

Green impact report

Offshore Wind: United Kingdom





1. Introduction

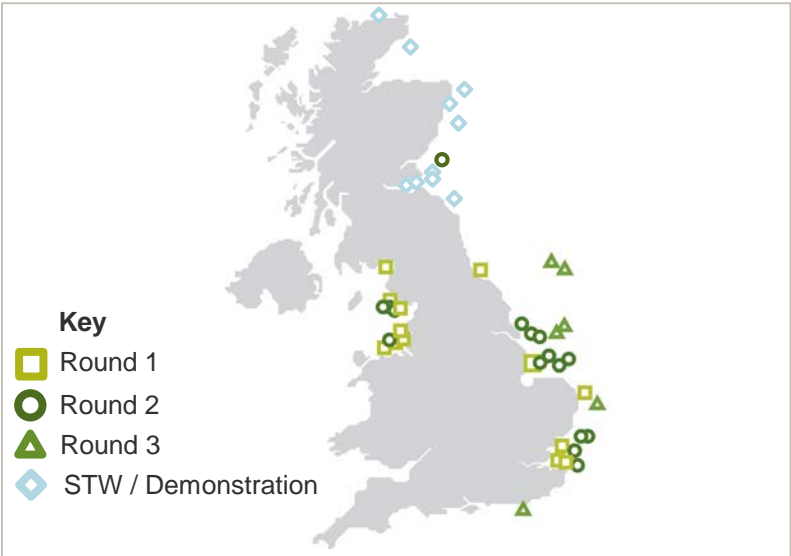
The Green Investment Ratings ('GIR') team of Green Investment Group Limited ('GIG') has prepared this Green Impact Report (the 'Report') showing various environmental benefits of offshore wind electricity generation projects across the UK, including those projects that are consented, in construction, operational and have been decommissioned; ('UK Offshore Wind Portfolio' or 'Portfolio'). Within this Report, the Portfolio has been divided in line with The Crown Estate's leasing rounds: Round 1, Round 2, Round 3 and Scottish Territorial Waters ('STW') / demonstration projects. The assessment was undertaken using publicly-available data (see Appendix 1). This Report does not contain, nor has any part of the assessment been based on, any commercially confidential data.

The GIR team has forecast the Portfolio's avoided: greenhouse gas ('GHG') emissions; other emissions to air; and fossil fuels consumption, (together, the 'Green Impact') and is pleased to set out its assessments in this Report, as summarised below.

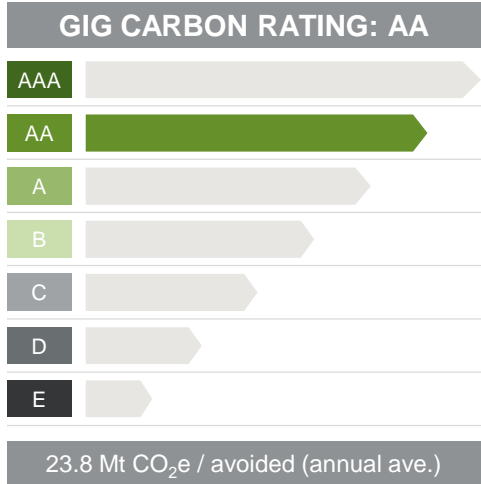
This Report also considers the Portfolio's alignment with the United Nations' Sustainable Development Goals.

The Portfolio scores 'AA' on the GIG Carbon Rating scale with an aggregated average annual forecast of 23.8 Mt CO₂e avoided.

| UK Offshore Wind Portfolio Information | |
|--|------|
| Operational projects | 29 |
| Operational capacity (GW) | 6.7 |
| Projects under construction | 9 |
| Capacity under construction (GW) | 5.1 |
| Consented projects in development | 11 |
| Consented capacity in development (GW) | 10.1 |



Green Impact Summary: Actual & Forecast Performance



| GHG emissions avoided (carbon dioxide equivalent) | |
|---|----------------------------------|
| Forecast remaining lifetime | 743,334 kt CO ₂ e |
| Forecast average annual | 23,815 kt CO ₂ e / yr |
| Forecast full deployment annual | 32,051 kt CO ₂ e / yr |
| Emissions avoided to end 2017 | 43,422 kt CO ₂ e |
| Other emissions to air avoided (oxides of nitrogen) | |
| Forecast remaining lifetime | 624,710 t NO _x |
| Forecast average annual | 19,522 t NO _x / yr |
| Forecast full deployment annual | 26,936 t NO _x / yr |
| Emissions avoided to end 2017 | 36,492 t NO _x |
| Fossil fuels consumption avoided (oil equivalent) | |
| Forecast remaining lifetime | 324,286 kt oe |
| Forecast average annual | 10,134 kt oe / yr |
| Forecast full deployment annual | 13,983 kt oe / yr |
| Consumption avoided to end 2017 | 18,943 kt oe |

Important note: This Report has been prepared by GIG on the basis of, and should be read in conjunction with, the methodology v1.1, assumptions, limitations and other terms set out in Appendices 2, 3 and the Important Notice and Disclaimer, Appendix 4. This is not a due diligence report and should not be relied upon as such. If appropriate, recipients and users of this Report should conduct their own separate environmental, social and governance enquiries and assessments. This Report is provided for information purposes only and does not constitute and shall not be deemed to be in any way an offer or invitation or solicitation of any offer or invitation to sell or purchase shares or invest in any Project. This Report has not been filed, lodged, registered or approved in any jurisdiction and recipients of this document should keep themselves informed of and comply with and observe all applicable legal and regulatory requirements.



2. Green Impact Forecast

In this Report we use the term ‘Green Impact’ to refer to the GHG emissions, other emissions to air and fossil fuels consumption avoided by the UK Offshore Wind Portfolio once fully built-out and deployed, as described. Electricity yield generation forecasts are derived from actual performance, with the exception of those projects that have been operating for three years or fewer, whereby the yield generation forecasts have been calculated using the average generation per MW capacity for offshore wind across the UK for the past five years, multiplied by the capacity of the project. Each of the forecasts set out below is based on publicly-available data and is subject to GIG’s assessment of Green Impact Forecast Accuracy (as set out on page 4). The forecasts and Green Impact Forecast Accuracy are subject to the methodology, assumptions, limitations set out in Appendices 2 & 3, unless otherwise stated.

