

Climate Jobs Summary: 'SCOTLAND'

This document summarises jobs estimates for SCOTLAND from Green House Think Tank's Climate Jobs Project modelling (v2019a) done on behalf of the Green European Foundation. This work can be found at greenhousethinktank.org/climate-jobs/. The modelling was done for each NUTS (Nomenclature of Territorial Units for Statistics) 2016 level 3 area in the UK using Eurostat and the UK Office of National Statistics (ONS) data and published job metrics. The most recently published statistics are taken where possible but due to gaps and time lag in what statistics authorities publish, the data use to represent now (2019) may be a few years older. All jobs estimates are in full time equivalents and negative numbers indicate jobs lost.

NUTS regions are a hierarchical geographic code system created by the EU for the consistent collection and collation of statistics across Europe. The first two letters signify the country, the next the NUTS1 region, and the last two numbers of the NUTS 2 & 3 regions respectively. The NUTS 3 areas are generally smaller than English Counties but bigger than districts, NUTS 2 areas generally cover large cities or a few counties and NUTS 1 represent regions.

The table below summaries background statistics for the SCOTLAND area. The breakdown of the modelling results by sector, which add up to these jobs totals, is shown below. The full explanation of the transition proposed, the methodology used and references are in '*Unlocking the Job Potential of Zero Carbon*', published in December 2018¹.

NUTS Code	Population / Pop per Hectare		Area hectares	Total Net Jobs	
	2019	2035		Transition	Long Term
UKM	4,990,000 / 0.6	5,220,000 / 0.7	8,020,000	53,100	35,300

2035 has been taken as the date when greenhouse gas emissions need to be reduced to net zero (at the latest). Setting such a target is consistent with the UK using no more than its fair share of the global carbon budget and limiting the risk of exceeding a global warming to 1.5°C. This end date is also consistent with Zero Carbon Sooner paper published by Tim Jackson² and most climate emergency declarations by local council areas across the UK.

Reuse & Recycling

The table below shows how many jobs are created and lost due to an increase in the recycling rate for three waste categories. The modelling uses recycling as a proxy for the reuse, repair and deconstruction jobs which will need to be created over the transition. The latter are likely to be more labour intensive and less energy intensive than recycling, so creating more jobs than estimated.

Category	Recycling Rate		Additional Tonnes		
	2019	2035	Recycled	New Jobs	Jobs lost ^a
Municipal solid waste	40%	90%	2,740,000	4,020	-866
Commercial and industrial	40%	90%	2,300,000	1,680	-363
Construction and demolition	40%	90%	11,900,000	5,820	-1,250

^a Landfill and incineration jobs are lost as waste disposal reduces (alongside the creation of new reuse and recycling jobs).

¹ Download at: gef.eu/publication/unlocking-the-potential-of-zero-carbon/

² www.cusp.ac.uk/themes/aetw/zero-carbon-sooner/

Transport

The transport modelling applies the modal shifts set out in Zero Carbon Britain, Rethinking the Future report (Centre for Alternative Technology, 2013) at a sub-regional level (40 NUTS2 areas for the UK). This is then scaled according to population to provide jobs estimates for NUTS3 areas.

Transport Type	Modal Shift		Existing Modal Split		p-km/v-km ^a		Total Net Jobs	
	v-km/y ^b	p-km ^c change	%	p-km /p/y ^d	2019	2035	Transition	Long Term
Maintenance private non-electric vehicles	-30.5 b	-99%	91%	12,500	1.6	1.7	-6,960	-13,900
Maintenance private electric vehicles	16.2 b	60%	0%				1.7	2,710
Bus Drivers	214 m	220%	2%	304	9.0	10.0	4,060	8,120
Bus Maintenance							1,060	2,130
Railways Operation and Maintenance	20.5 m	110%	6%	746	126.8	130.0	4,240	8,480

^a Average occupancy per vehicle

^b v-km/y = vehicle kilometres per year, b = billions, m = millions

^c p-km = passenger kilometres

^d p-km/p/y = passenger kilometres per person per year

These estimates only include some of the changes to shift to zero carbon transport. Changes to freight and increased jobs associated with walking and cycling are not modelled and would also indirectly support other local job creation and retention (e.g. local shops and community facilities).

Building Retrofit

The modelling assumes a street by street retrofit programme focused on the areas with the worst energy performance. The table below summaries the jobs created from retrofit of the proposed percentages of total dwellings for four different categories of retrofit.

Retrofit Type	Dwellings to retrofit		Total Net Jobs	
	%	Number	Transition	Long Term
Energy Efficiency Improvements	75%	1,840,000	12,300	5,790
Solar Thermal	75%	1,840,000	6,860	
Solar PV	20%	491,000	4,020	
Ground Source Heat Pumps (GSHP)	13%	319,000	7,040	

There will also be jobs required to improve the energy efficiency of public sector, commercial and industrial and community buildings, but these have not been modelled.

