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Attachments: [ExA:WQApp19.2:10.D1.3 Norfolk Vanguard and Boreas Onshore Supply Chain Workshop .pdf](#)
[ExA:WQApp19.3:10.D1.3 Norfolk Vanguard WQ Appendix 19.3 Biggar Economics Study.pdf](#)
[ExA:WQApp20.1:10.D1.3 Norfolk Vanguard WQ Appendix 20.1 Gantt Chart.pdf](#)

Dear Tracey

This is email 15 of 18 of the Applicant's submission for Norfolk Vanguard Examination Deadline 1.

We enclose the following documents:

Appendices to Written Questions:

- Appendix 19.2 Norfolk Vanguard and Norfolk Boreas Supply Chain Workshop December 5th 2018
- Appendix 19.3 Biggar Economics Study
- Appendix 20.1 Gantt Chart for Q 20.22

Please could you kindly confirm receipt.

Best Regards

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Norfolk Vanguard Offshore Wind Farm

The Applicant

Responses to First

Written Questions

Appendix 19.3 – Biggar Economics
Study (2016) (Q19.27)

Applicant: Norfolk Vanguard Limited
Document Reference: ExA;WQApp19.3;10.D1.3
Deadline 1

Date: January 2019

Photo: Kentish Flats Offshore Wind Farm



Wind Farms and Tourism Trends in Scotland

A Research Report

July 2016

BiGGAR Economics

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CONTENTS

Page

1 EXECUTIVE SUMMARY..... 1

2 INTRODUCTION 2

3 EXISTING EVIDENCE..... 4

4 TOURISM IN SCOTLAND..... 6

5 ONSHORE WIND ENERGY IN SCOTLAND 10

6 IMMEDIATE AREAS AROUND WIND FARMS 13

7 CONCLUSIONS 21

8 APPENDIX - LOCAL AUTHORITY TABLES 22

1 EXECUTIVE SUMMARY

The relationship between the development of the onshore wind sector and the tourism sector has been a subject of debate 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. 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.

Since 2009 and 2014, the onshore wind sector has grown significantly in Scotland, from an installed capacity of 2.0 gigawatts (GW) in 2009 to an installed capacity of 4.9 GW in 2014. Between 2009 and 2013 employment in the sustainable tourism sector in Scotland also grew by over 10%¹. At the level of the Scottish economy as a whole, this would suggest that both the sustainable tourism and onshore wind sectors can coexist and grow.

However, it could be argued that if there was 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 constructed wind farms.

Employment in the sustainable tourism sector grew in the vast majority of local authority areas in Scotland between 2009 and 2013. This growth was 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. Eight local authorities had seen a faster increase in wind energy deployment than the Scottish average. Of these, five also saw a larger increase in sustainable tourism employment than the Scottish average, while only three saw less growth than the Scottish average. The analysis presented in this report shows 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 the localities where onshore wind farms had been developed, that is within a 15km radius from wind energy sites. The analysis considered 18 wind farms constructed between 2009 and 2013, since tourism employment data from before and after the wind farm was developed was available from the Office of National Statistics. This found that in the majority of cases (66%) sustainable tourism employment performed better in areas surrounding wind farms than in the wider local authority area. There was no pattern emerging that would suggest that onshore wind farm development has had a detrimental impact on the tourism sector, even at the 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 The 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 as a service sector, levels of employment will be sensitive to changes in tourism numbers and spending.

2 INTRODUCTION

This is an independent study undertaken by BiGGAR Economics on the impacts of the development of the onshore wind industry on the Scottish tourism sector.

For copies of this report or for further information please contact Graeme Blackett at BiGGAR Economics by telephone on 0131 514 0850 or by email at graeme@biggareconomics.co.uk.

Associated sources and graphics can be found at www.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 2012² and 2015³. 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 (former) Department of Energy and Climate Change suggest that:

- support for renewable energy has remained consistent at around 75-82% in the last three years, with support at 75% as of August 2015. Opposition to renewable energy stood at 4%; and
- support and opposition for onshore wind stood at 65% and 12% 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*

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 rely too heavily on anecdotal evidence. Good quality 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 RenewableUK's wind energy database);
- The health of the tourism sector in each local authority, with local authority data available on employment in Sustainable tourism sectors from 2009-13 (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 2009-13 (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 summarises the existing research on wind farm development and tourism;
- Section 4 provides data on trends in sustainable tourism employment in Scotland and by local authority area;
- Section 5 outlines the growth in onshore wind farms installed in Scotland by local authority area;
- Section 6 analyses the trends in sustainable tourism employment from 2009-13, within a 15 km radius of the 18 wind farms with a capacity of at least 10MW that became operational in 2011-12. These trends are compared with the overall trend in Scottish sustainable tourism employment in this timeframe;
- Section 7 presents the conclusions of this analysis; and
- Section 8 provides an appendix with some of the data that was used in this analysis.

3 EXISTING EVIDENCE

This section considers some of the previous reports that have been published regarding the potential impact of wind farms on tourism in Scotland. In particular it considers:

- research undertaken by Glasgow Caledonian University on visitors opinions and reactions to wind farms;
- research commissioned by VisitScotland on visitors opinions of wind farms which included 3,000 interviews; and
- evidence given to the Scottish Parliament Economy, Energy and Tourism Committee regarding the achievability of Scotland's renewable energy target and the conclusions of this committee.

3.1 Glasgow Caledonian University Research

The Glasgow Caledonian University study was based on an extensive literature review and a survey, and is the largest Scottish focused academic study to date. The literature review considered 40 studies from the UK and Ireland and reports from Denmark, Norway, the US, Australia, Sweden and Germany. This found that there was no evidence to suggest that wind farms have a serious negative economic effect on tourists.

