

## Executive summary

UK Green Investment Bank Limited (“GIB”) has assessed the Green Impact of Galloper Offshore Wind Farm (the “Project”) based on project data provided by its independent advisers, and is pleased to summarise its assessment in this report.

### Green Investment classification

- The Project is forecast to have positive Green Impact, as set out below
- An investment in this Project may accordingly be classified as a Green Investment based on GIB's standard assessment criteria

### Green Impact forecasts

#### GIB's Green Impact forecasts for the Project are:

- Average annual greenhouse gas savings of 586.1 kt CO<sub>2</sub>e over its lifetime of 25 years ending in 2042
- A total of 14,650 kt CO<sub>2</sub>e of greenhouse gas savings over its lifetime
- The further Green Impact metrics set out in the table below

**Green Impact Forecast Accuracy:** GIB has assessed at Level 3 (Good) its level of confidence in the accuracy of these Green Impact forecasts. Further details of this assessment are provided overleaf.

### UK and global climate policy

The Project (and, accordingly, any related investment in the Project) will contribute to the global transition towards a low-carbon economy to the extent set out in this report, and so is consistent with the UK's commitments under the 2015 UNFCCC Paris Agreement.



### Project summary

Name:	Galloper
Technology:	Offshore wind energy
Location:	United Kingdom
Commercial operations date:	2017
Design life:	25 years
Total turbines:	56
Generation capacity:	336 MW
Remaining lifetime generation:	33,825 GWh
Forecast average annual generation:	1,353 GWh

### Forecast Green Impact metrics

#### Greenhouse gas emissions avoided (carbon dioxide equivalent)

Remaining lifetime	14,650 kt CO <sub>2</sub> e
Average annual	586.1 kt CO <sub>2</sub> e /yr

#### Fossil fuel consumption avoided (oil equivalent)

Remaining lifetime	6,389 ktoe
Average annual	255.5 ktoe / yr

#### Other emissions to air avoided (oxides of nitrogen)

Remaining lifetime	14,680 t NO <sub>x</sub>
Average annual	587 t NO <sub>x</sub> / yr

### Green Impact Forecast Accuracy:

#### Level 3 (Good)



Full details of the Project's Green Impact forecasts and our opinion on the Green Impact Forecast Accuracy can be found on subsequent pages of this Report.

### Important note:

This Report has been prepared by GIB on the basis, and should be read in conjunction with, the methodology, assumptions, limitations and other terms and conditions set out or referred to in Appendix 2 and Appendix 3.

# Green Impact Report

## Galloper Offshore Wind Farm

### Green Impact forecasts

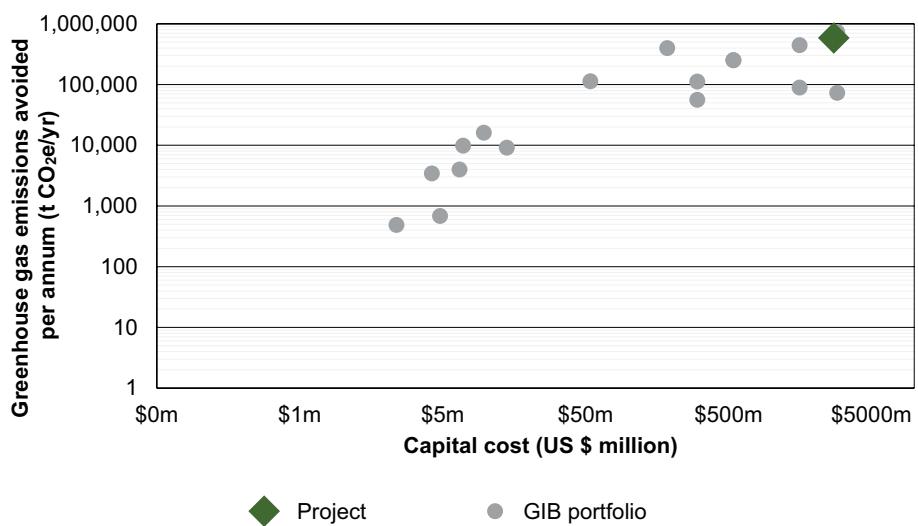
In this Report, we use the term “Green Impact” to refer to the environmental benefits estimated to be achievable by the Galloper project, and this includes estimated avoidance of greenhouses gas emissions, other emissions to air and resource use avoided (fossil fuel equivalent). Green Impact is calculated based on forecast or actual energy generation figures provided to us by the Project. As the Project is currently under construction, the following Green Impact forecasts are based on the forecast generation. The actual Green Impact is likely to vary annually once the Project is operational. The actual performance of the Project against the generation forecast will be monitored for the lifetime of the investment. Each of the Green Impact forecasts set out below is based on project data provided by independent advisors (see Appendix 1) and is subject to GIB’s assessment of Green Impact Forecast Accuracy (set out on page 3).