Greenhouse gas emissions avoided

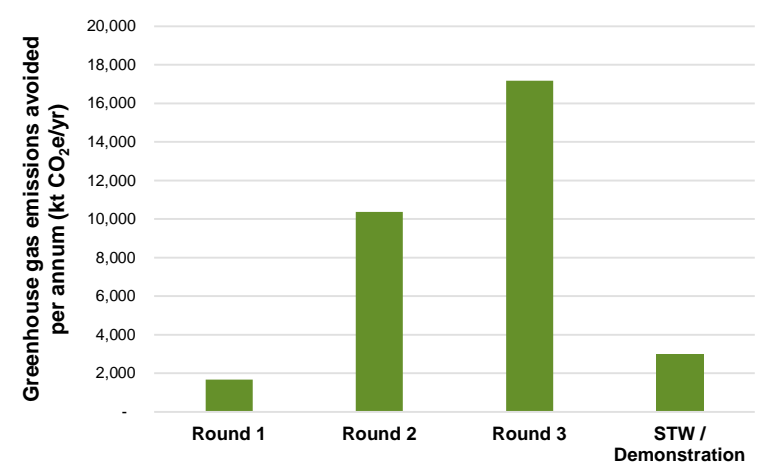
GHG emissions avoided (measured in carbon dioxide equivalent: CO₂e), both actual and forecast, is derived by comparing the emissions associated with each underlying project to a counterfactual (alternative method of energy generation). In this case, the counterfactual is UK marginal grid emissions.

The UK Offshore Wind Portfolio is forecast to avoid an average of 23.8 Mt CO₂e / yr, and is anticipated to peak at almost 32.1 Mt CO₂e / yr once all projects have been deployed.

The forecast profiles for each Round are shown in the chart below. This chart demonstrates the step change associated with each Round as more sites become operational, as well as the different years in which the Rounds are forecast to be generating Green Impact.

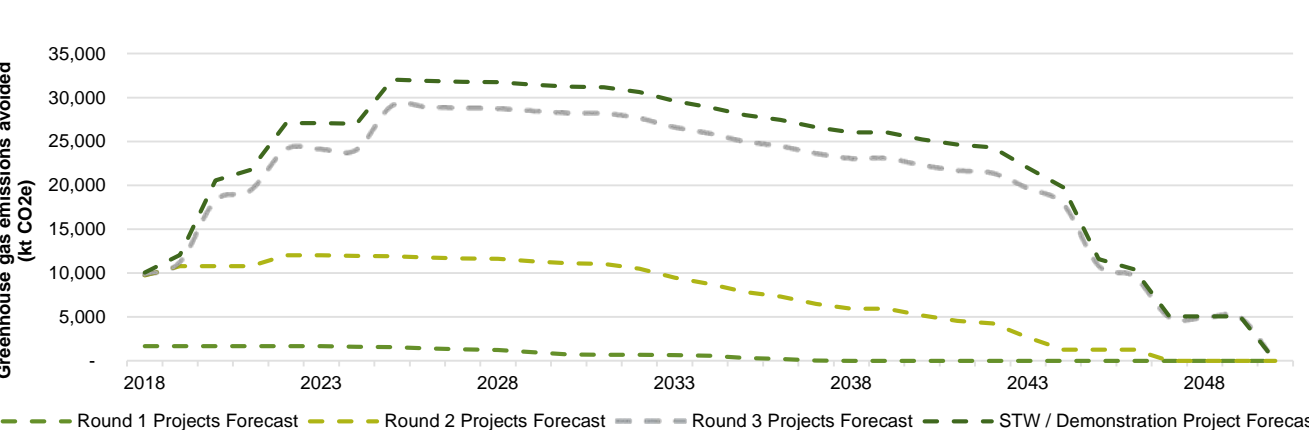
Round 3 and STW / Demonstration forecasts are estimated based on total consented capacity.

The Portfolio is forecast to avoid emissions of over 32 Mt CO₂e per year



| Portfolio GHG emissions avoided (carbon dioxide equivalent) | |
|---|----------------------------------|
| Remaining lifetime | 743,334 kt CO ₂ e |
| Forecast average annual | 23,815 kt CO ₂ e / yr |
| Full deployment annual | 32,051 kt CO ₂ e / yr |

Greenhouse gas emissions avoided: forecast profiles (stacked)



| GHG emissions avoided (carbon dioxide equivalent) by round | | | |
|--|------------------------------|----------------------------------|----------------------------------|
| | Remaining lifetime | Forecast average annual | Full deployment annual |
| Round 1 | 21,935 kt CO ₂ e | 1,097 kt CO ₂ e / yr | 1,667 kt CO ₂ e / yr |
| Round 2 | 219,203 kt CO ₂ e | 7,559 kt CO ₂ e / yr | 10,364 kt CO ₂ e / yr |
| Round 3 | 429,267 kt CO ₂ e | 13,415 kt CO ₂ e / yr | 17,169 kt CO ₂ e / yr |
| STW / Demonstration | 72,930 kt CO ₂ e | 2,279 kt CO ₂ e / yr | 2,963 kt CO ₂ e / yr |



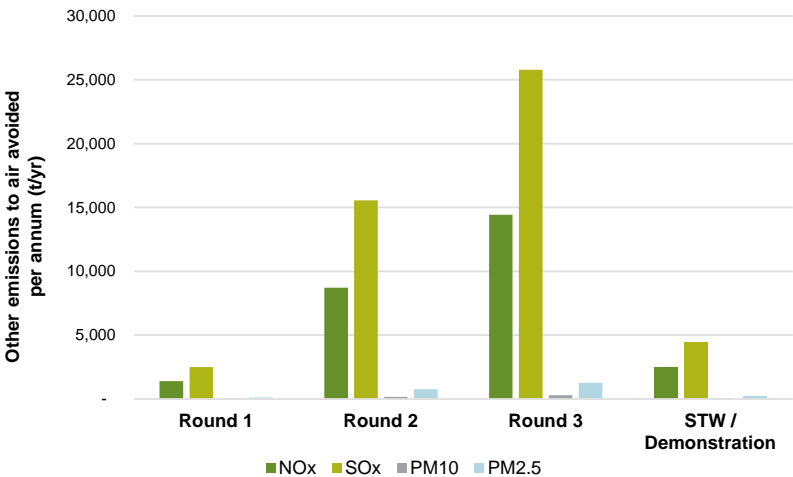
2. Green Impact Forecast

Other emissions to air avoided

'Other emissions to air avoided' is a measure of net air pollutant emissions compared to the counterfactual method of energy generation. Quantified air pollutant emissions include oxides of nitrogen (NO_x), oxides of sulphur (SO_x), particulates up to 10 micrometres (µm) in diameter (PM₁₀) and particulates up to 2.5 µm in diameter (PM_{2.5}).

The UK Offshore Wind Portfolio is forecast to result in the avoidance of almost 27 kt / yr of NO_x and over 48 kt / yr of SO_x, as well as almost 3 kt / yr of particulate matter once all projects have been deployed.