A person-to-person survey considered the views of 380 tourists in four case study areas (Caithness and Sutherland; Stirling, Perth and Kinross; Scottish Borders; Dumfries and Galloway) and was undertaken at locations that maximised the likelihood that respondents would have seen a wind farm during their visit. The key findings from this survey were that:

- 75% of people felt that wind farms had a positive or neutral effect on the landscape;
- 2% of those interviewed who had seen a wind farm in the area (4 respondents out of 191) said that it would affect their decision to visit the area again. 2 indicated that the likelihood would increase and 2 that the likelihood would decrease. These 4 respondents were intercepted in the Stirling, Perth and Kinross area;
- after seeing a photomontage of a local wind farm before and after development, 3% of respondents said that it would affect their decision to visit the area again; and
- after seeing a photomontage of a local wind farm before and after an extension was added, 7% of respondents said that it would affect their decision to visit the area again.

The study then considered a number of scenarios to consider the range of possible outcomes for the tourism sector based on the responses of those surveyed. This found that the worst-case scenario was of a negative economic effect equivalent to 3.5% of jobs in tourism by 2015, compared with a situation where there were no wind farms. This was as a result of two potential effects: visibility from tourist routes (impacting on decisions to return) and visibility from accommodation (impacting prices some tourists might be prepared to pay).

Overall the study concludes that the effects of meeting renewables targets on tourism are so small that, provided planning and marketing are carried out effectively, there is no reason why the two are incompatible.

3.2 VisitScotland Research

The research commissioned by VisitScotland incorporated the views of 3,000 interviews. This report found that for 83% of residents in Scotland the decision to holiday in Scotland would not be affected by the presence of a wind farm. This study found that 80% of respondents in Scotland, when asked about holidays and short breaks in the Scottish countryside, disagreed or felt neutral that wind farms spoil the look of the Scottish countryside. Almost half (46%) of respondents in Scotland stated they would be interested in visiting a wind farm visitor centre.

3.3 Scottish Parliament Inquiry

During 2012, the Economy, Energy and Tourism Committee of the Scottish Parliament heard evidence from a wide range of experts as part of an inquiry into the achievability of the Scottish Government's 2020 renewable energy targets, the merits of the targets, and what the risks and barriers are to realising them.

Tourism was one of the issues investigated by the Inquiry and the evidence considered included both the Glasgow Caledonian University and VisitScotland reports cited above. The findings of the Committee were published in November 2012 and are reiterated below:

“While some strongly held localised and anecdotal opinion exists, the Committee has seen no empirical evidence which demonstrates that the tourism industry in Scotland will be adversely affected by the wider deployment of renewable energy projects, particularly onshore and offshore wind.

Whilst care always needs to be taken in terms of the planning process and decisions on the siting of individual projects in areas popular with tourists and in our rural and wild land areas, no one has provided the Committee with evidence, as opposed to opinion, that tourism is being negatively affected by the development of renewable projects. However, given the importance of this issue, the Committee recommends that VisitScotland and the Scottish Government continue to gather evidence on this from visitors to Scotland.”

3.4 Summary

These studies considered the opinions of visitors to Scotland and the impact that onshore wind farms could have on the decisions. They did not directly consider the impacts of wind farms on sustainable tourism employment and this study was undertaken to address this gap in research.

4 TOURISM IN SCOTLAND

The discussion surrounding the role of wind farms on the wider economy often highlights the important role that the sustainable tourism⁴ 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. This chapter provides an overview of employment trends in the sustainable tourism sector within Scotland.

4.1 Sustainable Tourism Employment

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 sectors that form this category are defined by the Scottish government. The data can be found from the annual Business Register and Employment Survey (BRES). The figures used in this study consider the years between 2009 and 2013. Scotland was host to large one-off events in 2014, such as the Commonwealth games and the Ryder Cup and therefore data from 2014 has been omitted to avoid any misleading trends.

Analysis of the Business Register and Employment Survey indicates that overall in Scotland in 2013 there were 211,215 jobs in sustainable tourism, an increase of 10.76% from 2009. Table 4.1 summarises these trends across the sub sectors.

Some of the spending in these sectors comes from residents and not tourists. 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. However it is reasonable to assume 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

⁴ 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 4.1 – Sustainable Tourism Employment in Scotland by Sub-Sector

Sub-sector	Number Employed, 2013	Change 2009-13	% Change 2009-13
Amusement and recreation activities	9,721	4,887	101.1%
Other reservation service and related activities	1,740	770	79.4%
Restaurants and mobile food service activities	84,352	17,502	26.2%
Museums and other cultural activities	8,741	1,510	20.9%
Holiday and other short stay accommodation	3,392	510	17.7%
Camping grounds, recreational vehicle parks and trailer parks	2,489	327	15.1%
Hotels and similar accommodation	53,601	4,447	9.1%
Operation of sports facilities	13,594	238	1.8%
Beverage serving activities	32,558	-9,059	-21.8%
Tour operator activities	1,027	-619	-37.6%
Total for Tourism	211,215	20,513	10.8%

