

Unlock renewables for a green recovery - technical appendix

Methodology and sources for key outputs



1. Total and 'shovel ready' pipeline

- Method:
- The total pipeline was calculated from the registers of 'accepted to connect' energy generation assets on the distribution and transmission electricity networks.
 - The 'shovel ready' pipeline was calculated from renewable energy planning data, defined as sites 'awaiting construction', having received planning permission but not begun construction.
 - The onshore pipeline map was produced using the SWRR data for each distribution network licence area, and transmission substation location data for projects on the TEC register.

Data:

<i>Units: MW capacity</i>	Onshore wind	Solar PV	Battery storage	Offshore wind	Total
SWRRs and TEC register	11,930	8,614	8,590	31,706	60,841
REPD - sites with PP	4,757	1,901	4,555	7,164	18,377

- Sources:
- [Distribution network System Wide Resource Registers \(SWRRs\)](#)
 - [National Grid TEC Register](#)
 - [Renewable Energy Planning Database \(REPD\)](#)

2. Value to the economy (Gross Value Added)

- Method:
- The value added to the economy from developing these pipeline projects was calculated through Gross Value Added (GVA) metrics for each technology from a variety of recent sources. As GVA estimates vary, a central estimate for each technology was used, as shown in the table below.
 - Where GVA estimates are unavailable, figures for total expenditure per MW have been used, multiplied by 1.7 as per ONS input-output analytical tables 2016, to produce as estimate for GVA. This is denoted with an asterisk.
 - Further sources, including studies by the Institute of Welsh Affairs, GHD, IEA and Solar Power Europe were reviewed for benchmarking and context, but did not provide quantified figures.

Data:

<i>Units: £m GVA per MW</i>	Onshore wind	Solar PV	Battery storage	Offshore wind	Source #
BVG Associates (2017)	2.7				1
Solar Trade Association (2014)		1.4			2
Solar Trade Association (2020)		0.8			3
Irena (2017) *		1.0 - 1.8			4
DNV GL for BEIS (2016) *			1.5		5
Catapult ORE (2017)				2.3	6
Estimate used	2.7	1.0	1.5	2.3	n/a
Total GVA - shovel ready (£m)	12,807	1,901	6,970	16,477	38,154
Total GVA - all pipeline (£m)	32,115	8,614	13,143	72,925	126,797

- Sources:
- [\(1\) BVG Associates - Economic benefits from onshore wind farms](#)
 - [\(2\) Solar Trade Association - Solar powered growth in the UK](#)
 - [\(3\) Solar Trade Association - Priorities for a renewable recovery package](#)
 - [\(4\) Irena - Renewable energy benefits: leveraging local capacity for solar PV](#)
 - [\(5\) DNV GL for BEIS - Energy storage use cases](#)
 - [\(6\) Catapult Offshore Renewables Energy - The economic value of offshore wind](#)
 - [IWA - The economic costs and benefits of Renewable Energy Transition in Wales](#)
 - [Solar Power Europe - Solar PV jobs & value added in Europe](#)
 - [GHD - Transmission reinforcement between the Western Isles and the Scottish Mainland](#)

3. Jobs associated with buildout of the pipeline

- Method:
- Total years of employment (job-years) per MW capacity for each technology were calculated from recent sources. This is benchmarked against the GVA from section 2 using ONS productivity data, assuming a 25 year project life.
 - Based on the sources reviewed in section 2, it is assumed that one-third of created direct and indirect employment occurs in the first five years of design, construction and operation of a project.
 - Therefore, the estimated average number of jobs created over the next five years as the result of the pipeline buildout is (total job-years / (3*5))

Data:

<i>Units: FTE years per MW</i>	Onshore wind	Solar PV	Battery storage	Offshore wind	Source #
BVG Associates (2017)	2.3				1
ONS employment data (2018)	1.0	0.7		1.6	2
Solar Trade Association (2014)		6.7 - 7.4			3
NRDC (2019)	1.3	3.5			4
University of California (2016)		3.9			5
Vivid Economics (2019)		2.8			6
Benchmark (£50,000 GVA/job-year)	3.4	1.3	1.9	2.9	7
Estimate used	2.0	2.4	1.9	2.2	n/a

<i>Units: as stated</i>	Onshore wind	Solar PV	Battery storage	Offshore wind	Total
Total FTE years - shovel ready	237,867	114,044	216,375	394,015	962,300
Total FTE years - all pipeline	596,500	516,834	408,044	1,743,853	3,265,232
Average FTE over 5 years - shovel ready	15,858	7,603	14,425	26,268	64,153
Average FTE over 5 years - all pipeline	39,767	34,456	27,203	116,257	217,682

- Sources:
- [\(1\) BVG Associates - Economic benefits from onshore wind farms](#)
 - [\(2\) ONS - Low carbon and renewable energy economy, UK: 2018](#)
 - [\(3\) Solar Trade Association - Solar powered growth in the UK](#)
 - [\(4\) NRDC - Powering jobs growth with green energy](#)
 - [\(5\) University of California - The link between good jobs and a low carbon future](#)
 - [\(6\) Vivid Economics - The economic impact of creating a congestion free, energy independent...](#)
 - [\(7\) ONS - Productivity measured by Gross Value Added \(GVA\)](#)

4. Cost of energy from renewables compared to gas and nuclear

- Method:
- LCOE for renewables, gas CCGT and nuclear and the UK, in £/MWh (2019 prices), were sourced from CarbonBrief, Irena and Bloomberg NEF. The upper and lower estimates for new build projects were used to define likely LCOE ranges for the pipeline of projects.

Data:

<i>LCOE: £/MWh</i>	Onshore wind	Solar PV	Offshore wind	Existing gas CCGT	Nuclear
Lower bound	37	45	44	55	103
Upper bound	51	71	64	60	103

- Sources:
- [CarbonBrief - Analysis: Record-low price of UK offshore wind cheaper than existing gas plants...](#)
 - [Irena - Renewables power generation costs in 2018](#)
 - [BloombergNEF - Scale-up of solar and wind puts existing coal, gas at risk](#)