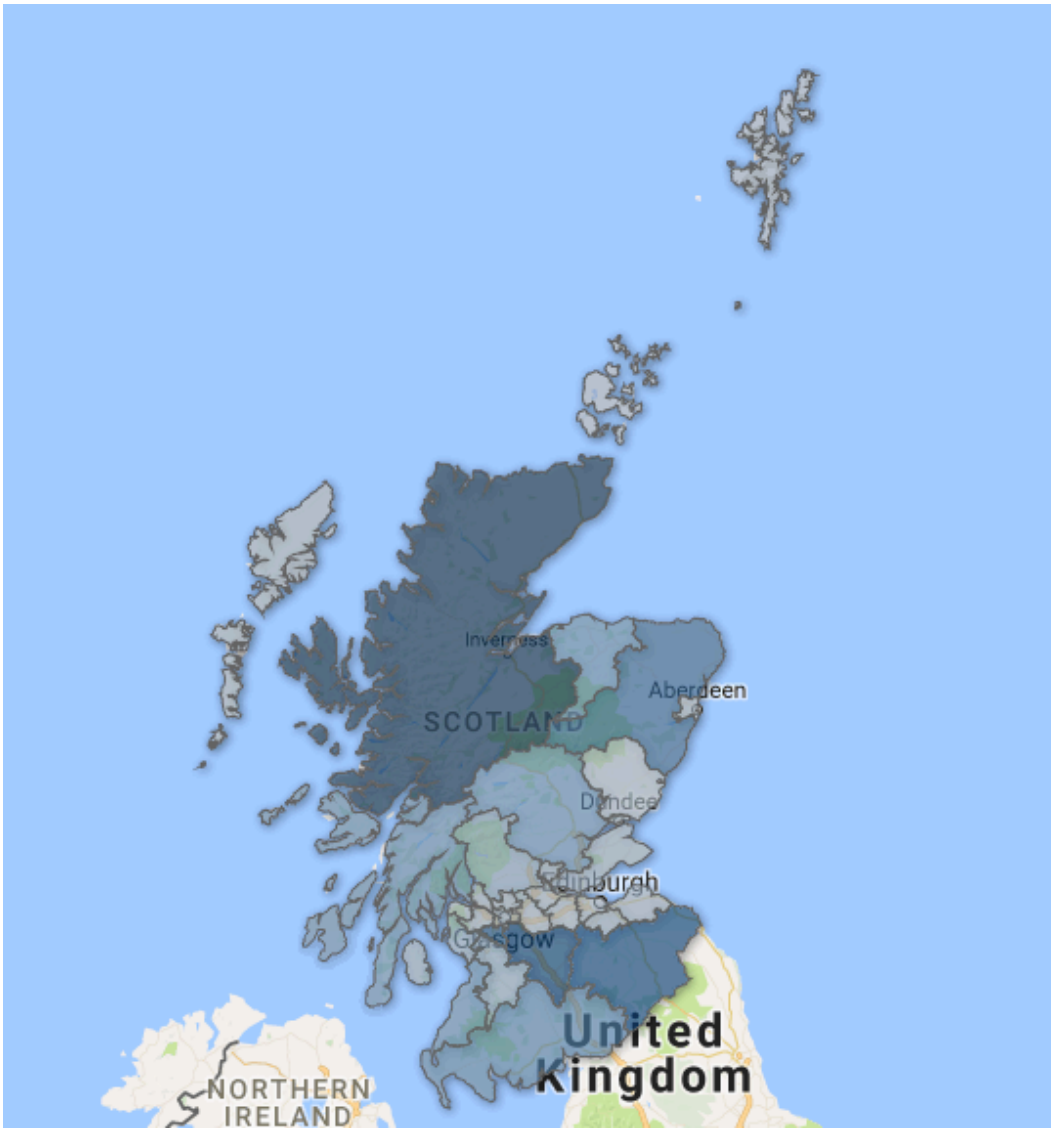
3.3 Summary

The sustainable tourism sector in Scotland is a significant contributor to employment in the economy, accounting for over 217,000 jobs throughout the country. The sector is particularly important in many rural areas of Scotland, where it can account for up to 17% of the total workforce. In the time period between 2009 and 2015 the sector saw a considerable growth in employment levels, an increase of 15%. This growth was not spread equally throughout the country and those areas that already had a strong reliance on the sector saw this dependence increase.

4 ONSHORE WIND ENERGY IN SCOTLAND

There has been a considerable increase in onshore wind farm development in Scotland in recent years. Between 2009 and 2015 the number of wind turbines has more than doubled from 1,207 to 2,761. The installed capacity has also grown significantly, with 1,983 megawatts (MW) installed in 2009 and 5,315 MW connected to the grid in 2015.

Figure 4-1 – Installed Capacity of Onshore Wind Farms (2015)



Source: BEIS - Renewable Energy Planning Database (2017)

There is also variation in how the level of installed capacity increased between 2009 and 2015. Table 7.3 in Appendix A tracks the level of installed capacity each year between 2009 and 2015. In particular, between 2009 and 2015:

- five local authorities saw an increase in capacity of over 300% across the 6 years. East Ayrshire saw capacity increase by 826%, with the number of turbines tripling;
- six local authorities had their first wind farms become operational between 2009-15. Most of these were small-scale developments; and

- six out of 32 local authorities currently do not currently have any onshore wind farms.