Source: ONS (2015), Business Register and Employment Survey, 2009-13

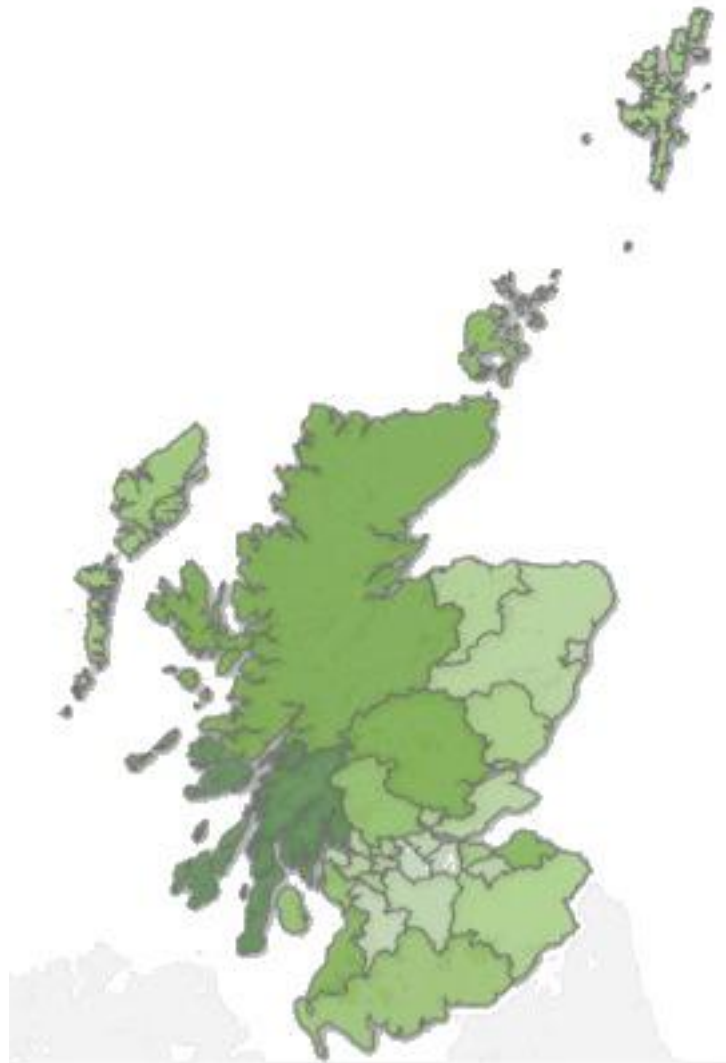
4.2 Trends across Local Authorities

Within Scotland there is variation in the importance of the tourism industry across the local authorities. Table 6 in the Appendix 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 shows that there is a significant variation in the proportion of the local workforce that are employed in the sustainable tourism sectors.

The local authorities with the greatest reliance on employment in sustainable tourism are also mainly 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 mainly 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 4-1 – Density of Sustainable Tourism Employment



Source: ONS (2015), *Business Register and Employment Survey 2013*

There have also been variations in changes to sustainable tourism employment across local authority areas. Across Scotland, between 2009 and 2013 the level of sustainable tourism employment grew by 10.8%. Overall, 28 out of 32 local authority areas experienced an increase in sustainable tourism industry employment and seven experienced average growth of over 20% over this time period.

Local authorities where sustainable tourism accounts for a high proportion of employment have seen the greatest growth in employment. For example, the sustainable tourism sector accounts for 18.3% of employment in Argyll and Bute and between 2009 and 2013 employment grew by over 40%.

As the share of tourist related activities as a percentage of all employment does appear to reflect locations where tourists 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.

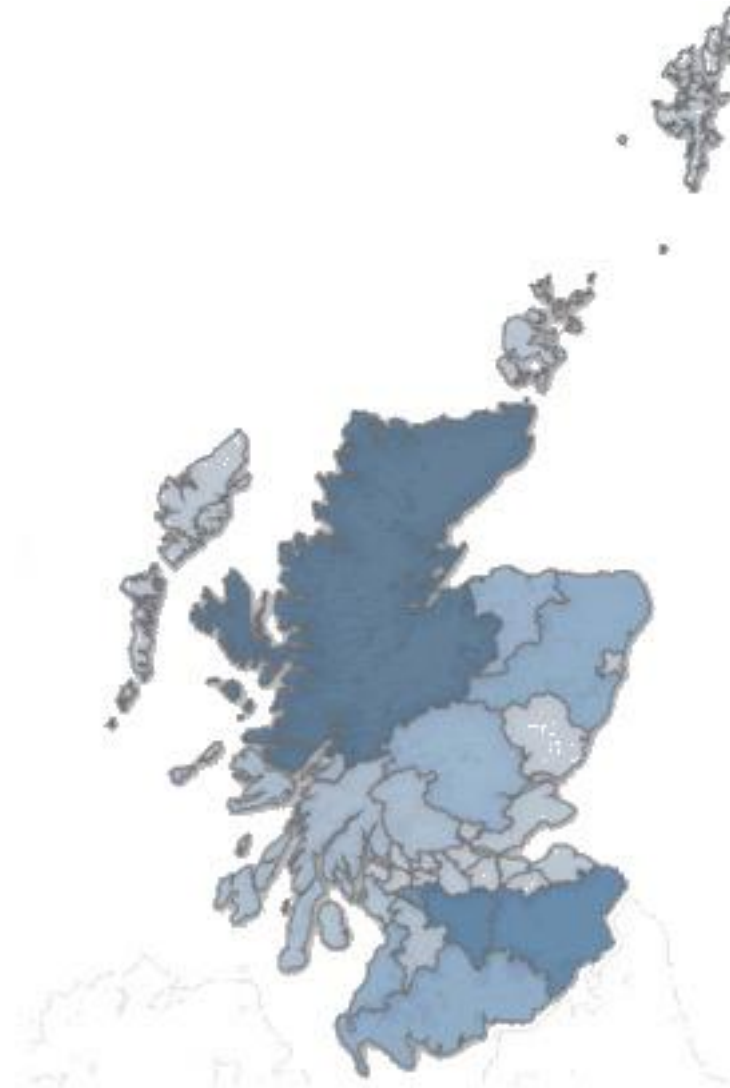
4.3 Summary

The sustainable tourism sector in Scotland is a significant contributor to employment in the economy, accounting for over 210,000 jobs throughout the country. The sector is particularly important in many rural areas of Scotland, where it can account for up to 18% of the total workforce. In the time period between 2009 and 2013 the sector saw a considerable growth in employment levels, an increase of more than 10%. 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.

5 ONSHORE WIND ENERGY IN SCOTLAND

There has been a considerable increase in onshore wind farm development in Scotland since 2009. Between 2009 and 2014 the number of wind farms increased by 184% from 91 to 258. The installed capacity has also grown significantly, with 1,982 megawatts (MW) installed in 2009 and 4,859 MW connected to the grid in 2014.

