



Terraform Power Inc.

2019 Global GHG Inventory Report

APRIL 8, 2020 | REPORT | V 1.0

Disclaimer

The information, concepts and recommendations expressed in this document are based on information available at the time of the preparation of this document. Action or abstinence from acting based on the opinions and information contained in this document are the sole risk of the reader and Delphi shall have no liability for any damages or losses arising from use of the information and opinions in this document. All information is provided "as is" without any warranty or condition of any kind. The document may contain inaccuracies, omissions or typographical errors.

Confidential

This document should be treated as confidential business information and should not be shared outside of Terraform Power Inc. without the expressed written consent of Terraform Power Inc.

All rights reserved. The use of any part of this document, whether it is reproduced, stored in a retrieval system, or transmitted in any form or means (including electronic, mechanical, photographic, photocopying or recording), without the prior written permission of The Delphi Group is an infringement of copyright law.

Prepared by the Delphi Group

DELPHI.ca | 428 Gilmour St | Ottawa ON | K2P 0R8 | T +1 613.562.2005 | E info@delphi.ca

GHG Inventory Summary sheet	4
Introduction	5
Company Overview	5
Reporting Period	5
Base Year and Base Year Recalculation Policy	5
Inventory Boundaries	5
6.1 GHG Inventory Consolidation Approach	5
6.2 Organizational Boundaries	5
6.3 Operational Boundaries	6
GHG Quantification Methodology	6
GHG Inventory Results	7
8.1 GHG Emissions by Scope	7
8.2 GHG Emissions by Emission Category	7
8.3 Scope 1 and 2 GHG Emissions by Generation Type	7
8.4 Scope 1 and 2 GHG Emission Intensity	8
8.5 Biogenic CO ₂	8
8.6 GHG Emissions Claims	9
APPENDIX A - Calculation Methodologies, Emission Factors and GWPs¹⁰	
APPENDIX B - List of legal entities / facilities included in the 2019 GHG inventory	12

GHG Inventory Summary sheet

Organization Name	Terraform Power, Inc. ("TERP")
Contact Person	Khyati Thakkar, FP&A Associate kthakkar@terraform.com
Reporting Period	January 01, 2019 to December 31, 2019
Consolidation Approach	Operational control
Operations Included	A total of 571 power generation projects, including: - 16 projects for TERP Wind North America - 520 projects for TERP Solar North America - 1 project for TERP Solar UK - 1 project for TERP Solar Chile - 33 projects for Saeta, located in Portugal, Spain, and Uruguay
Operations Excluded	All project acquisitions made within the 2019 calendar year
Emission Sources Included	Stationary combustion, mobile combustion, fugitive emissions, and purchased grid electricity
Selected Base Year	2019
2019 GHG Emissions	Scope 1: 11,319 tonnes CO ₂ e Scope 2: 16,672 tonnes CO ₂ e

Introduction

This GHG inventory report is prepared for Terraform Power Inc. ("TERP"). The report has been prepared in accordance with WRI/WBCSD's Greenhouse Gas Protocol's Corporate Accounting and Reporting Standards for quantifying corporate GHG emissions ("GHG Protocol"). It includes the information required by the GHG Protocol for public reporting. The GHG emissions claims made in this report have not been 3rd-party verified.

Company Overview

TerraForm Power is an owner and operator of a best-in-class, 4,066 MW renewable power portfolio including solar and wind assets in North America and Western Europe.

Reporting Period

The GHG emissions presented in this report are for the 2019 calendar year (i.e. occurring between the period of January 1, 2019 and December 31, 2019).

Base Year and Base Year Recalculation Policy

TERP has selected 2019 as the base year for the company's GHG inventory. TERP will be establishing a base year recalculation policy used to recalculate base year emissions in future years accordingly.

Inventory Boundaries

6.1 GHG Inventory Consolidation Approach

TERP has selected the Operational Control approach for consolidating its organizational and operational boundaries.

6.2 Organizational Boundaries

The following operations fall within TERP's 2019 GHG organizational boundary¹:

- 16 projects for TERP Wind North America
- 520 projects for TERP Solar North America
- 1 project for TERP Solar UK

¹ All project acquisitions made within the 2019 calendar year are not included in the 2019 GHG quantification.

- 1 project for TERP Solar Chile
- 33 projects for Saeta, located in Portugal, Spain, and Uruguay.

The list of facilities included in the 2019 GHG inventory, as well relevant information on facility type, installed capacity and 2019 generation can be found in Appendix B.