The Portfolio is forecast to avoid emissions of almost 27 kt NO_x per year



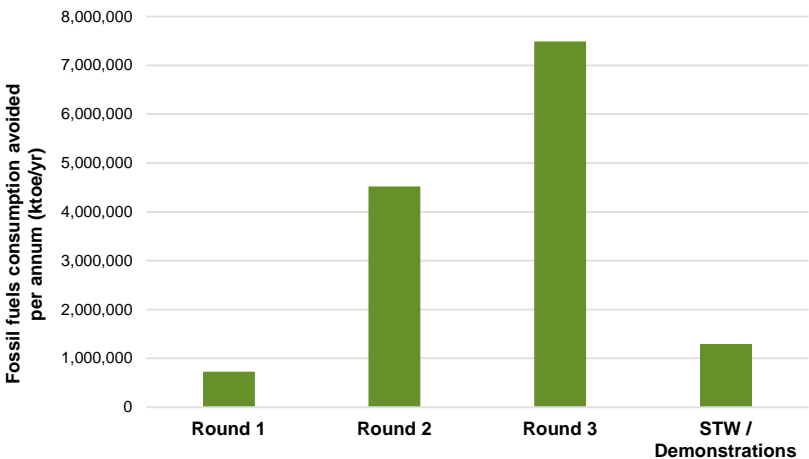
| Portfolio emissions to air avoided | |
|---|--------------------------------|
| Full deployment annual nitrogen oxides | 26,936 t NO _x / yr |
| Full deployment annual sulphur oxides | 48,158 t SO _x / yr |
| Full deployment annual 10µm particulate matter | 563 t PM ₁₀ / yr |
| Full deployment annual 2.5µm particulate matter | 2,398 t PM _{2.5} / yr |

Fossil fuels consumption avoided

'Fossil fuels consumption avoided' is a measure of the net consumption of coal, oil and gas compared to the counterfactual method of energy generation, and is normalised to kilotonnes of oil equivalent (kt oe) as a proxy measure.

The UK Offshore Wind Portfolio is forecast, on a whole portfolio basis, to result in the avoidance of consumption of almost 14 Mt oil equivalent per year at full deployment.

The Portfolio is forecast to avoid almost 14 Mt oil equivalent per year



| Portfolio fossil fuels consumption avoided | |
|--|-------------------|
| Remaining lifetime | 324,286 kt oe |
| Forecast average annual | 10,134 kt oe / yr |
| Full deployment annual | 13,983 kt oe / yr |

3. Overall Green Impact Forecast Accuracy

GIG has assessed the weighted average Green Impact Forecast Accuracy for UK Offshore Wind Portfolio at Level 3 (Good).

Green Impact Forecast Accuracy is GIG’s assessment of the level of confidence that can reasonably be placed on the accuracy of any quantified Green Impact Forecast. It is based on publicly available information (set out in Appendix 1) and on the methodology referred to in Appendix 2.

GIG assesses Green Impact Forecast Accuracy at levels ranging from Level 1 (Low) to Level 5 (Very High), which represent the combined and weighted average of a series of factors, according to GIG’s in-house experience of the sensitivity of each element. See Appendix 2 for further detail.

The forecast accuracy for the individual Rounds is shown below.

Level 3 (Good)



Round 1 sites

The Round 1 sites are all fully operational with the exception of Blyth Offshore Windfarm which has been decommissioned. The majority of the Round 1 sites have been operating for over five years. As such forecast performance has been calculated based on past performance and the Green Impact Forecast Accuracy is therefore considered to be Very High. This represents a very high level of confidence that the actual Green Impact will be in line with the forecast going forward.

Level 5 (Very High)



Round 2 sites

The majority of the Round 2 sites are currently operational and, of the remainder, one is under construction whilst another has consent authorised. Of the operational capacity, over half have been in operation for three years or more. As such, while the Green Impact Forecast Accuracy impacted by the development stage and the quality of the data used to calculate the forecast, GIG’s confidence in its assessment of the forecast Green Impact is High.

Level 4 (High)



Round 3 sites

The consented Round 3 sites are still in development and as such the forecast is impacted both by the early stage projects (with associated potential for design and capacity change) and the quality of the data used to generate the forecast (which are based on maximum capacity assumptions). Detailed forecast data are not publicly available at this stage. As a result, GIG’s confidence in the forecasts for the Round 3 sites is Moderate.

Level 2 (Moderate)





3. Overall Green Impact Forecast Accuracy (cont.)

STW / Demonstration sites

Similar to Round 3 sites, the consented STW and Demonstration sites are still in development and as such the forecast is impacted both by the early stage projects (with associated potential for design and capacity change) and the quality of the data used to generate the forecast (which are based on maximum capacity assumptions). Detailed forecast data are not publicly available at this stage. As a result, GIG’s confidence in the forecasts for the STW and Demonstration sites is Moderate.

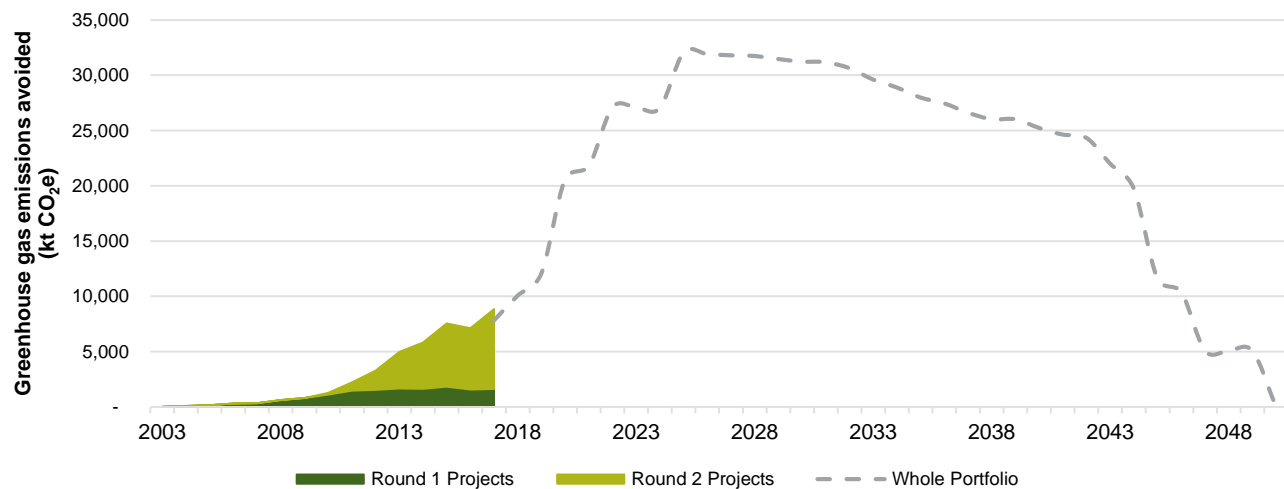


4. Actual Green Impact Performance

The following section shows the actual Green Impact to the end of 2017 of the operating projects within the UK Offshore Wind Portfolio; namely the GHG emissions, other emissions to air and fossil fuels consumption avoided. The actual GHG emissions avoided and the forecast profiles are shown in the following graph to illustrate previous performance and the expected increase in GHG emissions avoided over the next 30 years.

Offshore wind farms United Kingdom

Over 43 Mt CO₂e cumulatively avoided to end 2017



There has been a steady increase in GHG emissions avoided since 2003 as more capacity has come online. The forecast profile shows that this is expected to increase by more than three times by 2025.