Figure 5-1 – Installed Capacity of Onshore Wind Farms (Jan 2015)



Source: RenewableUK - UK Wind Energy Database (January 2015)

There is also variation in how the level of installed capacity increased between 2009 and 2014. Table 8. in the Appendix tracks the level of installed capacity each year between 2009 and 2014. In particular, between 2009 and 2014:

- five local authorities saw an increase in capacity of over 300% across the 4 years. East Ayrshire saw capacity increase by 840%, with the number of turbines tripling;
- five local authorities had their first wind farms become operational between 2009-14. Most of these were small-scale developments; and

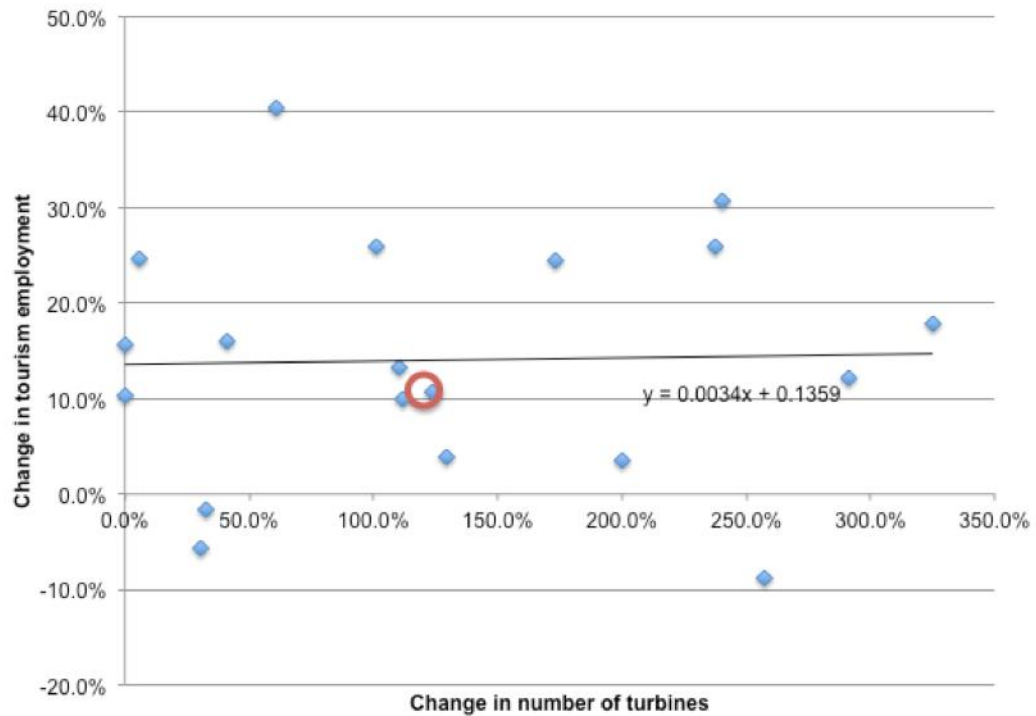
- eight out of 32 local authorities currently do not currently have any onshore wind farms.

A breakdown in the wind farm developments between 2009 and 2014 in terms of the number of wind farms and turbines and the overall installed capacity by local authority area are presented in the last three tables of the Appendix. This shows that the proportional increase in installed capacity is actually highest in areas that have had a low starting point, such as in Eilean Siar. The growth in the number of turbines between 2009 and 2014 is plotted against the change in the level of employment in sustainable tourism for local authorities in Scotland in Figure 5-2. This shows that there is a significant level of variation between both factors across the country. Across Scotland, the number of onshore wind turbines increased by 121% and sustainable tourism employment increased by 11% in this time period. This is marked by a red circle in Figure 5.3.

The area that has seen the largest drop in tourism employment is South Lanarkshire, which has also seen a significant growth in the number of turbines. However, the local authority that has seen the greatest growth in the number of wind turbines is Eilean Siar (The Western Isles), 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 growth 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 weak or non-existent. The trendline shown in Figure 5-2 is essentially 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 deviation within the data means that no positive conclusions can be reached from this analysis. There is neither a positive nor a negative relationship between wind farms and sustainable tourism employment at the local authority level.

Figure 5-2 – Change in tourism employment and number of wind turbines by Local Authority



5.1 Summary

The growth in the installed capacity and number of turbines increased significantly in Scotland between 2009 and 2014.

Of the local authorities that saw an faster increase in wind energy deployment than the Scottish average, five also saw a larger increase in sustainable tourism employment than the Scottish average, while only three saw less growth than the Scottish average.

At the local authority level there is no relationship between the number of wind turbines and the level of employment in sustainable tourism.

6 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 presume the effect on tourism that a wind farm could be quite localised. Therefore it was necessary to examine the impact on sustainable tourism employment that wind farms have had on their immediate surrounding area. These immediate surrounding areas were defined as the Scottish Data Zones that lie within a 15 km radius of the wind farm.