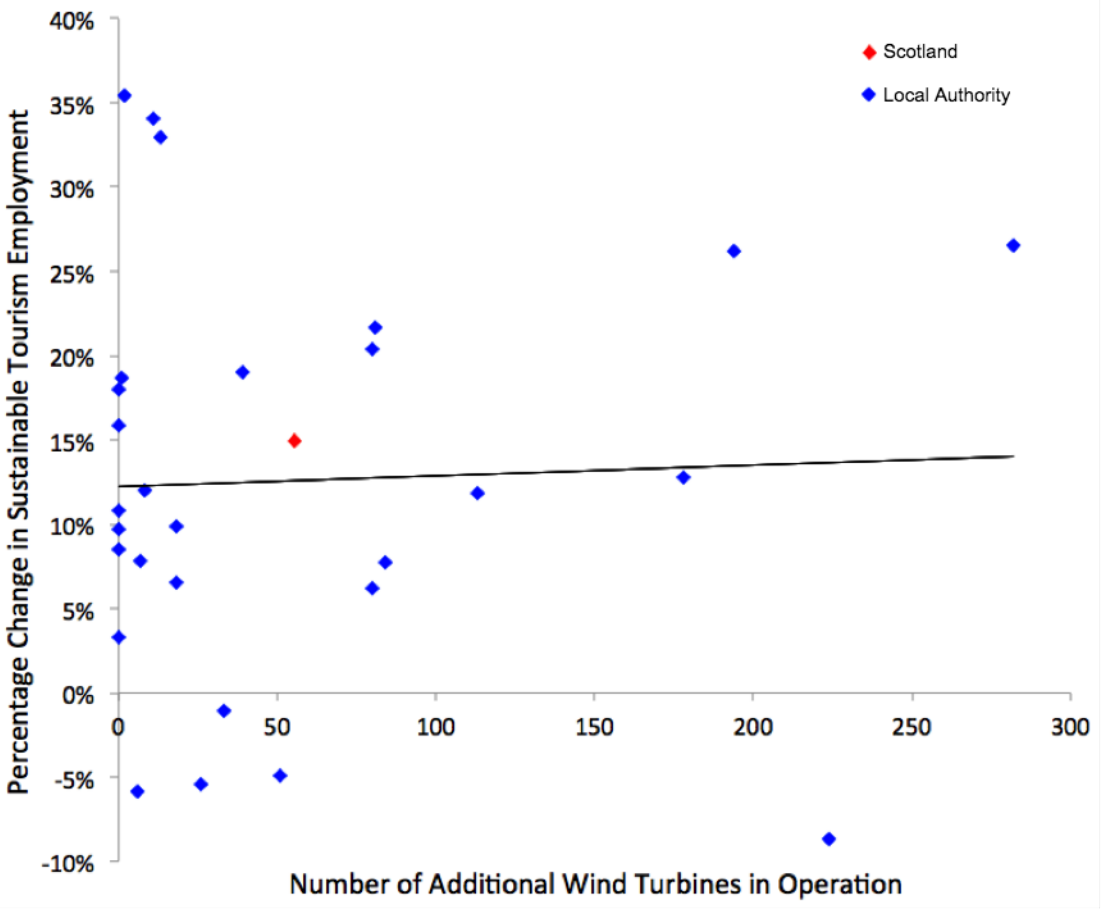
A breakdown in the wind farm developments between 2009 and 2015 in terms of the number of wind turbines and the overall installed capacity by local authority area are presented in Table 7.4, Table 7.5 and Table 7.6 in Appendix A. This shows that there has been a huge variation in the growth in installed capacity between local authorities in recent years.

Figure 4-2 plots the percentage change in sustainable tourism employment against the number of additional wind turbines that became operational between 2009 and 2015 for all the local authorities in Scotland (excluding Aberdeen City, Dundee City, City of Edinburgh and Glasgow City). This shows that there is a significant level of variation between both factors across the country. Across Scottish local authorities, the average number of additional onshore wind turbines installed was 55, while sustainable tourism employment increased by 15% in this time period. This is shown with the red point in Figure 4-2.

The area that has seen the largest drop in sustainable tourism employment is South Lanarkshire, which has also seen a significant increase in the number of turbines. However, the local authority that has seen the greatest increase in the number of wind turbines is Highland, which is one of the many local authority areas that has seen a greater increase in sustainable tourism employment than the Scottish average and at the same time a greater increase in the number of onshore wind turbines.

The huge variation between the local authorities means that any relationship between growth in turbines and changes to tourism employment is likely to be very weak or non-existent. The trendline shown in Figure 4-2 is almost horizontal, with only the slightest positive gradient. A positive gradient would imply a positive relationship between the number of wind turbines and total tourism employment. However, the vast deviation within the data means that no positive conclusions can be reached from this analysis. It is clear from the data that there is no correlation between the number of wind turbines and tourism employment. Based on the analysis this study has found no relationship between wind farm development and sustainable tourism employment at the local authority level.

Figure 4-2 – Change in tourism employment and number of wind turbines by Local Authority (2009-2015)



4.1 Summary

The installed capacity of onshore wind energy and the number of onshore wind turbines increased significantly between 2009 and 2015.

Of the local authorities that saw a greater number of wind turbines made operational than the Scottish average between 2009-15, four also saw a larger increase in sustainable tourism employment than the Scottish average, while five saw less growth than the Scottish average.

At the local authority level this study found there to be no relationship between the number of wind turbines and the level of employment in sustainable tourism.

5 IMMEDIATE AREAS AROUND WIND FARMS

The previous chapters have found that the number of wind farms in Scotland has increased significantly with no corresponding decline in tourism at either a national or local authority level. However, it is reasonable to suppose that the effect on tourism of wind farms could be more localised. It was therefore necessary to examine the impact wind farms have had on sustainable tourism employment in the immediate surrounding area. The immediate surrounding areas were defined as the Scottish Data Zones that lie within a 15 km radius of the wind farm.

5.1 Selected Wind Farms

The previous study investigated the impact of the construction and operational phases of wind farm developments on the local tourism economy, by assessing 18 wind farm sites throughout Scotland. The wind farms selected all had a capacity of over 10 MW and were geographically spread throughout Scotland, with many in local authorities that have a strong reliance on the sustainable tourism sector. All of wind farm sites were constructed in 2010-12, and became operational during the time period to 2013. The 18 wind farm sites that were selected in the previous study were:

- Allt Dearg;
- Arecleoch;
- Clyde;
- Drone Hill;
- Glenkerie;
- Gordonbush;
- Griffin;
- Hill of Towie;
- Kelburn;
- Kilbruar Extension;
- Little Raith;
- Mark Hill;
- Millenium Extension;
- Millour Hill;
- Muirhall;
- Novar Extension;
- Spurness; and
- Whitelee Extension.