6.3 Operational Boundaries

The GHG Protocol requires the reporting of scope 1 and 2 emissions sources. Scope 3 emissions sources are indirect emissions that occur in the value chain of the reporting company, including both upstream and downstream emissions. TERP has included scope 1 and scope 2 emissions in 2019 per the requirements of the GHG Protocol. The following scope 1 and 2 emission sources were included in the GHG inventory:

- combustion of natural gas for one TERP wind project and five Saeta CSP projects
- on-site combustion of diesel and propane
- combustion of gasoline, diesel, and propane in transport fleets
- SF6 emissions for two Saeta wind Spain projects
- grid electricity consumption.

GHG Quantification Methodology

The methods used are consistent with the GHG Protocol. Information on the calculation methodologies, emission factors and GWPs used can be found in Appendix A.

GHG Inventory Results

8.1 GHG Emissions by Scope

Emissions Scope	GHG Emissions (Metric Tonnes CO ₂ e)	% of Total BEP Emissions
Scope 1	11,319	40%
Scope 2	16,672	60%
Total	27,991	100%

8.2 GHG Emissions by Emission Category

Emissions Category	GHG Emissions (Metric Tonnes CO ₂ e)	% of Total Emissions
Mobile Combustion	748	3%
Stationary Combustion	10,450	37 %
Fugitive Emissions	120	0.4%
Electricity Consumption	16,672	60%
Total	27,991	100%

8.3 Scope 1 and 2 GHG Emissions by Generation Type

Generation Type	Scope 1 and 2 GHG Emissions (Metric Tonnes CO ₂ e)
Wind	5,827
Solar	2,927
CSP	19,236

8.4 Scope 1 and 2 GHG Emission Intensity

Generation Type	Scope 1 and 2 GHG Emissions (Metric Tonnes CO ₂ e)	Generation (GWh)	Scope 1 and 2 GHG Emissions Intensity (kg CO ₂ e/MWh)
TERP Wind- NA	3,804	4,907	0.78
TERP Solar NA	2,209	1,529	1.45
TERP Solar Chile	687	258	2.67
TERP Solar UK	32	11	2.97
Saeta Wind - Spain	1,806	1,076	1.68
Saeta - CSP	19,228	693	27.77
Saeta - Solar	9	9	1.02
Saeta Wind - Uruguay	5	356	0.01
Saeta Wind - Portugal	213	328	0.65
TERP+Saeta Overall	27,991	9,165	3.05

8.5 Biogenic² CO₂

Biogenic CO ₂ Emissions (Metric Tonnes)	
Biogenic CO ₂	-

² Biogenic CO₂ refers to direct CO₂ emissions from biologically sequestered carbon (e.g. from burning biomass/biofuels). As per the GHG protocol standard, biogenic CO₂ emissions are to be reported separately and not included under scope 1 emissions.

8.6 GHG Emissions Claims

The following is a summary of the GHG-related claims made in this GHG Inventory report:

Total Scope 1 and GHG emissions for the 2019 calendar year (January 1, 2019 to December 31, 2019), within the organizational and operational boundaries described in this report, are **27,991 tonnes CO₂e**:

- Total Scope 1 emissions are **11,319 tonnes CO₂e**.
- Total Scope 2 (location-based) emissions are **16,672 tonnes CO₂e**.

This quantification has been completed by the Delphi Group and is not third-party verified

APPENDIX A - Calculation Methodologies, Emission Factors and GWPs

The quantification methods used are primarily based on an emission factor approach, which applies a standard equation of activity level data (such as energy consumption in kWh or m³) multiplied by an appropriate GHG emission factor for each emission source within the GHG inventory boundary. Results of these calculations are then multiplied by appropriate global warming potentials (GWP) to express results in CO₂e units. The tables below present the calculation methodologies, sources for emission factors, and GWPs used in the quantification of GHGs.

Calculation Methodologies

Emission Source	Calculation methodology
Stationary Fuel Combustion	$E = Quantity_{Fuel} \times EF_{Fuel, combustion\ technology}$ Where $Quantity_{Fuel}$ is fuel consumed, measured in mass, volume or energy units, $EF_{Fuel, combustion\ technology}$ is the emission factor specific to the fuel type and the combustion technology, in units corresponding to the quantity of fuel.
Mobile Combustion	$E = Quantity_{Fuel} \times EF_{Fuel, mobile\ combustion}$ Where $Quantity_{Fuel}$ is fuel consumed, measured in mass, volume or energy, $EF_{Fuel, mobile\ combustion}$ is the emission factor specific to the fuel type and type of mobile combustion, in units corresponding to the quantity of fuel.
Fugitive Emissions	$E = Quantity_{fugitive\ gas}$ Where $Quantity_{fugitive\ gas}$ is the quantity of fugitive greenhouse gas that is released, measured in mass units.
Electricity consumption	$E = Electricity\ consumption \times EF_{grid}$ Where $Electricity\ consumption$ is the quantity of electricity (in kWh, MWh, etc.) that is purchased from the grid for consumption at BEP's facilities/offices. EF_{grid} is the grid emission intensity factor for grid electricity generation in the region.