6.1 Selected Wind Farms

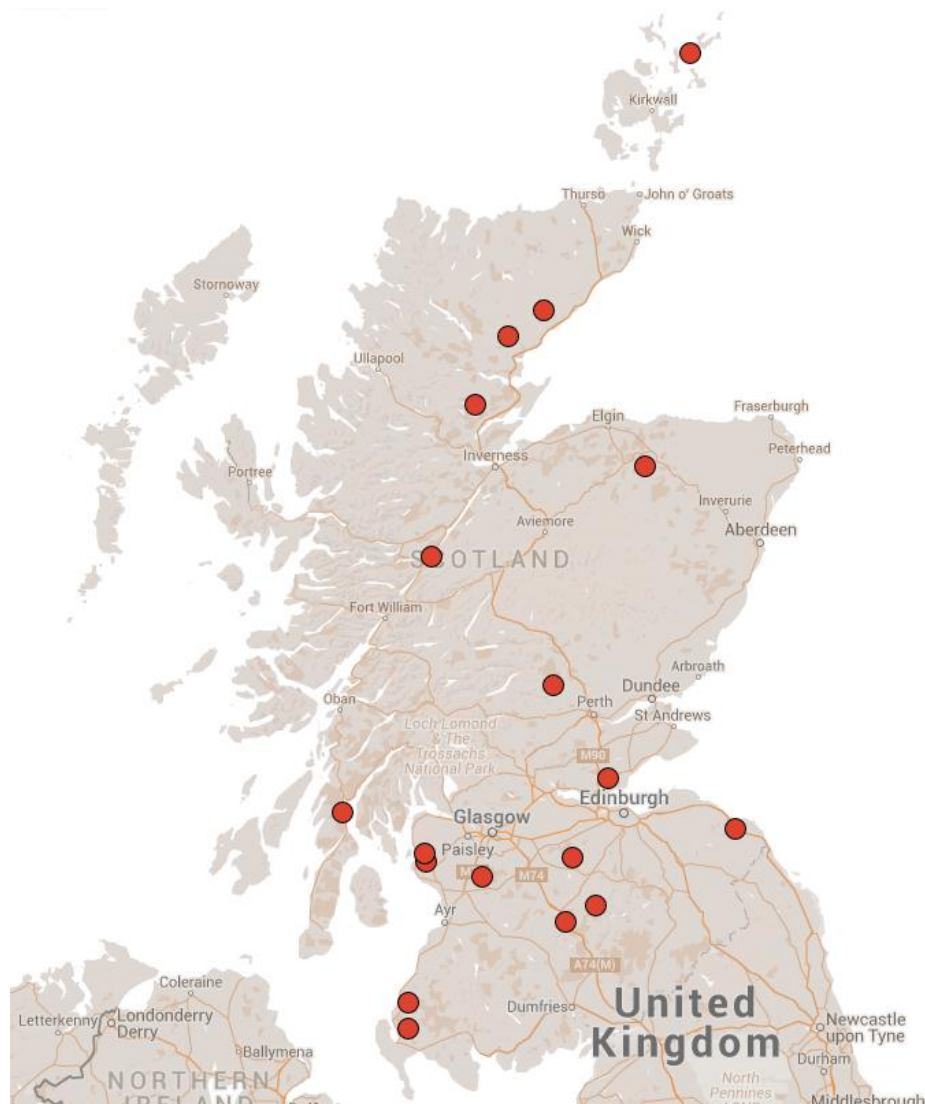
In order to assess the impact of the construction and operational phases of wind farm developments on the local tourism economy, 18 wind farms sites were selected throughout Scotland. All of these sites were constructed between 2011 and 2012. Therefore, in 2009 the wind farm did not exist and was constructed and became operational during the time period to 2013. This would mean any impacts associated with both the construction and operation of the wind farm would be apparent in the sustainable tourism employment statistics. The 18 sites that were selected 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.

Only wind farms with a capacity of over 10MW were selected. The selected wind farms were geographically spread throughout Scotland and many are in Local

Authorities that have a strong reliance on the sustainable tourism sector. Each selected wind farm is shown by location in Figure 6-1.

Figure 6-1 – Location of Wind Farms used in Analysis

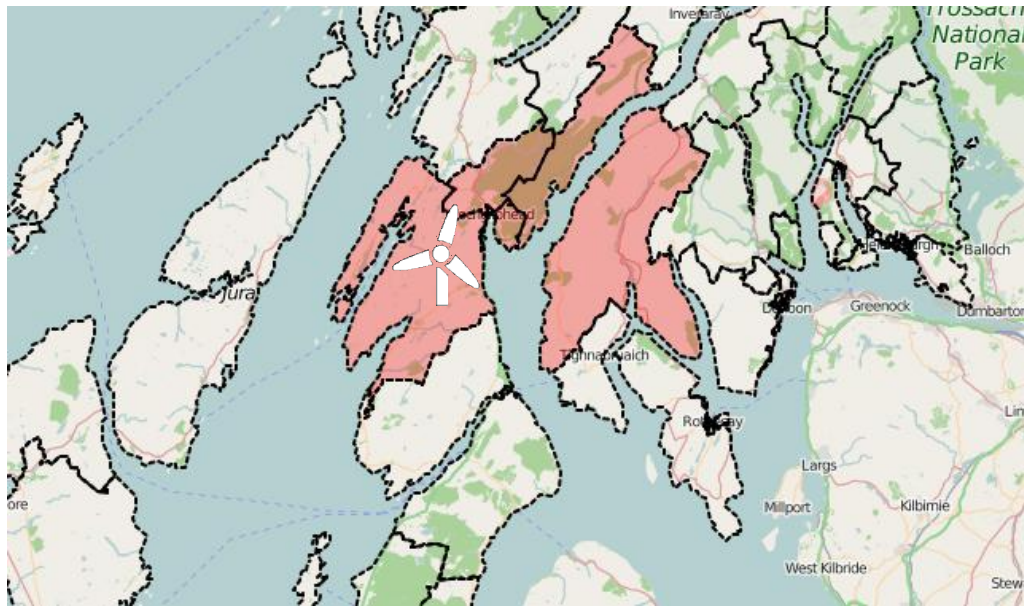


6.2 Sustainable Tourism in Wind Farms' Immediate Area

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 2013. 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 5 or more data zones, and some have more than 100, 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 6-2. 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 parts of Argyll.

Figure 6-2 - 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 170 times more sustainable tourism employment than the smallest, Spurness. Overall 6 of the areas had less than 200 people employed in sustainable tourism in 2009.