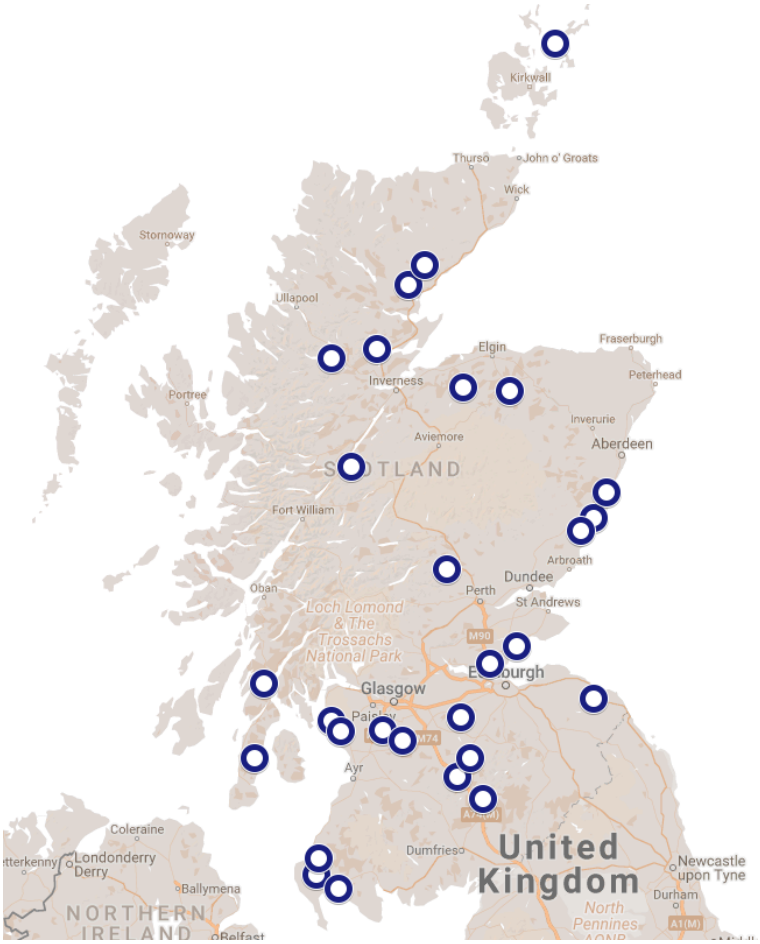
This study reassesses these 18 wind farm sites, in addition to the 10 wind farm sites that became operational throughout Scotland in 2014 with a capacity of over

10 MW. All of these wind farm sites were constructed after 2009 and became operational during the time period to 2014. Therefore, any impacts associated with both the construction and operation of the wind farm would be apparent in the sustainable tourism employment statistics for 2015. The additional 10 wind farm sites that became operational in 2014 are:

- Beinn an Tuirc Phase 2;
- Berry Burn;
- Carscreugh;
- Earlseat;
- Easter Tulloch Wind Farm;
- Harestanes;
- Lochluichart;
- Mid Hill Phase 2;
- Tullo Wind Farm South; and
- West Browncastle.

The 28 selected wind farms are shown by location in Figure 5-1.

Figure 5-1 – Location of Selected Wind Farms

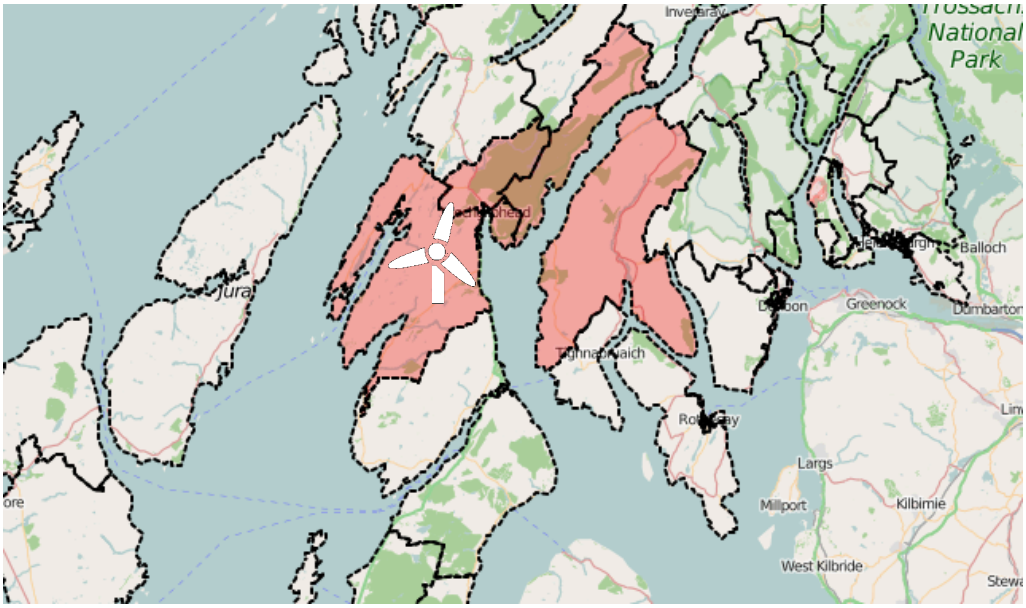


5.2 Sustainable Tourism in Wind Farms' Immediate Area

In order to assess the impact of development and operation of these wind farms on the local tourism economy it was necessary to consider the levels of sustainable tourism employment in each of these local areas between 2009 and 2015. The Office of National Statistics (ONS) notes that the Business Register and Employment Survey estimates are subject to sampling errors that increase as geographic areas become smaller. However, most surrounding areas examined are made up of 10 or more data zones, and some have more than 200, therefore the risks associated with potential sampling errors have been reduced.

The immediate areas surrounding wind farms in rural areas can cover a diverse geography. For example, the local area used in the analysis of Allt Dearg is shown in Figure 5-2. This shows the area most likely to be impacts by the construction and operational activity associated with Allt Dearg wind farm includes the town of Lochgilphead and more sparsely populated areas of Argyll.

Figure 5-2 - Allt Dearg Wind Farm and Local Area



There is significant variation in the size of the level of employment in sustainable tourism. The surrounding area with the highest level, Little Raith has 150 times more sustainable tourism employment than the smallest, Spurness. Overall, 8 of the 28 areas had less than 200 people employed in sustainable tourism in 2015.