#### Green Impact forecast: Greenhouse gas emissions avoided

Avoidance of greenhouse gas (GHG) emissions (measured in carbon dioxide equivalent – CO<sub>2</sub>e), both actual and forecast, is derived by comparing the emissions associated with the Project to a counterfactual (alternative) method of energy generation, in this case UK marginal grid electricity generation.

**We forecast that the Project has the potential to avoid emissions of 14.6 million tonnes CO<sub>2</sub>e over its remaining lifetime, resulting in an average annual avoidance of 586 thousand tonnes CO<sub>2</sub>e for each year of operation.**

The Project is forecast to avoid emissions of 586 kt CO<sub>2</sub>e annually

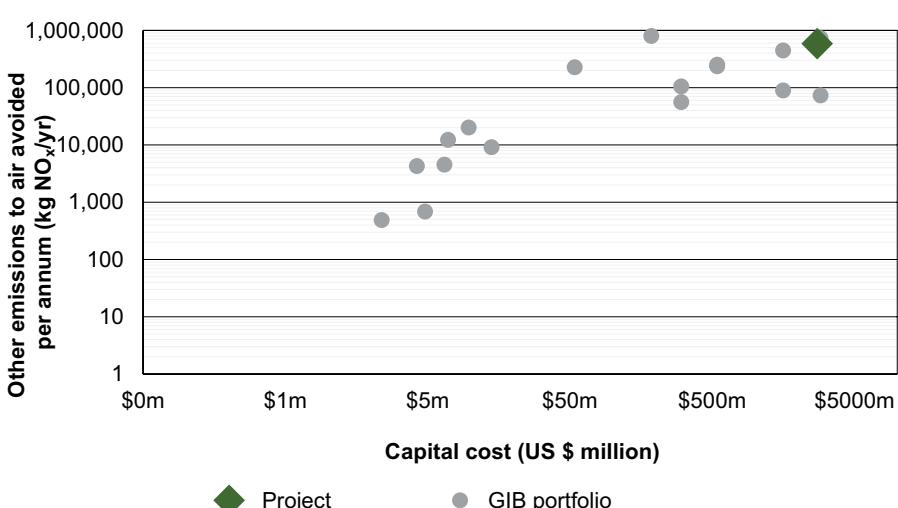


#### Green Impact forecast: Other emissions to air avoided

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<sub>x</sub>), oxides of sulphur (SO<sub>x</sub>), particulates 10 micrometres in diameter (PM<sub>10</sub>) and particulates 2.5 micrometres in diameter (PM<sub>2.5</sub>).

**We forecast that the Project has the potential to avoid emissions equivalent to 587 tonnes NO<sub>x</sub>, 1,107 tonnes SO<sub>x</sub>, 12 tonnes PM<sub>10</sub> and 54 tonnes PM<sub>2.5</sub> annually.**

The Project is forecast to avoid emissions of NO<sub>x</sub>, SO<sub>x</sub> and particulates