Table 6.1 – Tourism Related Employment in Wind Farm Areas

Wind Farm Area	2009	2010	2011	2012	2013
Allt Dearg	100	100	200	100	200
Arecleoch	100	100	100	100	100
Clyde	200	100	100	100	100
Drone Hill	200	200	200	200	300
Glenkerie	200	200	200	200	200
Gordonbush	100	100	100	100	100
Griffin	500	600	700	700	700
Hill of Towie	400	300	400	400	500
Kelburn	2,500	2,500	2,500	2,200	2,700
Kilbraur Extension	100	100	100	100	100
Little Raith	6,100	5,600	5,600	5,100	5,500
Mark Hill	500	500	500	500	600
Millenium Extension	100	100	100	100	100
Millour Hill	2,400	2,400	2,400	2,200	2,600
Muirhall	1,600	1,500	1,700	1,600	1,900
Novar Extension	300	300	300	400	500
Spurness	-	-	-	-	-
Whitelee	3,800	3,900	3,700	3,500	4,300
Scotland	190,700	183,400	185,100	181,500	211,200

Source: ONS Business Register and Employment Survey, 2009-13 (number have been rounded to nearest 100 in line with guidance)

Table 6.2 shows the percentage change in employment in sustainable tourism industries between 2009 and 2013, in the wind farm regions and in Scotland. During this time period sustainable tourism employment grew by 10.78% in Scotland. Overall 15, out of the 18, 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 6.2 – Change in Tourism Related Employment in selected areas, 2009 - 2013

Wind Farm Area	2009
Allt Dearg	96.46%
Kilbraur Extension	60.00%
Drone Hill	45.25%
Novar Extension	35.76%
Arecleoch	28.92%
Gordonbush	27.88%
Griffin	26.23%
Hill of Towie	18.09%
Spurness	17.14%
Mark Hill	15.99%
Muirhall	15.97%
Millenium Extension	15.57%
Millour Hill	11.83%
Whitelee	11.47%
Kelburn	10.91%
Scotland	10.76%
Little Raith	-8.88%
Clyde	-14.47%
Glenkerie	-19.84%

Source: BiGGAR Economics

If wind farm developments did have an effect on tourist-related employment, it could show up in the year-on-year changes in employment in the surrounding region. It would be expected that area that saw wind farm developments in 2011-12 might start to experience slower year-on-year growth later on in the period 2009-13.

Table 6.3 charts this. A change larger than the Scottish average is highlighted in green. As can be seen, there is no pattern or consistency that would suggest any relationship between tourism employment and wind farm development.

Table 6.3 – Annual Change in Tourism Related Employment in Selected Areas

Windfarm Area	09-10	10-11	11-12	12-13	09-13
Allt Dearg	-3.54%	43.12%	-13.46%	64.44%	96.46%
Kilbraur Extension	23.75%	12.12%	4.50%	10.34%	60.00%
Drone Hill	10.86%	-9.80%	-7.69%	57.35%	45.25%
Novar Extension	-7.85%	9.46%	10.09%	22.25%	35.76%
Arecleoch	1.20%	0.00%	5.95%	20.22%	28.92%
Gordonbush	-19.23%	19.05%	11.00%	19.82%	27.88%
Griffin	18.49%	18.47%	-7.53%	-2.76%	26.23%
Hill of Towie	-11.11%	8.43%	-3.22%	26.59%	18.09%
Spurness	-71.43%	60.00%	68.75%	51.85%	17.14%
Mark Hill	3.28%	0.19%	-2.23%	14.67%	15.99%
Muirhall	-4.56%	6.72%	-4.72%	19.50%	15.97%
Millenium Extension	-9.02%	-2.70%	4.63%	24.78%	15.57%
Millour Hill	0.55%	0.51%	-9.23%	21.90%	11.83%
Whitelee	1.78%	-4.90%	-5.13%	21.39%	11.47%
Kelburn	-0.28%	0.33%	-8.88%	21.66%	10.91%
Scotland	-3.84%	0.91%	-1.91%	16.36%	10.76%
Little Raith	-7.11%	0.05%	-8.63%	7.30%	-8.88%
Clyde	-11.95%	4.29%	-10.96%	4.62%	-14.47%
Glenkerie	-14.17%	17.45%	-12.85%	-8.76%	-19.84%

Source: BiGGAR Economics analysis of ONS Business Register and Employment Survey, 2009-13

6.3 Sustainable Tourism Relative to Local Authority

Analysis has also been undertaken to compare the areas around wind farms with the relevant local authority area, which would help to identify any regional effects to employment.

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

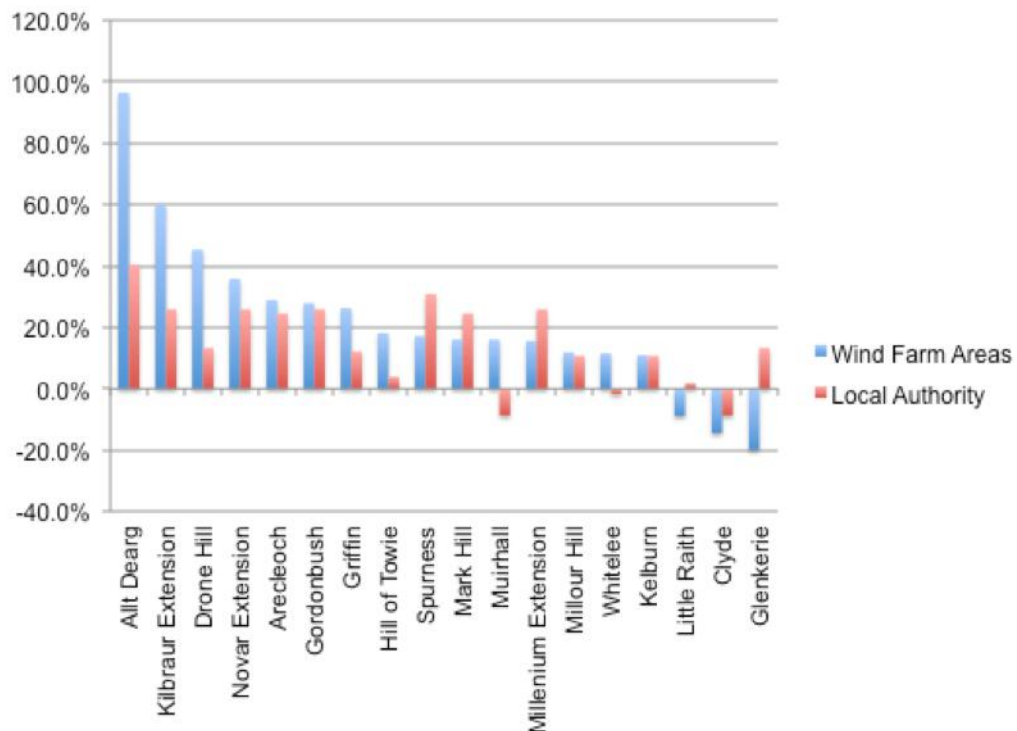
The table below shows the change in tourism related employment in both a wind farm development's nearby area and the local authority it is in. Of the two, the area that grew faster in a given year is highlighted in bold. Of the 18 sites considered, the level of growth in sustainable tourism employment was higher in the immediate areas surrounding the wind farm in 12 cases (Table 6.4 and Figure 6.3).