Table 5.1 – Tourism Related Employment in Wind Farm Areas

Wind Farm Area	2009	2010	2011	2012	2013	2014	2015
Allt Dearg	100	100	200	100	200	100	200
Arecleoch	100	100	100	100	100	100	100
Clyde	200	100	100	100	100	100	100
Drone Hill	200	200	200	200	300	300	300
Glenkerie	200	200	200	200	200	200	200
Gordonbush	100	100	100	100	100	100	200
Griffin	500	600	700	700	700	800	600
Hill of Towie	400	400	400	400	500	400	500
Kelburn	2,400	2,400	2,400	2,200	2,700	2,200	2,300
Kilbraur Extension	100	100	100	100	100	100	200
Little Raith	6,000	5,600	5,600	5,100	5,500	5,400	6,000
Mark Hill	500	500	500	500	600	500	600
Millenium Extension	100	100	100	100	100	100	200
Millour Hill	2,400	2,400	2,400	2,200	2,600	2,200	2,300
Muirhall	1,600	1,500	1,600	1,600	1,900	1,700	1,900
Novar Extension	300	300	300	400	500	500	600
Spurness	0	0	0	0	0	0	0
Whitelee Extension	3,800	3,900	3,700	3,500	4,200	4,000	4,300
Beinn an Tuirc P2	200	100	200	200	300	300	200
Berry Burn	900	900	900	800	1000	900	1100
Carscreugh	100	100	100	100	100	100	100
Earlseat	3700	3400	3500	3000	3600	3400	3600
Easter Tulloch	600	600	600	700	800	800	900
Harestanes	300	200	300	400	400	400	500
Lochluichart	100	100	100	200	200	200	200
Mid Hill Phase 2	500	400	400	500	500	500	600
Tullo South	800	800	700	800	1000	900	1100
West Browncastle	500	500	500	400	500	400	400
Scotland	188,600	182,000	183,200	182,100	212,200	196,200	216,900

Source: ONS Business Register and Employment Survey, 2009-15 (number have been rounded to nearest 100 in line with guidance)

Table 5.2 shows the percentage change in employment in sustainable tourism industries between 2009 and 2015, in the wind farm regions and in Scotland. Overall, 17 out of the 28 local areas saw sustainable tourism employment increase by more than the Scottish average over the period in which a wind farm was constructed and became operational.

Table 5.2 – Change in Tourism Related Employment in Selected Areas, 2009 - 2015

Wind Farm Area	2009 - 2015
Lochluichart	135.1%
Kilbraur Extension	94.9%
Novar Extension	77.0%
Allt Dearg	64.3%
Carscreugh	62.3%
Harestanes	60.8%
Gordonbush	52.9%
Easter Tulloch	48.7%
Drone Hill	39.1%
Hill of Towie	33.9%
Millenium Extension 2	32.0%
Tullo South	31.5%
Mid Hill Phase 2	25.3%
Beinn an Tuirc P2	24.1%
Griffin	20.4%
Berry Burn	19.7%
Muirhall	16.2%
Scotland	15.0%
Spurness	14.3%
Arecleoch	13.3%
Whitelee Extension	11.7%
Mark Hill	10.4%
Little Raith	-0.3%
Millour Hill	-2.2%
Kelburn	-3.5%
Earlseat	-3.5%
Glenkerie	-3.6%
West Browncastle	-9.5%
Clyde	-13.8%

Source: BiGGAR Economics

If wind farm developments did have a detrimental effect on tourism-related employment, it may be evident in the year-on-year changes in employment in the surrounding region. It would be expected that an area, which underwent wind farm developments in the time period 2010-14 might start to experience diminishing year-on-year tourism-related employment growth towards the end of the period 2009-15. Table 5.3 presents the annual change in sustainable tourism employment from 2009 to 2015 in the surrounding areas of the 28 selected wind

farms. A change that is greater than the Scottish average is highlighted in green. As can be seen, there is no pattern or consistency that would suggest any relationship between wind farm developments and sustainable tourism employment.

Table 5.3 – Annual Change in Tourism Related Employment in Selected Areas

Wind Farm Area	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2009-15
Lochluichart	-1.1%	49.5%	12.2%	24.4%	-4.6%	19.5%	135.1%
Kilbraur Extension	26.6%	11.0%	4.5%	10.3%	-3.1%	24.2%	94.9%
Novar Extension	-7.6%	9.5%	9.8%	22.8%	2.6%	26.5%	77.0%
Allt Dearg	-3.6%	44.4%	-14.1%	66.4%	-35.0%	26.9%	64.3%
Carscreugh	-9.8%	43.6%	-1.3%	0.0%	16.7%	8.8%	62.3%
Harestanes	-27.7%	19.8%	34.6%	8.7%	5.3%	20.5%	60.8%
Gordonbush	-19.2%	19.0%	11.0%	19.8%	3.8%	15.2%	52.9%
Easter Tulloch	-7.4%	2.2%	15.2%	24.9%	-4.4%	14.3%	48.7%
Drone Hill	11.4%	-9.8%	-8.1%	58.6%	-20.8%	20.0%	39.1%
Hill of Towie	-8.8%	8.1%	-4.7%	17.8%	-14.7%	41.9%	33.9%
Millenium Extension 2	-9.0%	-2.7%	4.6%	24.8%	-6.4%	22.0%	32.0%
Tullo South	1.6%	-9.0%	3.1%	30.3%	-6.1%	12.8%	31.5%
Mid Hill Phase 2	-7.9%	1.6%	1.3%	15.7%	3.2%	10.7%	25.3%
Beinn an Tuirc P2	-22.4%	28.0%	32.0%	24.2%	-2.5%	-21.9%	24.1%
Griffin	18.5%	18.5%	-7.5%	-2.8%	21.8%	-21.7%	20.4%
Berry Burn	-1.8%	-0.5%	-7.6%	31.0%	-12.5%	15.6%	19.7%
Muirhall	-4.9%	7.0%	-4.5%	19.3%	-7.8%	8.7%	16.2%
Scotland	-3.5%	0.7%	-0.6%	16.5%	-7.5%	10.5%	15.0%
Spurness	-71.4%	60.0%	68.8%	51.9%	-17.1%	17.6%	14.3%
Arecleoch	1.2%	0.0%	6.0%	20.2%	-9.3%	-3.1%	13.3%
Whitelee Extension	1.8%	-4.5%	-5.6%	20.8%	-4.1%	5.2%	11.7%
Mark Hill	3.3%	0.2%	-2.2%	14.7%	-13.5%	10.0%	10.4%
Little Raith	-7.1%	0.0%	-8.6%	7.4%	-2.7%	12.3%	-0.3%
Millour Hill	0.6%	0.5%	-9.2%	21.8%	-18.1%	6.8%	-2.2%
Kelburn	0.1%	0.5%	-9.1%	21.8%	-20.4%	8.9%	-3.5%
Earlseat	-7.0%	0.5%	-12.4%	17.9%	-5.3%	5.4%	-3.5%
Glenkerie	-14.2%	17.5%	-12.9%	-8.8%	17.2%	2.6%	-3.6%
West Browncastle	10.1%	-8.6%	-6.5%	6.1%	-5.3%	-4.2%	-9.5%
Clyde	-11.9%	4.3%	-11.0%	4.6%	-13.2%	16.1%	-13.8%