Land & Food

The modelling assumes that food is produced as close to where it is consumed as possible, particularly the most employment intensive activities (e.g. fruit and vegetable production). This will increase local resilience whilst reducing transport emissions and packaging requirements. The modelling also aims to remove the fossil fuel dependence of agriculture, in part by removing reliance on artificial fertiliser and pesticides. Together this is modelled as a shift to more mixed farming practices and a more organic/permaculture/agroecological based approach. The table below show how this would change agricultural land use³.

		Hectares:			
		Current	Needed ^a	Surplus ^b	Allocated ^c
	Cereal Crops ^d	778,000	260,000	939,000	478,000
	Potatoes		34,500		63,400
	Sugar		8,120		14,900
	Fruit & Veg		N/A ^e		9,710 ^f
	Natural Fibres		8,690		16,000
	Energy Crops		39,900		73,400
	Green Manure		87,400		154,000
	Pasture as part of Rotation				519,000
Permanent Pasture	Dairy Cows	1,260,000	554,000	473,000	529,000
	Beef Cattle				180,000
	Orchards & Vineyards ^g	53.8			243
Fruit Trees & Vineyards	Fruit & Vegetables	1,700	8,610	1,330	9,710
Complex Cultivation					
Irrigated Farmland					

^a for local sufficiency

^b for local sufficiency

^c For national sufficiency, assuming the local surpluses are distributed to nearby areas with land deficits

^d Including Animal Feed

^e See Fruit & Veg rows below

^f Adding arable hectare allocated to Fruit and Veg on top of those below.

^g Which could be grazed

The table below shows proposed changes in non-agricultural land use in order to meet non-food objectives including renewable energy generation, timber, enhancing of biodiversity and reducing release of/sequestering greenhouse gases.

(all hectares)	Moorland, Grass or Shrub	Existing Forest	Landfill + Mining Sites	Industrial	Urban	Urban Green Spaces	Peat Bogs	Other Natural ^a
Current	2,430,000 ^b	1,060,000	13,700	29,800	131,000	5,470	1,890,000	40,200
Proposed Forest	1,210,000 ^c	1,060,000 ^d	5,470			^e	All to be restored	
Solar PV			5,470	2,980 ^f	2,630 ^g			

^a Bare rocks [D], Beaches dunes sands [E], Inland marshes [S], Salt marshes [AH], Intertidal flats [T], Glaciers and perpetual snow

^b Currently Mostly Rough Grazing for sheep

^c or perhaps re-wilded in other ways

^d Returned to active management for timber

^e It is proposed that there is a significant increase in urban horticulture and greenery in general. Some of this maybe in existing 'green' areas but much would be on walls, roofs, carparks etc.

^f Assumed to be warehouse roof space

^g Assumed to be Public/Community/Commercial Building roof space

³ This modelling is based on national land use statistics and does not take into account the specifics of land in any local area or other local consideration. Further local analysis would be needed to assess the suitability of such shifts.

This shift towards more locally complex, mixed and diverse agriculture combined with better, active management of forestry and other land (e.g. hedges) will result in an increase in employment. The table below summarises the labour intensity change modelled in this sector. It is however felt, that this significantly underestimates job creation potential as ONS statistics for current farm jobs include non agricultural jobs (e.g. on farm processing, farm shops, local milk deliveries, grass/hedge cutting etc) that have not been modelled.

Current Jobs	Proposed Jobs	Change
41,200	44,200	-1,670

Renewable Energy

The table below outlines the proposed amount of different renewable energy technologies to be installed to transition to a zero carbon energy supply. This is based on the reduced demand for energy modelled in all sectors above and increased demand for electricity, mainly due to electrification in the transport and buildings sectors. It does not include PV panels on dwellings which are covered above. Energy storage and demand management jobs have not been estimated. Jobs in offshore renewables are not included in the total for specific areas, but are included in national totals.

Generation Type	Capacity installed	Load Factor	Total Net Jobs	
	MW ^a	%	Transition	Long Term
Existing Energy Jobs	N/A	N/A	-23	-46
Offshore Wind	-	43%	- ^b	-
Onshore Wind	12,500	29%	11,100	4,120
Tidal	-	24%	-	-
River run Hydro	386	30%	1,430	514
PV Farm	7,510	9%	923	-
Geothermal	-	96%	-	-
Electric Grid Upgrade	N/A	-	384	19

^a MW = Mega Watt

^b Only in National Summary

Other Jobs

The above jobs estimates indicate the scale of effort in different sectors required locally to transition to zero carbon in SCOTLAND. This will increase the vibrancy of the local economy. This transition will also require changes to:

- Manufacturing different things in different ways (e.g. more electric vehicles, renewable technologies, local food processing and sustainable construction products, more reuse and use of recycled materials);
- Additional jobs to protect the most vulnerable, ensure these changes increase equality and strengthen community resilience (including adapting to climate impacts, such as increased flood risks); and
- Additional work to train and upskill the workforce across the UK, including providing support to ensure that these jobs are open to all (including those with disabilities). This has been estimated as 4,380 jobs during the transition and 2,910 long term jobs in SCOTLAND.