Table 6.4 – Change in Tourism Related Employment in Selected Areas, 2009 - 2013

Change in Tourism Employment (2009 - 2013)			
Wind Farm Area	Local Authority	Wind Farm Area	Local Authority
Allt Dearg	Argyll and Bute	96.5%	40.4%
Kilbraur Extension	Highland	60.0%	25.9%
Drone Hill	Scottish Borders	45.3%	13.3%
Novar Extension	Highland	35.8%	25.9%
Arecleoch	South Ayrshire	28.9%	24.5%
Gordonbush	Highland	27.9%	25.9%
Griffin	Perth and Kinross	26.2%	12.1%
Hill of Towie	Moray	18.1%	3.9%
Spurness	Orkney Islands	17.1%	30.8%
Mark Hill	South Ayrshire	16.0%	24.5%
Muirhall	South Lanarkshire	16.0%	-8.7%
Millenium Extension	Highland	15.6%	25.9%
Millour Hill	North Ayrshire	11.8%	10.7%
Whitelee	East Renfrewshire	11.5%	-1.7%
Kelburn	North Ayrshire	10.9%	10.7%
Little Raith	Fife	-8.9%	1.8%
Clyde	South Lanarkshire	-14.5%	-8.7%
Glenkerie	Scottish Borders	-19.8%	13.3%

Source: BiGGAR Economics analysis of ONS Business Register and Employment Survey, 2009-13

Figure 6-3 – Change in Tourism Related Employment in Wind Farms areas and Affected Local Authorities



6.4 Summary

This section considered trends in employment in sustainable tourism in the datazones that were closest to onshore wind farm developments. This found that the majority of areas saw an increase in employment in sustainable tourism between 2009 and 2013, the period in which the wind farms became operational.

The period between 2009 and 2013 also found 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.

7 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 2013 were considered along with the growth in the onshore wind sector during this 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 expected 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.

8 APPENDIX - LOCAL AUTHORITY TABLES

Table 8.1: Sustainable Tourism employment by Local Authority (2013)

Local Authority	Sustainable Tourism Employment	% Of Total Employment
Argyll and Bute	6,905	18.3%
Highland	15,621	14.2%
Perth and Kinross	8,649	13.8%
South Ayrshire	6,129	13.3%
East Lothian	3,592	13.1%
Orkney Islands	1,275	12.6%
North Ayrshire	4,649	11.8%
Stirling	5,287	11.8%
Dumfries and Galloway	6,312	11.1%
Eilean Siar	1,148	10.8%
Edinburgh, City of	32,522	10.3%
Shetland Islands	1,381	9.9%
Angus	3,303	9.7%
Scottish Borders	3,888	9.4%
East Renfrewshire	1,756	9.1%
East Dunbartonshire	2,2210	8.8%
Moray	2,969	8.7%
Clackmannanshire	1,247	8.5%
Aberdeenshire	8,358	8.2%
Fife	10,412	8.0%
Dundee City	5,610	7.6%
Glasgow City	29,829	7.6%
West Dunbartonshire	2,307	7.6%
Renfrewshire	5,362	7.5%
South Lanarkshire	8,432	7.1%
Inverclyde	1,995	7.0%
Falkirk	4,144	6.7%
Midlothian	1,921	6.6%
Aberdeen City	11,035	6.1%
East Ayrshire	2,431	6.4%
West Lothian	4,033	5.5%
North Lanarkshire	6,506	5.2%
Scotland	211,215	8.6%

Source: ONS Business Register and Employment Survey, 2013

Table 8.2: Trends in Total Sustainable Tourism Employment by Local Authority (2009-13)

Local Authority	Change in Sustainable Tourism Employment	
	Value	Percentage Change
Clackmannanshire	367	41.7%
Argyll and Bute	1,986	40.4%
Orkney Islands	300	30.8%
Aberdeenshire	1,727	26.0%
Highland	3,214	25.9%
East Lothian	711	24.7%
South Ayrshire	1,207	24.5%
Eilean Siar	174	17.9%
East Dunbartonshire	314	16.6%
Stirling	733	16.1%
Shetland Islands	186	15.6%
Glasgow City	3,851	14.8%
Edinburgh, City of	4,032	14.2%
Scottish Borders	456	13.3%
Perth and Kinross	934	12.1%
North Ayrshire	449	10.7%
Dundee City	525	10.3%
Falkirk	384	10.2%
Dumfries and Galloway	575	10.0%
Aberdeen City	918	9.1%
West Lothian	306	8.2%
Angus	208	6.7%
Midlothian	83	4.5%
Moray	110	3.9%
East Ayrshire	84	3.6%
Inverclyde	66	3.4%
Fife	179	1.8%
Renfrewshire	2	0.0%
East Renfrewshire	-30	-1.7%
North Lanarkshire	-388	-5.6%
South Lanarkshire	-800	-8.7%
West Dunbartonshire	-482	-17.3%
Scotland	20,513	10.8%