# Green Impact Report

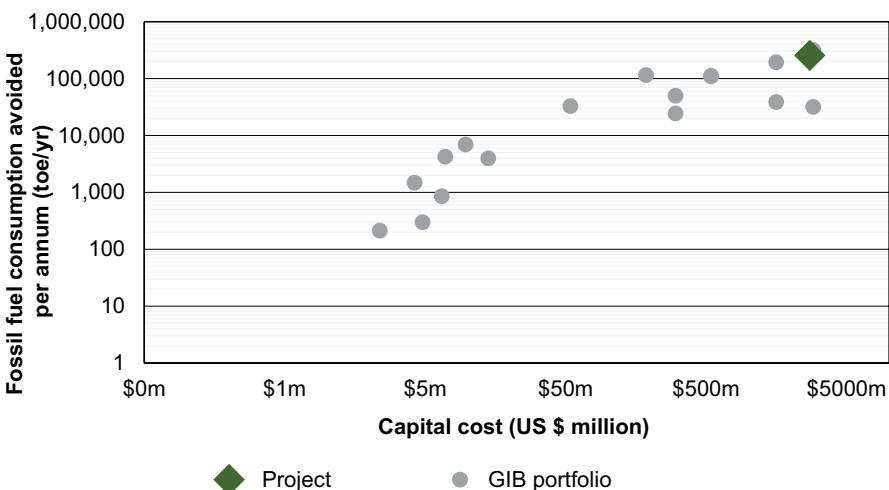
## Galloper Offshore Wind Farm

### Green Impact forecast: Fossil fuel consumption avoided

Fossil fuel consumption avoided is a measure of the net consumption of natural resources compared to the counterfactual method of energy generation, and is normalised to tonnes of oil equivalent (toe) as a proxy measure.

**We forecast that the Project has the potential to avoid the consumption of 6.4 million tonnes of oil equivalent over its remaining lifetime, resulting in an average annual avoidance of 255 thousand tonnes of oil equivalent for each year of operation.**

The Project forecast to avoid the consumption of 255 kt oil equivalent each year



Measure	Fossil fuel consumption avoided
Remaining lifetime fossil fuel consumption avoided	6,389 ktOE
Average annual fossil fuel consumption avoided	255.5 ktOE / yr

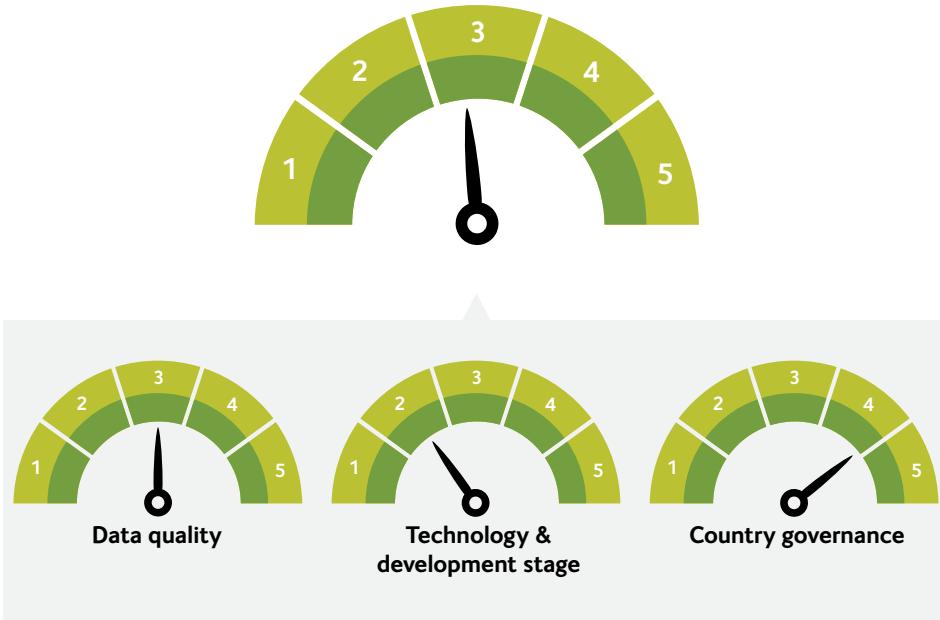
### Green Impact Forecast Accuracy

Green Impact Forecast Accuracy is GIB'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 information provided by the Project (set out in Appendix 1) and on the methodology referred to in Appendix 2.

GIB 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 as presented on the right.

On the basis of the information provided by the Project, GIB has assessed the Green Impact Forecast Accuracy for the Project at Level 3 (Good). This is a conservative estimate based on the fact that the Project is currently under construction. Following completion of construction, and subsequent collection of actual performance data, the data quality and development stage scores would be anticipated to increase, thereby raising the overall Green Impact Forecast Accuracy score.