Round 3 and STW / Demonstration sites are not visible on the graph above as there are few projects currently operational. However, together, over the last 10 years the Round 3 and STW / Demonstration sites have cumulatively avoided over 90 kt CO₂e to end 2017.

Further information about performance of Round 1 and 2 is provided in the following pages.

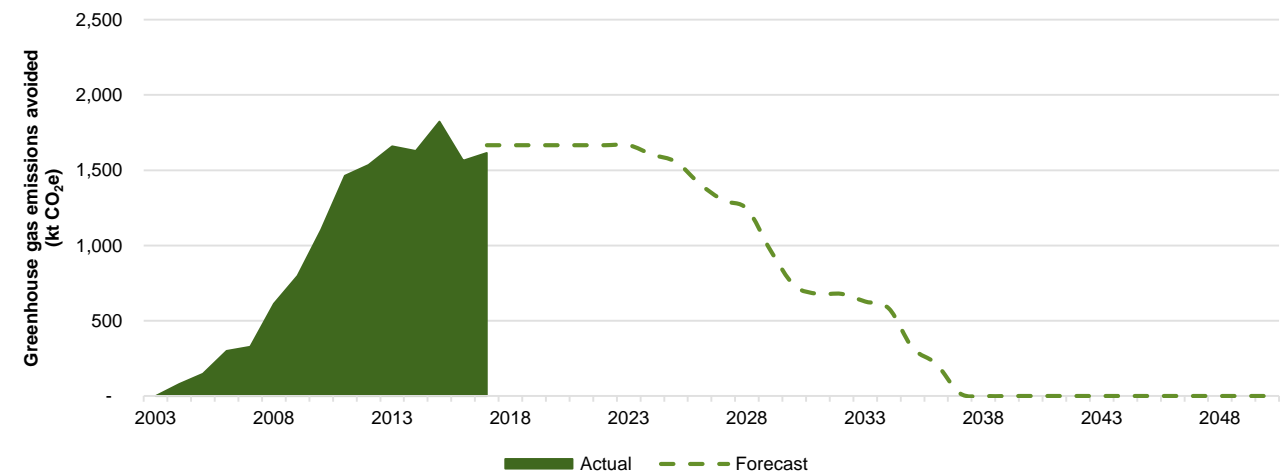
| Actual annual GHG emissions avoided (kt CO ₂ e – kilotonnes carbon dioxide equivalent) | | | | | |
|--|-----|------|-------|------|-------|
| 2003 | 0.4 | 2008 | 613 | 2013 | 4,979 |
| 2004 | 80 | 2009 | 805 | 2014 | 5,826 |
| 2005 | 148 | 2010 | 1,275 | 2015 | 7,552 |
| 2006 | 300 | 2011 | 2,228 | 2016 | 7,120 |
| 2007 | 327 | 2012 | 3,287 | 2017 | 8,879 |



4. Actual Green Impact Performance (cont.)

Round 1 sites

The Round 1 Projects avoided almost 15 Mt CO₂e to end 2017



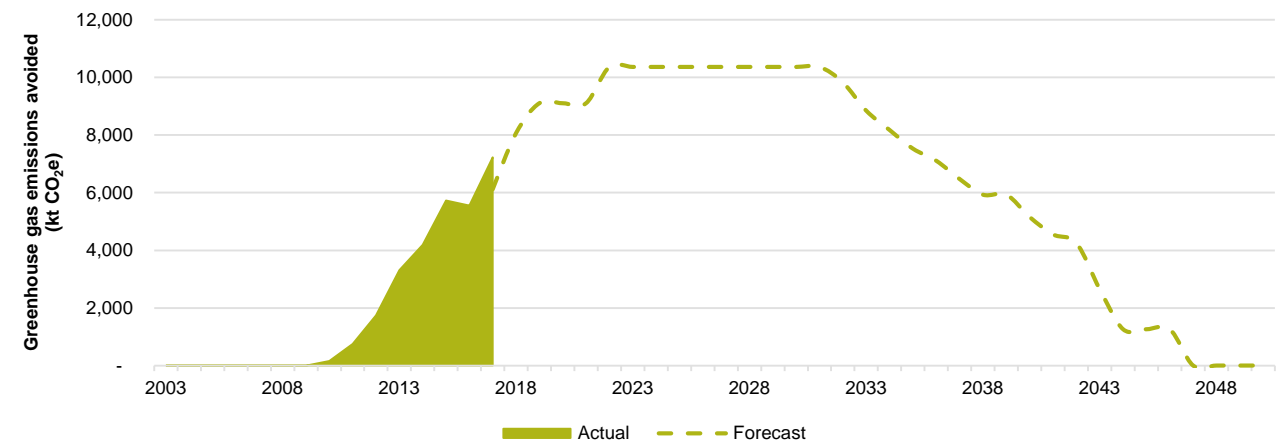
There has been a steady increase in GHG emissions avoided by Round 1 sites since 2004 as more capacity has come online. They are now fully operational (with the exception of one decommissioned project), with each project having an expected design life between 20 and 25 years.

In 2017, they achieved an average capacity factor of 34%.

| Actual performance to end 2017 | | |
|-------------------------------------|--------|----------------------|
| GHG emissions avoided | 14,660 | kt CO ₂ e |
| NO _x emissions avoided | 12,320 | kt NO _x |
| SO _x emission avoided | 22,027 | kt SO _x |
| PM ₁₀ emissions avoided | 257 | kt PM ₁₀ |
| PM _{2.5} emissions avoided | 1,097 | kt PM _{2.5} |
| Fossil fuels consumption avoided | 6,395 | kt oe |

Round 2 sites

The Round 2 Projects avoided almost 29 Mt CO₂e to end 2017



There has been a steady increase in GHG emissions avoided by Round 2 projects since 2010 as more capacity has come online.