Source: BiGGAR Economics analysis of ONS Business Register and Employment Survey, 2009-15

5.3 Sustainable Tourism Relative to Local Authority

Analysis has also been undertaken to compare the areas surrounding wind farms with the corresponding local authority area, in order to identify if there are any regional effects to employment.

While some comparisons may be spurious, given the small overall of level of employment in some areas, it is worthwhile examining whether wind farm development areas tend to underperform against their region, and if underperformance increases after a wind farm development becomes operational.

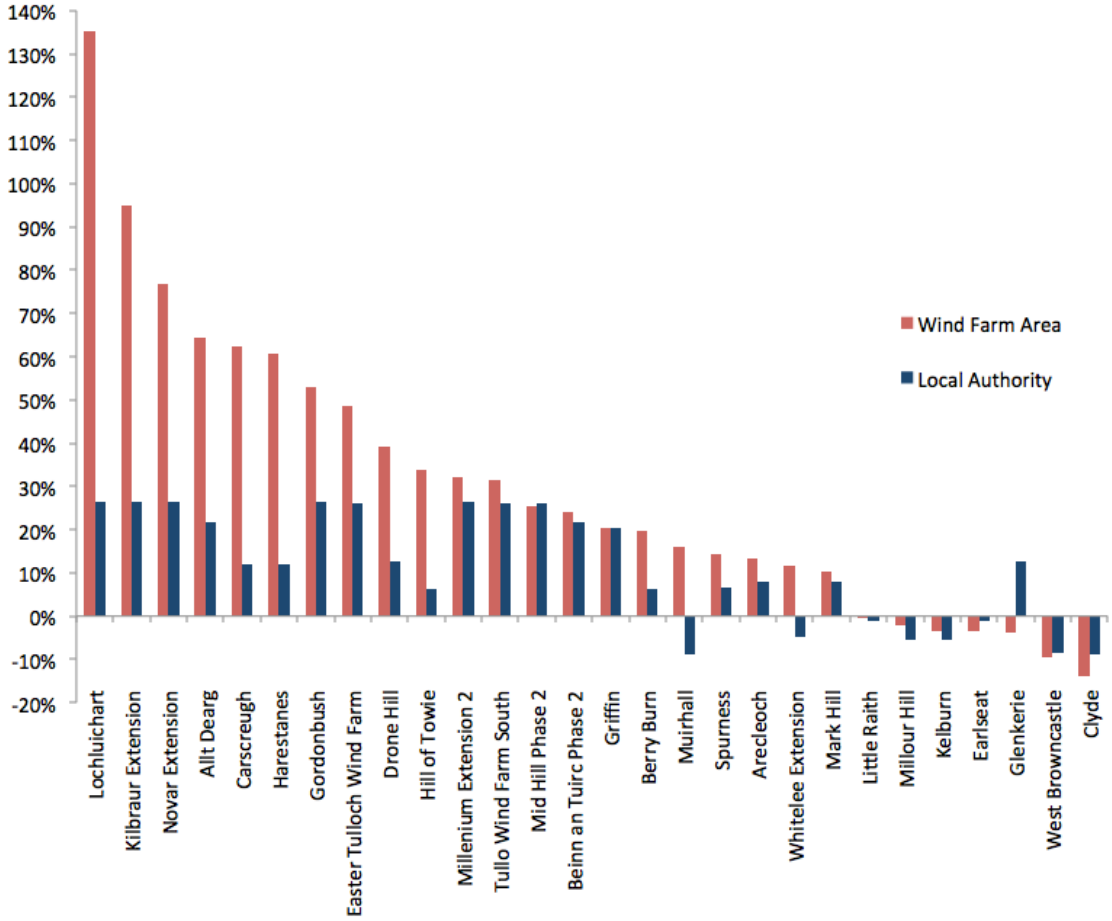
Table 5.4 shows the change in tourism related employment in both surrounding area of the wind farm and the corresponding local authority. The area that grew at the greatest rate in the time period 2009-15 is highlighted in green. Of the 28 wind farm sites considered, the level of growth in sustainable tourism employment was higher in the immediate areas surrounding the wind farm than in the local authority in 22 cases (Table 5.4 and Figure 5-3).

Table 5.4 – Change in Tourism Related Employment in Selected Areas, 2009 - 2015

Wind Farm Area	Local Authority	Change in Tourism Employment (2009 - 2015)	
		Wind Farm Area	Local Authority
Lochluichart	Highland	135.1%	26.5%
Kilbraur Extension	Highland	94.9%	26.5%
Novar Extension	Highland	77.0%	26.5%
Allt Dearg	Argyll and Bute	64.3%	21.7%
Carscreugh	Dumfries and Galloway	62.3%	11.9%
Harestanes	Dumfries and Galloway	60.8%	11.9%
Gordonbush	Highland	52.9%	26.5%
Easter Tulloch	Aberdeenshire	48.7%	26.2%
Drone Hill	Scottish Borders	39.1%	12.8%
Hill of Towie	Moray	33.9%	6.2%
Millenium Extension 2	Highland	32.0%	26.5%
Tullo South	Aberdeenshire	31.5%	26.2%
Mid Hill Phase 2	Aberdeenshire	25.3%	26.2%
Beinn an Tuirc P2	Argyll and Bute	24.1%	21.7%
Griffin	Perth and Kinross	20.4%	20.4%
Berry Burn	Moray	19.7%	6.2%
Muirhall	South Lanarkshire	16.2%	-8.7%
Spurness	Orkney Islands	14.3%	6.6%
Arecleoch	South Ayrshire	13.3%	7.8%
Whitelee Extension	East Renfrewshire	11.7%	-4.9%
Mark Hill	South Ayrshire	10.4%	7.8%
Little Raith	Fife	-0.3%	-1.1%
Millour Hill	North Ayrshire	-2.2%	-5.4%
Kelburn	North Ayrshire	-3.5%	-5.4%
Earlseat	Fife	-3.5%	-1.1%
Glenkerie	Scottish Borders	-3.6%	12.8%
West Browncastle	South Lanarkshire	-9.5%	-8.7%
Clyde	South Lanarkshire	-13.8%	-8.7%