### Green Impact Forecast Accuracy: Level 3 (Good)



# Green Impact Report

## Galloper Offshore Wind Farm

### Appendix 1

#### User input: Project data

Project Information*		Unit
Name	Galloper	
Technology	Offshore wind energy	
Country	United Kingdom	
Number of units	56	e.g. number of turbines/PV units
Stage	Under construction	Pre-construction, under construction, or operational
Remaining Life	25	yrs
Start date	2017	Year in which commercial operations date will be achieved
Electrical Output		
Capacity	336	MWe
Generation	1,353	GWhe/yr
Data type	Forecast data	Forecast or actual data

\* Source: data provided by GIB's technical adviser

### Appendix 2

#### Terms and Conditions: Terminology and Methodology

##### Terminology

###### *Green Investment*

“Green Investment” means an investment into a project on which GIB has made an assessment that it will, or is reasonably likely to, deliver Green Impact.

###### *Green Impact*

“Green Impact” is a collective term referring to the environmental benefits which have been calculated in accordance with GIB’s methodology to be, or to be reasonably likely to be, delivered by the project which is the subject of this Report. Green Impact includes estimated avoided greenhouse gas emissions, NO<sub>x</sub>, SO<sub>x</sub>, particulate matter and fossil fuel use. Green Impact is calculated and reported as defined metrics such as tonnes of carbon dioxide equivalent (t CO<sub>2</sub>e), tonnes of oil equivalent (toe), and kilogrammes (kg) of other air pollutant emissions.

###### *Green Impact Forecast Accuracy*

“Green Impact Forecast Accuracy” is an expression of the level of confidence that, in the opinion of GIB, 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).

##### Methodology

The Green Impact and Green Impact Forecast Accuracy assessments presented in this Report are based on GIB’s approach to assessing Green Impact using its proprietary green investment principles and policies, and have been generated using GIB’s green impact assessment model, developed by Ricardo Energy & Environment on behalf of GIB.

###### *Green Impact calculation*

GIB’s initial calculation of the Green Impact of each project is produced by comparing relevant information and data derived from that project against relevant baseline (or counterfactual) data for the assumed environmental impacts that would occur if the project did not take place, based on GIB’s proprietary reference sources or provided to GIB 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 GIB’s formal Green Impact Report.

For grid-connected projects that generate electricity, the baseline (or counterfactual) is assumed to be marginal electricity generated from the national grid in that country. GIB’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 projects*<sup>1</sup> and the *IFI approach to GHG accounting for energy efficiency projects*<sup>2</sup>.

GIB’s methodology calculates likely Green Impact on an annual and lifetime basis. The Green Impact reported is 100% of the Green Impact of the underlying project(s). There is no proportionate allocation of Green Impact to any particular project investment or to particular investors, all of whom may report the same Green Impact from the underlying project(s).

###### *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 GIB’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 governance<sup>3</sup>. The Forecast Accuracy scores for the three elements are weighted and combined to derive an overall level of Green Impact Forecast Accuracy.

###### *Project data*

GIB has relied in good faith on publicly available data and data and information made available in connection with the relevant project(s) by the original Recipient and/or relevant third parties others, and has assumed that such data and information is complete, accurate and up to date.

GIB may, at its discretion, conduct limited validation of the data and information provided by original Recipient, based on a high-level telephone interview with the client’s representative(s). GIB 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, no site-specific environmental or social due diligence has been, or is required to be, conducted by GIB, and GIB does not express any opinion on whether local site-specific environmental and/or social impact have been mitigated appropriately. GIB has not undertaken any review of any underlying project’s environmental and/or social, permitting, licencing or other compliance status.

###### *Reference data*

In preparing this Report, GIB has relied upon various sources of data and information provided to GIB by relevant third parties or obtained through public information sources, the content of which no GIB Party has verified or controls.

GIB calculates Green Impact using reference data obtained from, among others, by 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 CO<sub>2</sub> 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.

GIB’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.

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

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

3 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.

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# Green Impact Report

## Galloper Offshore Wind Farm

### Appendix 3

#### Other Assumptions, Limitations, Terms and Conditions

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