In 2017, they achieved an average capacity factor of 37%. This value is greater than Round 1 as Round 2 projects are constructed with larger turbines and are generally further offshore, resulting in greater wind resource availability.

| Actual performance to end 2017 | | |
|-------------------------------------|--------|----------------------|
| GHG emissions avoided | 28,669 | kt CO ₂ e |
| NO _x emissions avoided | 24,093 | kt NO _x |
| SO _x emission avoided | 43,076 | kt SO _x |
| PM ₁₀ emissions avoided | 503 | kt PM ₁₀ |
| PM _{2.5} emissions avoided | 2,145 | kt PM _{2.5} |
| Fossil fuels consumption avoided | 12,507 | kt oe |



5. Alignment with the UN Sustainable Development Goals

The United Nations Sustainable Development Goals¹ (SDGs) are a set of 17 goals for sustainable development adopted by the UN in 2015, each with associated targets to be achieved by 2030. The Green Investment Ratings team has considered the performance of the Portfolio against the SDGs and their associated targets and identified those which are most aligned. The UK offshore wind Portfolio is aligned with the following SDGs:

| | |
|--|---|
|  | Reduction of air pollutants through the avoidance of fossil fuels combustion to generate electricity |
|  | Generation of clean, renewable electricity |
|  | Climate finance investment, supporting the development of renewable infrastructure |
|  | Renewable electricity generation, resulting in the avoidance of fossil fuels consumption to generate electricity |
|  | Supporting action to tackle climate change through investment into infrastructure which avoids greenhouse gas emissions |



¹ <http://sustainabledevelopment.un.org/sdgs>

Appendix 1:

Source data used in the production of the Report

Round 1 Sites

| Project Name | Capacity (MW) | Design life (yrs) | Number of turbines | Stage as at September 2018 | Operations date | Forecast generation (GWh) |
|---|---------------|-------------------|--------------------|----------------------------|-----------------|---------------------------|
| Barrow Offshore Windfarm | 90 | 20 | 30 | Operational | Jun 2006 | 293.52 |
| Blyth Offshore Windfarm | 4 | 10 | 2 | Decommissioned | Dec 2000 | 0 |
| Burbo Bank Offshore Windfarm | 90 | 20 | 25 | Operational | Jul 2007 | 263.25 |
| Gunfleet Sands (1, 2 and Demonstration) | 185 | 25 | 50 | Operational | Jun 2010 | 585.17 |
| Kentish Flats Ltd - A,C | 90 | 20 | 30 | Operational | Sep 2005 | 247.95 |
| Lynn and Inner Dowsing Offshore Windfarms | 194.2 | 20 | 54 | Operational | Mar 2009 | 605.18 |
| North Hoyle Offshore Windfarm - A | 60 | 25 | 30 | Operational | Apr 2004 | 181.02 |
| Ormonde Windfarm | 150 | 25 | 30 | Operational | Feb 2012 | 493.72 |
| Rhyl Flats Windfarm | 90 | 25 | 25 | Operational | Dec 2009 | 287.15 |
| Robin Rigg Offshore Windfarm (East+West) | 180 | 20 | 60 | Operational | Apr 2010 | 517.34 |
| Scroby Sands Windfarm | 60 | 20 | 30 | Operational | Mar 2004 | 174.52 |
| Teesside Windfarm | 62.1 | 20 | 27 | Operational | Jun 2013 | 201.45 |

Notes

1. All data above are taken from publicly available sources, specifically (a) www.4coffshore.com; (b) Ofgem database; (c) Individual Project websites

2. Forecast generation has been calculated using the following method: (a) Where a Project has been operating for more than three years, forecast generation is calculated as an average of past performance over the last three years; (b) Where a Project is not yet operational, or has been operating for three years or fewer, forecast generation is calculated by multiplying the total capacity of the Project by the average generation per MW capacity of offshore wind farms in the UK over the past five years.

Green Impact Report

Offshore Wind: United Kingdom



Appendix 1:

Source data used in the production of the Report

Round 2 Sites

| Project Name | Capacity (MW) | Design life (yrs) | Number of turbines | Stage as at September 2018 | Operations date | Forecast generation (GWh) |
|---|---------------|-------------------|--------------------|----------------------------|-----------------|---------------------------|
| Burbo Bank Extension | 258 | 25 | 32 | Operational | May 2017 | 872.99 |
| Dudgeon Offshore Wind | 402 | 25 | 67 | Operational | Dec 2017 | 1360.24 |
| Galloper | 353 | 25 | 56 | Operational | Mar 2018 | 1194.44 |
| Greater Gabbard (GGOWL) | 504 | 25 | 140 | Operational | Sep 2012 | 1880.55 |
| Gwynt y Mor | 576 | 25 | 160 | Operational | Jun 2015 | 1664.51 |
| Humber Gateway Offshore Wind Farm | 219 | 25 | 73 | Operational | Jun 2015 | 741.03 |
| Kentish Flats Extension Wind Farm | 49.5 | 20 | 15 | Operational | Sep 2015 | 167.49 |
| Lincs Wind Farm | 270 | 20 | 75 | Operational | Aug 2013 | 1006.72 |
| London Array Offshore Windfarm | 630 | 20 | 175 | Operational | Apr 2013 | 2311.68 |
| Race Bank | 573.3 | 25 | 91 | Operational | Feb 2018 | 1939.86 |
| Sheringham Shoal Wind Farm | 317 | 25 | 88 | Operational | Oct 2012 | 1116.62 |
| Thanet Offshore Wind Farm | 300 | 40 | 100 | Operational | Sep 2010 | 869.42 |
| Triton Knoll | 860 | 25 | 90 | Consent Authorised | Jan 2022* | 2909.96 |
| Walney Extension | 660 | 25 | 90 | Operational | Sep 2018 | 2233.23 |
| Walney Offshore Wind Phase I + Phase II | 368 | 20 | 102 | Operational | Feb 2012 | 1354.16 |
| West of Duddon Sands Offshore Wind Farm | 388.8 | 20 | 108 | Operational | Oct 2014 | 1533.24 |
| Westermost Rough | 210 | 25 | 35 | Operational | Jul 2015 | 778.47 |

* Consented projects have an assumed operations date based on best available knowledge. It is anticipated that not all of these projects are likely to be built due to CfD availability.

Notes
 1. All data above are taken from publicly available sources, specifically (a) www.4coffshore.com; (b) Ofgem database; (c) Individual Project websites
 2. Forecast generation has been calculated using the following method: (a) Where a Project has been operating for more than three years, forecast generation is calculated as an average of past performance over the last three years; (b) Where a Project is not yet operational, or has been operating for three years or fewer, forecast generation is calculated by multiplying the total capacity of the Project by the average generation per MW capacity of offshore wind farms in the UK over the past five years.

Green Impact Report

Offshore Wind: United Kingdom



Appendix 1:

Source data used in the production of the Report

Round 3 Sites

| Project Name | Capacity (MW) | Design life (yrs) | Number of turbines | Stage as at September 2018 | Operations date | Forecast generation (GWh) |
|-----------------------------|---------------|-------------------|--------------------|----------------------------|-----------------|---------------------------|
| Dogger Bank- Creyke Beck A | 1200 | 25 | 200 | Consent Authorised | 2020* | 4060.41 |
| Dogger Bank- Creyke Beck B | 1200 | 25 | 200 | Consent Authorised | 2020* | 4060.41 |
| Dogger Bank- Teesside A | 1200 | 25 | 200 | Consent Authorised | 2020* | 4060.41 |
| East Anglia One | 714 | 25 | 102 | Construction | Jun 2020 | 2415.94 |
| East Anglia Three | 1200 | 25 | 172 | Consent Authorised | 2025* | 4060.41 |
| Hornsea Project One | 1218 | 25 | 174 | Construction | Jun 2020 | 4121.32 |
| Hornsea Project Two | 1386 | 25 | 165 | Construction | Jan 2022 | 4689.77 |
| Moray East | 950 | 25 | 100 | Consent Authorised | 2022* | 3214.49 |
| Rampion | 400.2 | 25 | 116 | In Commissioning | Sep 2018 | 1354.15 |
| Seagreen Alpha and Bravo | 1050 | 25 | 150 | Consent Authorised | 2025* | 3552.86 |
| Sofia (Teeside Wind Farm B) | 1200 | 25 | 200 | Consent Authorised | 2025* | 4060.41 |

* Consented projects have an assumed operations date based on best available knowledge. It is anticipated that not all of these projects are likely to be built due to CfD availability.