Source: ONS Business Register and Employment Survey, 2009-13

Table 8.3 – Onshore Wind Capacity in Scotland by Local Authority (MW)

Local Authority	2009	2010	2011	2012	2013	2014
Aberdeenshire	79.1	119.5	141.9	168.4	240.9	325.1
Angus	0.0	0.0	0.1	0.3	6.7	7.5
Argyll & Bute	112.6	132.8	138.7	148.9	148.9	238.6
Dumfries & Galloway	136.1	158.1	158.1	167.2	191.8	327.2
Dundee City	4.0	4.0	4.0	4.0	4.0	4.0
East Ayrshire	13.0	13.0	13.0	13.0	122.1	122.1
East Lothian	48.1	48.1	48.1	48.1	48.4	48.4
East Renfrewshire	323.9	323.9	323.9	431.9	453.1	453.1
Eilean Siar	4.8	4.8	4.8	4.8	28.2	29.1
Falkirk	0.0	0.0	0.0	0.0	0.5	0.5
Fife	0.0	0.8	2.3	27.0	40.2	56.2
Glasgow	0.0	0.0	0.0	0.0	2.0	2.0
Highland	384.7	467.3	502.3	616.4	770.9	839.9
Moray	116.6	116.6	116.6	164.9	208.2	274.9
North Ayrshire	48.0	48.0	48.0	94.0	102.1	102.1
North Lanarkshire	30.8	30.8	30.8	31.4	41.2	41.7
Orkney	17.6	22.1	25.7	38.6	43.6	44.6
Perth & Kinross	63.8	63.8	73.4	230.0	262.7	266.7
Scottish Borders	207.2	378.8	378.8	417.2	563.6	564.1
Shetland Islands	3.7	3.7	3.7	3.7	3.7	3.7
South Ayrshire	130.0	130.1	306.1	306.1	306.6	306.1
South Lanarkshire	146.6	146.6	287.7	509.5	542.3	631.0
Stirling	109.5	155.5	155.5	155.5	155.5	155.5
West Lothian	0.0	14.0	14.0	14.0	14.0	14.0
Scotland	1,982.1	2,384.3	2,779.6	3,597.0	4,301.1	4,858.5

Source: RenewableUK Wind Energy Database

Table 8.4 – Wind Farms in Scotland by Local Authority (2009)

Local Authority	Wind Farms	Turbines	MW
Aberdeenshire	17	61	79.05
Angus	0	0	0
Argyll & Bute	9	134	112.57
Dumfries & Galloway	6	100	136.1
Dundee City	1	2	4
East Ayrshire	1	20	13
East Lothian	2	18	48
East Renfrewshire	2	142	323.9
Eilean Siar	2	4	4.8
Falkirk	0	0	0
Fife	0	0	0
Glasgow	0	0	0
Highland	15	208	384.65
Moray	4	55	116.55
North Ayrshire	3	21	48
North Lanarkshire	3	23	30.8
Orkney	8	10	17.55
Perth & Kinross	2	34	63.8
Scottish Borders	6	146	194.71
Shetland Islands	2	5	3.68
South Ayrshire	1	52	130
South Lanarkshire	5	84	146.55
Stirling	2	51	109.5
West Lothian	0	0	0
Scotland	91	1170	1967.33

Source: RenewableUK Wind Energy Database

Table 8.5 – Wind Farms in Scotland by Local Authority (December 2014)

Local Authority	Wind Farms	Turbines	MW
Aberdeenshire	61	206	325.06
Angus	4	11	7.63
Argyll & Bute	15	216	148.92
Dumfries & Galloway	13	212	327.18
Dundee City	1	2	4
East Ayrshire	3	60	122.12
East Lothian	3	19	48.4
East Renfrewshire	5	188	453.1
Falkirk	1	1	0.5
Fife	7	26	56.22
Glasgow	1	1	2
Highland	33	419	839.85
Moray	9	126	274.88
North Ayrshire	8	47	102.08
North Lanarkshire	8	30	41.7
Orkney	20	34	44.55
Perth & Kinross	8	133	266.7
Scottish Borders	16	307	564.09
Shetland Islands	2	5	3.68
South Ayrshire	5	142	306.6
South Lanarkshire	22	300	630.98
Stirling	4	72	155.5
West Lothian	1	7	14
Eilean Siar	8	17	29.1
Scotland	258	2581	4858.54

Source: RenewableUK Wind Energy Database

Table 8.6 – Growth in Onshore Wind between 2009 - 2014 by Local Authority

Local Authority	Wind Farms	Turbines	MW
Aberdeenshire	258.82%	237.70%	311.21%
Angus	*	*	*
Argyll & Bute	66.67%	61.19%	32.29%
Dumfries & Galloway	116.67%	112.00%	140.40%
Dundee City	0.00%	0.00%	0.00%
East Ayrshire	200.00%	200.00%	839.38%
East Lothian	50.00%	5.56%	0.83%
East Renfrewshire	150.00%	32.39%	39.89%
Glasgow	*	*	*
Fife	*	*	*
Falkirk	*	*	*
Highland	120.00%	101.44%	118.34%
Moray	125.00%	129.09%	135.85%
North Ayrshire	166.67%	123.81%	112.67%
North Lanarkshire	166.67%	30.43%	35.39%
Orkney	150.00%	240.00%	153.85%
Perth & Kinross	300.00%	291.18%	318.03%
Scottish Borders	166.67%	110.27%	189.71%
Shetland Islands	0.00%	0.00%	0.00%
South Ayrshire	400.00%	173.08%	135.85%
South Lanarkshire	340.00%	257.14%	330.56%
Stirling	100.00%	41.18%	42.01%
West Lothian	*	*	*
Eilean Siar	300.00%	325.00%	506.25%
Scotland	183.52%	120.60%	146.96%

Source: BiGGAR Economics analysis of RenewableUK Wind Energy Database
indicates no wind farms in 2009

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