Source: BiGGAR Economics analysis of ONS Business Register and Employment Survey, 2009-15

Figure 5-3 – Change in Tourism Related Employment in Wind Farms areas and Affected Local Authorities



5.4 Summary

This section considered trends in sustainable tourism employment in the data zones that surrounded onshore wind farm developments. This found that the majority of areas saw an increase in employment in sustainable tourism between 2009 and 2015, the period in which the wind farms became operational.

The period between 2009 and 2015 also saw an increase in sustainable tourism across the majority of local authority areas in Scotland. When the growth in sustainable tourism employment in the areas local to wind farm developments was compared to the growth rate for the wider local authority it was found that for the majority of cases the tourism sector in the immediate area around the wind farm grew quicker than it did across the local authority area.

6 CONCLUSIONS

This study was undertaken to find empirical evidence of a relationship between the development of onshore wind farms and the tourism sector in Scotland. In order to do this the changes in employment in the sustainable tourism sector between 2009 and 2015 were considered along with the growth in the onshore wind sector during this time period.

The analysis found that there was no relationship between the growth in the number of wind turbines and the level of tourism employment at the local authority level.

It would be reasonable to expect that any impacts associated with a wind farm development are most likely to be felt strongest in the immediate vicinity of the development. An analysis of the levels of employment in the sustainable tourism sector in the immediate vicinity of onshore wind farm developments did not find any evidence of these areas being adversely affected. On the contrary it was found that the tourism sector in the majority of areas surrounding wind farms grew faster than in the local authorities where they were situated. Although this study does not suggest that there is any direct relationship between tourism sector growth and wind farm development, it does show that **wind farms do not cause a decrease in tourism employment** either at a local or a national level.

7 APPENDIX A – LOCAL AUTHORITY TABLES

Table 7.1 – Sustainable Tourism Employment by Local Authority (2015)

Local Authority	Tourism Employment	% Of Total Employment
Aberdeen City	11,040	6.2
Aberdeenshire	8,415	7.8
Angus	3,410	9.8
Argyll and Bute	6,290	16.7
Clackmannanshire	1,090	7.3
Comhairle nan Eilean Siar	6,415	11
Dumfries and Galloway	5,755	7.5
Dundee City	2,785	6.9
East Ayrshire	2,190	8.3
East Dunbartonshire	3,635	13.1
East Lothian	1,735	8.2
East Renfrewshire	34,220	10.7
City of Edinburgh	1,055	10
Falkirk	4,420	7.1
Fife	10,825	7.9
Glasgow City	30,505	7.3
Highland	16,095	14.1
Inverclyde	2,140	7.1
Midlothian	1,880	6.5
Moray	3,100	8.6
North Ayrshire	3,915	9.5
North Lanarkshire	6,510	5.2
Orkney Islands	1,215	11.8
Perth and Kinross	8,850	13.8
Renfrewshire	5,715	6.8
Scottish Borders	4,110	9.7
Shetland Islands	1,400	9.3
South Ayrshire	5,960	12.8
South Lanarkshire	8,480	7.3
Stirling	5,865	12.9
West Dunbartonshire	3,115	9.8
West Lothian	3,910	5.3
Scotland	216,850	8.6

Source: ONS (2017), Business Register and Employment Survey

Table 7.2 – Trends in Sustainable Tourism Employment by Local Authority (2009-15)

Local Authority	Change in Sustainable Tourism Employment	
	Value	Percentage Change
Aberdeen City	1,055	10.6%
Aberdeenshire	1,745	26.2%
Angus	365	12.0%
Argyll and Bute	1,120	21.7%
Clackmannanshire	270	32.9%
Comhairle nan Eilean Siar	680	11.9%
Dumfries and Galloway	660	13.0%
Dundee City	445	19.0%
East Ayrshire	300	15.9%
East Dunbartonshire	950	35.4%
East Lothian	-90	-4.9%
East Renfrewshire	7,105	26.2%
City of Edinburgh	95	9.9%
Falkirk	675	18.0%
Fife	-120	-1.1%
Glasgow City	4,545	17.5%
Highland	3,375	26.5%
Inverclyde	190	9.7%
Midlothian	60	3.3%
Moray	180	6.2%
North Ayrshire	-225	-5.4%
North Lanarkshire	-405	-5.9%
Orkney Islands	75	6.6%
Perth and Kinross	1,500	20.4%
Renfrewshire	450	8.5%
Scottish Borders	465	12.8%
Shetland Islands	220	18.6%
South Ayrshire	430	7.8%
South Lanarkshire	-805	-8.7%
Stirling	1,490	34.1%
West Dunbartonshire	305	10.9%
West Lothian	285	7.9%
Scotland	28,205	15.0%

Source: ONS Business Register and Employment Survey, 2009-15

Table 7.3 – Onshore Wind Capacity in Scotland by Local Authority (MW)

