



University of  
**Strathclyde**  
Business  
School

# Fraser of Allander Institute

The Economic Impact of Scotland's  
Renewable Energy Sector - 2022 Update  
*October 2022*



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The Fraser of Allander Institute

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## **Disclaimer**

The analysis in this report has been conducted jointly between Scottish Renewables and the Fraser of Allander Institute (FAI) at the University of Strathclyde. The FAI is a leading academic research centre focused on the Scottish economy.

The FAI is committed to providing the highest quality analytical advice and analysis. We are therefore happy to respond to requests for technical advice and analysis.

# Executive Summary

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- This report presents estimates of the economic impact of Scotland's renewable energy industry.
- Using a model of the Scottish economy that describes inter-industry economic relationships, we were able to estimate how much output, gross value added (GVA) and employment renewable activities support in Scotland's economy as a whole.
- There is no renewables sector defined in the national accounts, so we constructed the sector using data published by the Office for National Statistics (ONS).
- We estimate that the renewable energy industry had a turnover of £3.06 billion and 8,450 full-time equivalent (FTE) employment in 2020.
- However, the economic activity supported by renewables sector is far greater than its own turnover and employment. The renewable energy sector supports economic activity throughout its supply chains and this economic activity supports wage spending across Scotland.
- Including these spill-over effects, we estimate that the renewable energy industry supports over £5.6 billion of output, over £2.5 billion of GVA and over 27,000 FTE employment across the Scottish economy.
- The technologies that individually support the most FTE employment are onshore wind (10,120), offshore wind (6,735), hydropower (4,395) and renewable heat (2,770).
- However, there is significant uncertainty in the underlying ONS survey of renewable activities, particularly at the individual technology level. Our results are therefore accompanied by a moderately large margin of error. More robust and timely production of renewables data by the UK and/or Scottish Government would allow for more meaningful between-year and between-technology comparisons of these estimates.

## Introduction

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Renewable electricity generation will be an essential component of any net zero energy system. The deployment of renewable energy technologies such as onshore and offshore wind, solar photovoltaics, heat pumps and marine renewables is therefore paramount in the drive towards ending Scotland's contribution to climate change.

However, as well as serving to reduce greenhouse gas emissions, the deployment of renewable energy brings considerable benefits to the Scottish economy.

These benefits come from the activities and employment of the renewable energy sector as well as the activity supported by renewables across the wider economy via spill-over impacts. Using a model of the Scottish economy, this report estimates the amount of economic activity that renewables currently support in Scotland.

# Turnover and employment of Scotland's renewable energy sector

The renewable energy sector is not currently defined in national statistics. Therefore, to model the economic impact of Scotland's renewable energy industry on the Scottish economy we must construct the sector using existing data. This is done by extracting and aggregating the activity in other sectors that is attributable to renewables to develop a picture of the renewables industry as a whole.

We studied the economic impact related to eight renewable energy technologies:

- Offshore wind
- Onshore wind
- Solar photovoltaic
- Hydropower
- Other renewable electricity (including geothermal, wave and tidal stream)
- Renewable heat
- Renewable combined heat and power
- Bioenergy

Using the latest available data (2020), we calculate that Scotland's renewable energy sector had a turnover of £3.06 billion and approximately 8,450 FTE jobs. This is consistent with definitions of direct renewable energy activity used within the ONS Low Carbon and Renewable Energy Economy survey.

Table 1 shows how this turnover and employment is spread across different sectors of the Scottish economy. The electricity and gas sector accounts for almost half of turnover. By a significant margin most employment in renewables is classified as within the construction sector.

**Table 1:** Total direct turnover and FTE employment in Scotland's renewable energy sector, 2020\*

Description	Turnover (£m)	FTE Employment
Agriculture, forestry & fishing	65	200
Mining and quarrying	55	125
Manufacturing	465	1575
Electricity & gas	1410	1700
Water supply, sewerage & waste	25	150
Construction	580	2450
Wholesale & Retail	105	300
Real estate	15	0
Professional, scientific & technical	265	1550
Admin & support	65	350
Other services	10	125
<b>Total</b>	<b>3,060</b>	<b>8,450</b>

\*Rounded to the nearest £5m for turnover and 25 for FTE employment. Columns may not sum to totals due to rounding.