Notes
 1. All data above are taken from publicly available sources, specifically (a) www.4coffshore.com; (b) Ofgem database; (c) Individual Project websites
 2. Forecast generation has been calculated using the following method: (a) Where a Project has been operating for more than three years, forecast generation is calculated as an average of past performance over the last three years; (b) Where a Project is not yet operational, or has been operating for three years or fewer, forecast generation is calculated by multiplying the total capacity of the Project by the average generation per MW capacity of offshore wind farms in the UK over the past five years.

Green Impact Report

Offshore Wind: United Kingdom



Appendix 1:

Source data used in the production of the Report

STW / Demonstration Sites

| Project Name | Capacity (MW) | Design life (yrs) | Number of turbines | Stage as at September 2018 | Operations date | Forecast generation (GWh) |
|---|---------------|-------------------|--------------------|----------------------------|-----------------|---------------------------|
| Aberdeen Offshore Wind Farm (EOWDC) | 93.2 | 20 | 11 | In Commissioning | Aug 2018 | 315.36 |
| Beatrice Offshore Windfarm (BOWL) | 10 | 5 | 84 | Decommissioned | Sep 2009 | 0.00 |
| Blyth Offshore Demonstrator Project | 41.5 | 22 | 5 | Operational | Jun 2018 | 140.42 |
| Dounreay Tri | 10 | 25 | 2 | Construction | Jan 2020 | 33.84 |
| ForthWind Offshore Wind Demonstration Project Phase 1 | 12 | 25 | 2 | Consent Authorised | 2025* | 40.60 |
| Hywind Scotland Pilot Park | 30 | 20 | 5 | Operational | Oct 2017 | 101.51 |
| Inch Cape | 784 | 25 | 72 | Consent Authorised | 2022* | 2652.80 |
| Kincardine Offshore Windfarm | 50 | 25 | 7 | Construction | Jan 2020 | 169.18 |
| Levenmouth Demonstration | 7 | 25 | 1 | Operational | 2014 | 23.69 |
| Neart na Gaoithe | 448 | 25 | 54 | Consent Authorised | 2022* | 1515.89 |
| Beatrice Offshore Windfarm (BOWL) | 588 | 25 | 84 | Construction | Jun 2019 | 1989.60 |

* Consented projects have an assumed operations date based on best available knowledge. It is anticipated that not all of these projects are likely to be built due to CfD availability.

Notes
 1. All data above are taken from publicly available sources, specifically (a) www.4coffshore.com; (b) Ofgem database; (c) Individual Project websites
 2. Forecast generation has been calculated using the following method: (a) Where a Project has been operating for more than three years, forecast generation is calculated as an average of past performance over the last three years; (b) Where a Project is not yet operational, or has been operating for three years or fewer, forecast generation is calculated by multiplying the total capacity of the Project by the average generation per MW capacity of offshore wind farms in the UK over the past five years.

Appendix 2

Terms and Conditions: Terminology and Methodology

Terminology

Green Impact

The Green Impact metrics covered by this Report are identified in the header and executive summary. “Green Impact” is a collective term referring to the environmental benefits which have been calculated in accordance with GIG’s methodology to be, or to be reasonably likely to be, delivered by the project(s) to which this Report refers. The collective term can include defined metrics such as tonnes carbon dioxide equivalent avoided (t CO₂e), tonnes oil equivalent avoided (toe), and tonnes (t) of other air pollutant emissions avoided.

Green Impact Forecast Accuracy

“Green Impact Forecast Accuracy” is an expression of the level of confidence that, in the opinion of GIG, can reasonably be placed on the accuracy of any quantified Green Impact forecast. This assessment of forecast accuracy is described in levels as follows: Level 1 (Low), Level 2 (Moderate), Level 3 (Good), Level 4 (High), and Level 5 (Very High).

Forecast Average Annual

Forecast average annual refers to the annual average green impact over the remaining lifetime of project/ portfolio until the expected decommissioning of the project/final project within the portfolio

Methodology v 1.1

The Green Impact and Green Impact Forecast Accuracy assessments presented in this Report are based on GIG’s approach to assessing Green Impact using the methodologies set out within its proprietary green investment principles, policies and the associated processes of the Green Investment Handbook¹. The Green Impact assessment has applied proprietary modelling techniques and comparative data developed and owned by GIG, or by third party owners and made available under licence to GIG.

Green Impact calculation

GIG’s initial calculation of the Green Impact

of each project is produced by comparing relevant information and data derived from that project against relevant counterfactual (or baseline) data for the assumed environmental impacts that would occur if the project did not take place, based on GIG’s proprietary reference sources or provided to GIG by relevant third parties or obtained from publicly available sources. The resultant estimated Green Impact is then subject to further qualitative evaluation before production of GIG’s formal Green Impact Report.

For grid-connected projects that generate electricity, the counterfactual is assumed to be marginal electricity generated from the national grid in that country, which includes resources consumed to supply grid electricity. GIG’s methodology calculates the net Green Impact of the project by comparing its likely emissions to those of a marginal grid electricity mix, using the methodology set out in the International Financial Institutions (IFI) approach to GHG accounting for renewable energy projects² and the IFI approach to GHG accounting for energy efficiency projects³.

GIG’s methodology calculates results for likely Green Impact on an annual and lifetime basis.

Exclusions

The counterfactual of marginal grid electricity does not include the total quantifiable lifecycle environmental burdens (e.g. resources consumed during construction, or indirect emissions during operations such as those from associated transport vehicles) associated with energy generation. Therefore, to produce a valid comparison, the calculation of Green Impact for the project(s) assessed in this Report is based solely on the operational phase of the relevant project(s), and does not include a full lifecycle assessment of the project(s) unless specifically stated otherwise. This approach is aligned with the Greenhouse Gas Project Protocol⁴. GIG’s assessment does not include a review of any underlying project’s environmental and/or social, permitting, licencing or other compliance status.