Local Authority	2009	2010	2011	2012	2013	2014	2015
Aberdeen City	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Aberdeenshire	75.8	116.5	142.4	167.4	323.8	406.4	455.0
Angus	0.0	0.0	0.0	0.0	6.4	6.4	6.4
Argyll and Bute	129.6	148.9	154.9	165.7	211.7	255.4	261.4
Clackmannanshire	0.0	26.0	26.0	26.0	26.0	26.0	26.0
Comhairle nan Eilean Siar	3.9	3.9	3.9	3.9	24.6	24.6	37.8
Dumfries & Galloway	136.1	158.1	158.1	167.2	175.3	326.6	330.0
Dundee City	4.0	4.0	4.0	4.0	4.0	4.0	4.0
East Ayrshire	13.2	13.2	13.2	13.2	122.2	122.2	122.2
East Dunbartonshire	0.0	0.0	0.0	0.0	0.0	0.0	0.0
East Lothian	48.0	48.0	48.0	48.0	48.0	48.0	49.5
East Renfrewshire	328.5	328.5	328.5	436.5	457.7	469.1	469.1
City of Edinburgh	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Falkirk	0.0	0.0	0.0	0.0	0.0	0.0	12.0
Fife	0.0	0.0	3.0	28.0	40.5	63.4	70.0
Glasgow City	0.0	0.0	0.0	0.0	3.0	3.0	3.0
Highland	354.3	476.7	514.3	628.6	780.8	849.8	972.2
Inverclyde	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Midlothian	48.4	48.4	48.4	48.4	48.4	48.4	48.4
Moray	115.6	115.6	115.6	157.6	200.6	271.9	290.3
North Ayrshire	48.0	48.0	48.0	94.0	101.5	104.0	111.0
North Lanarkshire	4.0	4.0	4.0	4.0	15.5	15.5	21.2
Orkney Islands	16.5	24.5	24.5	34.5	38.1	39.1	39.1
Perth and Kinross	63.8	63.8	73.4	229.4	261.6	265.6	265.6
Renfrewshire	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Scottish Borders	188.9	381.2	381.2	431.8	578.2	578.2	594.2
Shetland Islands	3.7	3.7	3.7	3.7	3.7	3.7	6.7
South Ayrshire	120.0	120.0	296.0	296.0	296.0	296.0	296.0
South Lanarkshire	171.6	171.6	183.9	533.9	602.4	646.7	678.1
Stirling	109.5	129.5	129.5	129.5	129.5	129.5	131.9
West Dunbartonshire	0.0	0.0	0.0	0.0	0.0	0.0	0.0
West Lothian	0.0	14.0	14.0	14.0	14.0	14.0	14.0
Scotland	1,983	2,448	2,718	3,665	4,513	5,017	5,315

Source: BEIS - Renewable Energy Planning Database (2017)

Table 7.4 – Wind Farms in Scotland by Local Authority (2009)

Local Authority	Turbines	MW
Aberdeen City	0	0.0
Aberdeenshire	51	75.8
Angus	0	0.0
Argyll and Bute	154	129.6
Clackmannanshire	0	0.0
Comhairle nan Eilean Siar	3	3.9
Dumfries and Galloway	100	136.1
Dundee City	2	4.0
East Ayrshire	20	13.2
East Dunbartonshire	0	0.0
East Lothian	16	48.0
East Renfrewshire	144	328.5
City of Edinburgh	0	0.0
Falkirk	0	0.0
Fife	0	0.0
Glasgow City	0	0.0
Highland	213	354.3
Inverclyde	0	0.0
Midlothian	50	48.4
Moray	50	115.6
North Ayrshire	21	48.0
North Lanarkshire	2	4.0
Orkney Islands	12	16.5
Perth and Kinross	34	63.8
Renfrewshire	0	0.0
Scottish Borders	125	188.9
Shetland Islands	5	3.7
South Ayrshire	52	120.0
South Lanarkshire	103	171.6
Stirling	50	109.5
West Dunbartonshire	0	0.0
West Lothian	0	0.0
Scotland	1,207	1,983.3

Source: BEIS - Renewable Energy Planning Database (2017)

Table 7.5 – Wind Farms in Scotland by Local Authority (2015)

Local Authority	Turbines	MW
Aberdeen City	0	0.0
Aberdeenshire	245	455.0
Angus	8	6.4
Argyll and Bute	235	261.4
Clackmannanshire	13	26.0
Comhairle nan Eilean Siar	21	37.8
Dumfries and Galloway	213	330.0
Dundee City	2	4.0
East Ayrshire	59	122.2
East Dunbartonshire	0	0.0
East Lothian	18	49.5
East Renfrewshire	195	469.1
City of Edinburgh	0	0.0
Falkirk	4	12.0
Fife	33	70.0
Glasgow City	1	3.0
Highland	495	972.2
Inverclyde	0	0.0
Midlothian	50	48.4
Moray	130	290.3
North Ayrshire	47	111.0
North Lanarkshire	8	21.2
Orkney Islands	30	39.1
Perth and Kinross	114	265.6
Renfrewshire	0	0.0
Scottish Borders	303	594.2
Shetland Islands	6	6.7
South Ayrshire	136	296.0
South Lanarkshire	327	678.1
Stirling	61	131.9
West Dunbartonshire	0	0.0
West Lothian	7	14.0
Scotland	2,761	5,314.9

Source: BEIS - Renewable Energy Planning Database (2017)

Table 7.6 – Growth in Onshore Wind between by Local Authority (2009-2015)

Local Authority	Turbines	MW
Aberdeen City	0	0.0
Aberdeenshire	194	379.2
Angus	8	6.4
Argyll and Bute	81	131.8
Clackmannanshire	13	26.0
Comhairle nan Eilean Siar	18	33.9
Dumfries and Galloway	113	193.9
Dundee City	0	0.0
East Ayrshire	39	109.0
East Dunbartonshire	0	0.0
East Lothian	2	1.5
East Renfrewshire	51	140.6
City of Edinburgh	0	0.0
Falkirk	4	12.0
Fife	33	70.0
Glasgow City	1	3.0
Highland	282	617.9
Inverclyde	0	0.0
Midlothian	0	0.0
Moray	80	174.7
North Ayrshire	26	63.0
North Lanarkshire	6	17.2
Orkney Islands	18	22.6
Perth and Kinross	80	201.8
Renfrewshire	0	0.0
Scottish Borders	178	405.3
Shetland Islands	1	3.0
South Ayrshire	84	176.0
South Lanarkshire	224	506.5
Stirling	11	22.4
West Dunbartonshire	0	0.0
West Lothian	7	14.0
Scotland	1,554	3,331.7

Source: BiGGAR Economics analysis of BEIS - Renewable Energy Planning Database (2017)

8 APPENDIX B – CRITICISMS AND RESPONSE

Following the publication of the previous study, the John Muir Trust commissioned a report produced by Douglas Wynn[6], which offered a critical appraisal of the BiGGAR Economics study. Each criticism has been addressed in this report and this section directly considers and responds to the criticisms.