# Economy wide impact of Scotland's renewable energy sector

The economic impact of Scotland's renewable energy industry is not limited to the economic activity of the sector itself.

Renewables companies purchase goods and services from firms in their supply chain. These suppliers, in turn, have their own supply chains and employment. Renewables companies thus support economic activity across the economy via the interlinked supply chains involved in producing their output.

We modelled these links between supply chains to estimate the full economic impact of Scotland's renewable energy sector. The economic impact can be broken down into three components:

- The direct impact: the output and employment of renewable energy companies.
- The indirect impact: the economic activity supported within the supply chains of renewable energy companies.
- The induced impact: the direct and indirect effects lead to increased employment across the Scottish economy which in turn leads to increased wage spending. The economic activity arising from this increased spending is the induced impact.

Table 2 sets out the total output, GVA and FTE supported by Scotland's renewable energy sector broken down by direct, indirect and induced impact. In total, renewables supported over £5.6 billion of output, over £2.5 billion of GVA and over 27,000 FTE employment across the Scottish economy.

**Table 2:** Direct, indirect and induced output, GVA and FTE employment supported by Scotland's renewable energy sector, 2020\*

Impact	Output (£m)	GVA (£m)	FTE employment
Direct	3,060	1,270	8,450
Indirect	1,440	630	8,800
Induced	1,120	680	9,900
<b>Total</b>	<b>5,620</b>	<b>2,580</b>	<b>27,150</b>

\*Figures rounded. Columns may not sum due to rounding.

While this encouragingly represents an increase in the supported output, GVA, and FTE employment since 2019, we would caution overreading these results. The margin of error associated with the surveying, updates to the methodology and the challenges of economic measurement in 2020 will contribute to variability in the data.

Table 3 shows how the total output, GVA and FTE employment supported by renewables - both directly and through spill over impacts - is spread across the different sectors of the Scottish economy. More than a third of output and more than a quarter of GVA is supported by the electricity and gas sector. Combined, the construction, wholesale and retail, electricity and gas, and manufacturing sectors account for over half of the FTE employment supported by renewables.

**Table 3:** Total output, GVA and FTE Employment by sector supported by Scotland's renewable energy sector, 2020\*

<b>Industry</b>	<b>Output (£m)</b>	<b>GVA (£m)</b>	<b>FTE Employment</b>
Agriculture, forestry & fishing	145	55	800
Mining and quarrying	75	30	275
Manufacturing	705	290	2,750
Electricity & gas	2,030	675	2,800
Water supply, sewerage & waste	65	35	275
Construction	830	355	4,550
Wholesale & Retail	360	215	3600
Transport & storage	105	50	925
Accommodation & food services	85	50	1,600
Information & communications	50	35	475
Finance & insurance	120	55	500
Real estate	305	245	425
Professional, scientific & technical	350	230	2,600
Admin & support	175	110	2,225
Public admin & defence	30	15	225
Education	55	40	1,200
Health & social work	45	30	575
Arts, entertainment & recreation	40	20	550
Other services	55	40	775
Activities of households as employers	5	5	25
<b>Total</b>	<b>5,620</b>	<b>2,580</b>	<b>27,150</b>

\*Figures rounded. Columns may not sum due to rounding.

# Economy wide impact of renewable energy technologies

By analysing data for each renewable energy technology, we were able to estimate their individual economic impacts. Table 4, Table 5 and Table 6 set out the estimated output, GVA and FTE employment supported by each renewable energy technology respectively.

However, these estimates need to be treated with a degree of caution. The point estimates from the ONS statistics that were used to perform the modelling have wide confidence intervals due to the smaller sample sizes of this more granular data.