Green Impact Forecast Accuracy

Green Impact Forecast Accuracy is determined from a number of project parameters that include the project technology, stage of project development, and country in which the project is located, together with GIG’s opinion of the input data quality. These parameters have been assigned values that represent the degree to which they affect the accuracy of the forecast Green Impact, and are used to produce Forecast Accuracy scores for three elements: Data quality, Technology & development stage, and Country governance⁵. The Forecast Accuracy scores for the three elements are weighted according to GIG’s in-house experience of the sensitivity of each element and combined to derive an overall level of Green Impact Forecast Accuracy

Carbon Rating

Our Carbon Rating is a measure of a project’s lifecycle greenhouse gas emissions compared to the emissions of the counterfactual. Projects with the lowest lifecycle emissions relative to the counterfactual would score the highest ratings from AAA to B. Projects with lifecycle emissions similar to the counterfactual would score a C, and projects with greater emissions would score a D or E. The emissions of the counterfactual are derived from the IFI approaches to greenhouse gas accounting – please see above for details. Where we do not have project-specific information on lifecycle emissions, we use the median harmonised values from the US National Renewable Energy Laboratory’s Lifecycle Assessment Harmonization⁶

¹ www.greeninvestmentgroup.com/green-impact

² <http://documents.worldbank.org/curated/en/2015/12/25514886/ifi-approach-ghg-accounting-renewable-energy-projects>

³ <http://documents.worldbank.org/curated/en/2015/12/25514884/ifi-approach-ghg-accounting-energy-efficiency-projects>

⁴ www.ghgprotocol.org/standards/project-protocol

⁵ Country governance scores are determined from datasets of indicators from the World Bank, Transparency International and United Nations University Institute for Environment and Human Security

⁶ <https://www.nrel.gov/analysis/life-cycle-assessment.html>

Appendix 3

Terms and Conditions: Assumptions, Limitations and other terms

Disclaimer

Green Investment Group Limited is not an authorised deposit-taking institution for the purposes of the Banking Act 1959 (Cth)¹, and Green Investment Group Limited's obligations do not represent deposits or other liabilities of Macquarie Bank Limited ABN 46 008 583 542. Macquarie Bank Limited does not guarantee or otherwise provide assurance in respect of the obligations of Green Investment Group Limited.

Scope and distribution of this document

UK Green Investment Bank plc ("GIG") has prepared this document (the "Report") for the exclusive use of the person with whom GIG has contracted to produce it (together with its subsidiaries and affiliates (the "Recipient")) in connection with the project or projects identified on page 1.

This Report has been prepared on the basis of the scope of work and subject to the terms and conditions set out or referred to in the terms of engagement agreed between GIG and the Recipient (the "Terms of Engagement"). The Terms of Engagement accordingly apply in full to the provision, receipt and use of this Report.

Liability and reliance

Unless GIG has expressly agreed otherwise in the Terms of Engagement, neither GIG nor any of its subsidiaries, holding companies (if any), joint ventures or affiliates (the "GIG Group") nor any of the directors, officers, employees, consultants, shareholders, sub-contractors or advisers of any member of the GIG Group (each of the foregoing being a "GIG Party") shall have or assume any liability whatsoever (whether direct or indirect and whether arising in contract, in tort or otherwise) to the Recipient, or to any of its affiliated companies or to any other person for or in connection with, and no claim shall be made by the Recipient or any other person in relation to, the provision, receipt or use of this Report or any of its contents or any error or inaccuracy in this Report.

The disclosure to, or receipt by, any other person of this Report shall not give rise to any legal or contractual relationship between any GIG Party and such other person, nor shall it give rise to any duty or assumption of responsibility in favour of such other person. No third party may rely

upon the content of this Report and any use of this Report by such third party shall be at its own risk.

No GIG Party shall be liable to any such third party in relation to such use or reliance.

Intellectual Property Rights

All rights are reserved by GIG which, together with its relevant licensors, shall remain the exclusive owners of all intellectual property rights of whatsoever nature subsisting in (1) this Report, (2) any other document or materials provided by any GIG Party in connection with the evaluation of green impact and/or the preparation of this Report, (3) any systems, methodologies, software, algorithms or outputs used produced or developed by or for GIG in connection with this Report or any of its contents, and (4) otherwise made available for use by any person in connection with this Report.

Nature of the contents of this Report

The forecasts and assessments expressed in this Report are not ratings: they are, and shall be construed solely as, statements of opinion as to the relative prospects that particular environmental benefits can be achieved by a specified project or other asset that is the subject of any securities or other investment, and not as statements of current or historical or scientific fact, or as an endorsement of the accuracy of any data or conclusion or as any assurance that any environmental impact (either positive or negative) or risk will or will not occur.

The contents of this Report may not be relied upon as being a conclusive, complete or accurate representation of all elements and factors relating to any project. Furthermore, this Report is not, and shall not be interpreted or construed as, an assessment of the economic performance or creditworthiness of any person or project.

This Report is valid only as at the date of issue based on the information, data and/or documents provided to GIG by the Recipient or any relevant third party, or obtained using publicly available sources, as at the date of issue and shall not take account of any future information, events or changes with respect to the Recipient or any other person, any business, any

financial instrument, any relevant project or transaction, any financial market or any relevant sector or otherwise (unless this Report is specifically amended at GIG's discretion).

This Report is not an offer or solicitation to buy or sell any investment or product or service, nor is it financial advice or trading advice or any other advice as to the merits of any investment, nor is it a recommendation regarding any investment decision or any decision to purchase, hold or sell any investment.

Project data

GIG has relied in good faith on publicly available data and data, and has assumed that such data and information is complete, accurate and up to date.

GIG has not conducted, and shall not be responsible for conducting, any audit or detailed review or assurance or any other verification exercise of any such data (including data related to allocation of the use of proceeds).

Furthermore, for the purposes of this Report no site-specific environmental or social due diligence has been, or is required to be, conducted by GIG, and GIG does not express any opinion in this Report on whether local site-specific environmental and/or social impact have been mitigated appropriately. In preparing this Report, GIG has not undertaken any review of any underlying project's environmental and/or social, permitting, licencing or other compliance status.

Appendix 3

Terms and Conditions: Assumptions, Limitations and other terms

Reference data

In preparing this Report, GIG has relied upon various sources of data and information obtained through public information sources, the content of which no GIG Party has verified or controls.

GIG calculates Green Impact using reference data obtained from, among others, the Ecoinvent life cycle inventory datasets for the calculation of environmental impacts. Green Impact is also calculated based on data supplied by the International Energy Agency (IEA), specifically from the 2015 editions of the World Energy Statistics and Balances dataset and the CO₂ Emissions from Fuel Combustion dataset.

Any limitations and caveats that are applicable to the Ecoinvent and IEA datasets, as published on their websites, are also applicable to the results presented in this Report.

GIG's method is designed to work with a limited number of key inputs and to create results for over 200 different countries and makes some simplifying assumptions in order to achieve this degree of flexibility.

Publication and use of this Report

This Report may be published on GIG's website but must not be further published, reproduced or transmitted without GIG's prior written consent.

No person may in any way alter, modify or change this Report without the prior written consent of GIG. In particular, without limitation, any person in receipt of this Report may only use or disclose this Report in its original, whole and complete format and shall not summarise, dissect or in any way use or display only part of this Report without the prior written consent of GIG.