8.1 Analytic Framework

8.1.1 Criticism:

The definition of sustainable tourism and source of employment data for sustainable tourism used in the study is unclear.

8.1.2 Response:

Sustainable tourism in this study and the previous study is the Growth Sector as defined by the Scottish Government.[7] It is designated as one of the six Growth Sectors identified by the Scottish Government. Employment data and statistics were then sourced from the Business Register and Employment Survey (BRES), which is regarded as the definitive source of official government employee statistics by industry. Detailed geographical and industrial level statistics in this study were extracted from the National Online Manpower Information Service (NOMIS).

8.2 Multi-causality of changes in employment activity in the 'tourism-characteristic sector'

8.2.1 Criticism:

The BiGGAR Economics study focuses solely on wind farms and ignores other drivers of tourism in Scotland.

8.2.2 Response:

It is agreed that this is what the report does; the objective was to establish whether there was any correlation between wind farm development and tourism and to investigate whether there was a relationship that could be demonstrated from the data. It was found that there is no correlation between wind farms and tourism and that there is no ascertainable relationship between the two at a national or local level. There are of course numerous other drivers of tourism such as infrastructure, exchange rates, broadband connectivity and general economic conditions.

8.3 Exclusion of small, family enterprises from the ONS sampling frame

8.3.1 Criticism:

The Business Register and Employment Survey excludes very small businesses in the sampling frame.

[6] Douglas Wynn (2016), A Critical Appraisal of 'Wind Farms and Tourism Trends in Scotland' by BiGGAR Economics, July 2016

[7] Sustainable Tourism in this report is the Growth Sector as defined by the Scottish Government http://www.gov.scot/Topics/Statistics/Browse/Business/Publications/GrowthSectors

8.3.2 Response:

The Business Register and Employment Survey (BRES) is regarded as the definitive source of official government employee statistics by industry. As with any survey or data collection, there are some caveats. One of the strengths of BRES is that estimates are provided at detailed geographical and industrial levels. High-level estimates are published on the ONS website and more detailed estimates are published on the National Online Manpower Information Service (NOMIS) website.

BRES does not cover businesses neither registered for VAT nor Pay-As-You-Earn (PAYE), "which make up a small part of the economy".[8] The deregistration threshold for VAT is an annual turnover of less than £83,000, which may include many small rural businesses within the sustainable tourism industries. However, many of these businesses will be registered for Pay-As-You-Earn, and therefore included within the BRES sampling frame.

The analysis in this study considers the trends in sustainable tourism employment and assumes that there is no particular reason that the very small businesses that are excluded from the sampling frame will be affected by different market trends than the businesses that are included.

8.4 Inclusion of non-tourist economic activity in the employment trend data

8.4.1 Criticism:

Tourism businesses benefit from spending by local residents as well as tourists.

8.4.2 Response:

Tourism businesses benefit from spending by local residents in addition to tourists. However, the study focuses on any changes in sustainable tourism employment levels. If there were any change in the level of employment that was supported by tourism spending, it would be evident in the overall level of employment.

8.5 Inclusion of the cities in the all-Scotland employment trend data

8.5.1 Criticism:

The all-Scotland sustainable tourism figures used in the study include urban areas as well as rural areas.

8.5.2 Response:

The inclusion of urban areas in the all-Scotland tourism figures was appropriate and necessary since both urban and rural areas both contribute to and form the overall Scottish tourism product. It is accepted that in numerical terms the cities of Scotland have a greater number of people employed in tourism, but that many rural areas have a higher proportion of the total employment within the tourism industries.

[8] Office of National Statistics (2016), Business Register and Employment Survey 2015

This is well understood and incorporated into the methodology throughout the report where trends in sustainable tourism are considered in proportional changes rather than in numerical changes. This allows for comparison between local authorities that have different scales of tourism employment.

8.6 Inclusion of employment multiplier effects of wind farm construction itself in the trend data

8.6.1 Criticism:

There is circularity in including wind farm construction workers' direct impacts.

8.6.2 Response:

The main conclusions of the study were based on tourism employment figures before construction began and after it was complete, and therefore excludes any positive benefits on the tourism sector from construction workers' spending.

8.7 Short and selective timeframe

8.7.1 Criticism:

The study should have used tourism data from 2014, and not 2013.

8.7.2 Response:

The study uses data from 2015, which is the latest available sustainable tourism data from the ONS.

The previous study used data from 2013, and not 2014, as 2014 was an atypical year for Scottish tourism (2014 was the Year of Homecoming, and both the Commonwealth Games and the Ryder Cup took place in Scotland in 2014). Had the 2014 data been used as end of the time period, the conclusions of the study would not have changed, but the robustness of the report may have been questioned on the basis that 2014 was an atypical year.

8.8 Basis of selection of local wind farm cases

8.8.1 Criticism:

The basis for selection of the local wind farms sites was not clear.

8.8.2 Response:

The 28 wind farms selected for this study all had a capacity of over 10 MW and were geographically spread throughout Scotland, with many in local authorities that have a strong reliance on the sustainable tourism sector. All of the wind farms were constructed in 2010-14, and became operational during the time period to 2015. Therefore, any impacts associated with both the construction and operation of the wind farm would be apparent in the sustainable tourism employment statistics for 2015.

8.9 Limitations and essential caveats on the use of ONS data in local studies

8.9.1 Criticism:

The study should have respected the caveats and methodological advice offered by the ONS regarding the sustainable tourism employment data at a small geographical level.

8.9.2 Response:

The ONS caveats were fully considered throughout the development of the methodology and report. While this criticism may have had some merit if the study had only included a small number of case studies, the approach taken included a large number of case studies (28 wind farms). The study also included analysis at the local authority level as well as the localities of wind farms.

Additionally, throughout the report all the analysis is based on the unrounded data, but is presented to the nearest 100 in line with ONS guidance. This has ensured that there have been no distortions in the analysis and that the data has been presented appropriately, keeping in line with ONS guidance.