Therefore, these estimates should only be used to provide a sense of magnitude of the economic impacts during the survey year rather than be used as evidence of how the sector is developing over the short term.

**Table 4:** Output supported by renewable technologies (£ million), 2020\*

Technology	Direct	Indirect	Induced	Total
Offshore wind	615	225	305	<b>1150</b>
Onshore wind	1,340	720	425	<b>2,485</b>
Solar photovoltaic	75	30	30	<b>135</b>
Hydropower	610	345	195	<b>1,150</b>
Other renewable elec	5	0	5	<b>15</b>
Renewable heat	215	100	100	<b>410</b>
Renewable comb. heat & power	25	15	10	<b>50</b>
Bioenergy	175	85	70	<b>325</b>

\*Figures rounded. Columns may not sum due to rounding. Sums may not match figures for the renewables sector as a whole due to methodological differences in comparing individual shocks with aggregate shocks.

**Table 5:** GVA supported by renewable technologies (£ million), 2020\*

Technology	Direct	Indirect	Induced	Total
Offshore wind	295	110	185	<b>590</b>
Onshore wind	515	300	260	<b>1,075</b>
Solar photovoltaic	35	15	20	<b>70</b>
Hydropower	235	145	120	<b>495</b>
Other renewable elec	5	0	5	<b>10</b>
Renewable heat	90	45	60	<b>200</b>
Renewable comb. heat & power	10	5	5	<b>25</b>
Bioenergy	80	35	40	<b>160</b>

\*Figures rounded. Columns may not sum due to rounding. Sums may not match figures for the renewables sector as a whole due to methodological differences in comparing individual shocks with aggregate shocks.

**Table 6:** FTE employment supported by renewable technologies, 2020\*

<b>Technology</b>	<b>Direct</b>	<b>Indirect</b>	<b>Induced</b>	<b>Total</b>
Offshore wind	2,200	1,845	2,690	<b>6,735</b>
Onshore wind	2,600	3,755	3,760	<b>10,120</b>
Solar photovoltaic	940	255	275	<b>1,470</b>
Hydropower	900	1,765	1,735	<b>4,395</b>
Other renewable elec	50	20	40	<b>110</b>
Renewable heat	110	805	865	<b>2,770</b>
Renewable comb. heat & power	50	90	100	<b>240</b>
Bioenergy	500	480	605	<b>1,585</b>

\*Figures rounded. Columns may not sum due to rounding. Sums may not match figures for the renewables sector as a whole due to methodological differences in comparing individual shocks with aggregate shocks.

# Modelling Methodology

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To estimate the economic impact of Scotland's renewable energy industry we combined data from the Low Carbon and Renewable Energy Economy (LCREE) Survey published by the ONS with a model of the Scottish economy.

This model separates the Scottish economy into 98 sectors and describes the economic links between each sector as well as how these sectors interact with households, government and investment. The Scottish Government's input output tables were the key dataset supporting this model.

It should be noted that the underlying input-output tables are based on a large number of data sources and a production lag therefore exists. Our model is based on the latest input-output table for 2018. It will therefore not pick up the major structural changes that occurred in 2020 until the corresponding data has been produced by the Scottish Government. Significant uncertainty therefore exists in estimates for the year 2020.

The 2019 version of the report used data from the ONS LCREE survey to estimate the turnover and employment of renewable activities across Scottish industries. However, this data was not available for this update due to issues of disclosive data.

To produce these estimates, we have used the aggregate results for each technology in Scotland in 2020 and apportioned these to Scottish industries using the prior 2017 industry proportions. The exception to this was for 'Other renewable electricity' where the UK-wide employment proportions were used. This was necessary because disclosure issues meant that the Scottish industry proportions were not available. In addition to the uncertainty of the ONS' Scotland-wide estimates, this is another reason why the results of the modelling of individual technologies in this report should be treated with caution.

Finally, it is important to note that the updates to the methodology to better capture the employment associated with renewable activities mean that the modelled numbers in this report are not directly comparable to those in the previous version of this report.



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