No person may disclose, publish or reproduce this Report in any manner which is misleading or which impairs the relevant data being disclosed, published or reproduced or in any manner which creates a false impression as to the origin or value of the information or which has an adverse impact upon GIG's reputation as a provider of the relevant services.

This Report is not for use by any person in:

- a) evaluating specific technical or scientific aspects of relevant projects;
- b) carrying out financial, commercial,

economic or investment-related due diligence in relation to the Recipient or any other person, any financial instruments issued, or to be issued, by the Recipient or any other person, or relevant project(s) or transactions;

c) providing investment or financial advice, making investment decisions or recommendations or evaluating financial performance of any person or financial instrument;

d) valuing financial instruments;

e) verifying the accuracy or completeness of any information, data, documents or representations provided to GIG by the Issuer by any third party;

f) verifying the accuracy or completeness of any publicly available information, data, documents or representations; or

g) providing or obtaining advice on legal, regulatory, environmental, accounting or taxation matters.

No GIG Party shall be liable to the Recipient or any third party for any losses suffered in connection with such use.

Governing Law

This Report (including these appendices) and any dispute or claim (including non-contractual disputes or claims) arising out of or in connection with it or its subject matter or use shall be governed by and construed in accordance with the law of the UK.

Appendix 4

Important Notice and Disclaimer:

The information contained in this presentation is confidential and must not be disclosed to any other party.

This presentation does not constitute an offer, invitation or recommendation and does not oblige Green Investment Group Limited (or any of its affiliates, or funds managed by its affiliates) ("**GIG**") to make an investment, underwrite or otherwise acquire an interest in any securities or to provide any financing in relation to the content of this document. Any proposal or offer would be conditional upon, amongst other things, GIG obtaining internal approvals and external approvals and detailed legal, taxation and accounting advice.

This presentation does not purport to contain all the information that may be required by the recipient to assess its interests in any proposal. GIG has prepared this presentation on the basis of information which is publicly available, and sources believed to be reliable. The accuracy of such information (including all assumptions) has been relied upon by GIG, and has not been independently verified by GIG. The recipient should conduct its own independent investigation and assessment as to the validity of the information contained in this presentation, and the economic, financial, regulatory, legal, taxation, stamp duty and accounting implications of that information. The recipient represents that it is not relying on any recommendation or statement of GIG. Except as required by law, GIG and its respective directors, officers, employees, agents and consultants make no representation or warranty as to the accuracy or completeness of the information contained in this presentation, and take no responsibility under any circumstances for any loss or damage suffered as a result of any omission, inadequacy, or inaccuracy in this presentation.

The information contained in this presentation is confidential and must not be disclosed to any other party.

This presentation does not constitute an offer, invitation or recommendation and does not oblige Green Investment Group Limited (or any of its affiliates, or funds managed by its affiliates) ("**GIG**") to make an investment, underwrite or otherwise acquire an interest in any securities or to provide any financing in relation to the content of this document. Any proposal or offer would be conditional upon, amongst other things, GIG obtaining internal approvals and external approvals and detailed legal, taxation and accounting advice.

This presentation does not purport to contain all the information that may be required by the recipient to assess its interests in any proposal. GIG has prepared this presentation on the basis of information which is publicly available, and sources believed to be reliable. The accuracy of such information (including all assumptions) has been relied upon by GIG, and has not been independently verified by GIG. The recipient should conduct its own independent investigation and assessment as to the validity of the information contained in this presentation, and the economic, financial, regulatory, legal, taxation, stamp duty and accounting implications of that information. The recipient represents that it is not relying on any recommendation or statement of GIG. Except as required by law, GIG and its respective directors, officers, employees, agents and consultants make no representation or warranty as to the accuracy or completeness of the information contained in this presentation, and take no responsibility under any circumstances for any loss or damage suffered as a result of any omission, inadequacy, or inaccuracy in this presentation.

Appendix 5

Deloitte LLP Independent Assurance Report to Green Investment Group Limited on the assertions contained within the 'Green Impact Report: Offshore Wind UK'.

We have been engaged by the Directors of the UK Green Investment Group Limited ("GIG") to conduct a limited assurance engagement relating to the assertions contained within the 'Green Impact Report: Offshore Wind UK'.

Our unqualified conclusion

Based on our work as described in this report, nothing has come to our attention that causes us to believe that the assured assertions are materially misstated.

Respective responsibilities of the directors and assurance provider

The Directors are responsible for preparing the 'Green Impact Report: Offshore Wind UK'.

The data has been prepared on the basis of the methodology set out in Appendix 2 of the 'Green Impact Report: Offshore Wind UK'.

Our responsibility is to express a conclusion on the selected assertions based on our procedures. We conducted our engagement in accordance with International Standard on Assurance Engagements 3000 (Revised) *Assurance Engagements Other than Audits or Reviews of Historical Financial Information* ("ISAE3000 (Revised)"), issued by the International Auditing and Assurance Standards Board, in order to state whether anything had come to our attention that causes us to believe that the Assured Data have not been prepared, in all material respects, in accordance with the applicable criteria.

Our engagement provides limited assurance as defined in ISAE3000 (Revised). The evidence gathering procedures for a limited assurance engagement are more limited than for a reasonable assurance engagement, and therefore less assurance is obtained than in a reasonable assurance engagement.

Procedures

Our procedures consisted of:

Selecting a sample of quantitative and qualitative assertions ("Assertions") made throughout the Offshore Wind Report and requesting supporting evidence associated with the assertions.

Reading the supporting evidence and assessing:

- Applicability of the supporting evidence to assertion
- Original context of the supporting evidence as compared to the context of the assertion
- Where sourced externally, whether the external data source is a commonly used and reputable source of data
- Where sourced internally, whether the internal data has been taken from the same systems used to compile GIG's Green Impact Statements.

Our Procedures did not include:

Procedures to test the robustness of the supporting evidence underlying the sampled Assertions

Interviewing personnel responsible for the preparation of the report to understand the report management process

Evaluation of the internal data management and reporting system, nor the associated processes and controls.

Independence

We performed the engagement in accordance with Deloitte's independence policies, which cover all of the requirements of the International Federation of Accountants' Code of Ethics and in some areas are more restrictive. The firm applies the International Standard on Quality Control 1 and accordingly maintains a comprehensive system of quality control including documented policies and procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

Deloitte LLP

London

1 October 2018



Contact us

Edinburgh

Atria One, Level 7
144 Morrison Street
Edinburgh
EH3 8EX
UK

+44 (0)203 037 2000

New York

125 West 57th Street
7th and 8th Floor
New York
NY 10019
USA

+ 1 212 231 1000

London

Ropemaker Place
28 Ropemaker Street
London
EC2Y 9HD
UK

+44 (0)203 037 2000

Hong Kong

Level 18, One International
Finance Centre
1 Harbour View Street
Central
Hong Kong

+852 392 21888

Find out more

www.greeninvestmentgroup.com