Emission Factors

The references for the emissions factors used in the quantifications are presented in the table below³.

Emission Factor	Region	CO2 eq	Units	Reference	Source
Stationary Combustion					
Natural gas	ALL	54.5	g/scf	USEPA, 2018	https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_o.pdf
Propane	ALL	5741.7	g/gallon		
Diesel	ALL	2803.5	g/L	ECCC NIR, 2019	Environment and Climate Change Canada (ECCC) 2019 National Inventory Report 1990-2017: Greenhouse Gas Sources and Sinks in Canada, Part 2, Table A6-4
Mobile Combustion					
Gasoline	ALL	2485.8	g/L	ECCC NIR, 2019	Environment and Climate Change Canada (ECCC) 2019 National Inventory Report 1990-2017: Greenhouse Gas Sources and Sinks in Canada, Part 2, Table A6-13.
Diesel	ALL	2745.3	g/L		
Propane	ALL	1556.9	g/L		
Grid Electricity Generation					
Spain	Spain	288	g/kWh	IEA, 2019	International Energy Agency Electricity Database purchased by Brookfield Renewable.
Portugal	Portugal	359	g/kWh		
Uruguay	Uruguay	14	g/kWh		
Chile	Chile	435	g/kWh		
UK	UK	0.2556	kg/kWh	DEFRA, 2019	https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2019 . Tab "UK electricity".
Canada-ON	ON	17	g/kWh	ECCC NIR, 2019	Environment and Climate Change Canada (ECCC) 2019 National Inventory Report 1990-2017: Greenhouse Gas Sources and Sinks in Canada, Part 3, Table A13-7.
US-All	US	952.9	lb/MWh	eGRID, 2020	https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid
US-AZNM	AZNM	1027.5	lb/MWh		
US-CAMX	CAMX	498.7	lb/MWh		
US-ERCT	ERCT	936.1	lb/MWh		
US-HIMS	HIMS	1119.1	lb/MWh		
US-HIOA	HIOA	1682.6	lb/MWh		
US-MROW	MROW	1249.2	lb/MWh		
US-NEWE	NEWE	527.6	lb/MWh		
US-NWPP	NWPP	643.4	lb/MWh		
US-NYUP	NYUP	253.9	lb/MWh		
US-SRMW	SRMW	1676.8	lb/MWh		

³ Detailed information on GHG emission factors used can be found in the 2019 GHG calculator.

Global Warming Potentials (GWPs)

The global warming potentials (GWPs) used in the calculations are presented in the table below.

Reference: IPCC Fourth Assessment Report (2008), 100-year timeframe

Emissions Scope	Global Warming Potential
CO ₂	1
CH ₄	25
N ₂ O	298
SF ₆	22,800

APPENDIX B - List of legal entities / facilities included in the 2019 GHG inventory

TERP Wind North America (16 projects, total 2019 power generation: 4,898 GWh)

Country	Facility	Project ID	State	Type	Capacity (MW)
USA	Bishop Hill	IL-15-0044	IL	Wind	217.7
USA	Bull Hill	ME-15-0009	ME	Wind	34.2
USA	California Ridge	IL-15-0045	IL	Wind	226.46
USA	Cohocton	NY-15-0171	NY	Wind	125
USA	Mars Hill	ME-15-0010	ME	Wind	42
USA	Kahuku	HI-15-0048	HI	Wind	30
USA	KWP II	HI-15-0047	HI	Wind	21
USA	KWP I	HI-15-0046	HI	Wind	30
USA	Prairie Breeze	NE-15-0003	NE	Wind	200
USA	Rattlesnake	TX-15-0044	TX	Wind	207
USA	Rollins	ME-15-0011	ME	Wind	60
USA	Sheffield	VT-15-0028	VT	Wind	40
USA	South Plains I	TX-14-0113	TX	Wind	200

Country	Facility	Project ID	State	Type	Capacity (MW)
USA	Steel Winds I and II	NY-16-0062	NY	Wind	35
USA	Stetson	ME-15-0012	ME	Wind	82.5
Canada	Raleigh	ON-15-0095	Ontario	Wind	78

- TERP Solar North America (520 projects, total 2019 power generation: 1,529 GWh). A full list of projects can be found on Tab "2-0. Asset List" of the 2019 TERP GHG Inventory Calculator.
- TERP Solar UK (1 project, 2019 power generation: 10.6 GWh).

Country	Facility	Project ID	Type	Capacity (MW)
UK	GB- Norrington	GB-14-0013	Solar	11.2

- TERP Solar Chile (1 project, 2019 power generation: 257.5 GWh)

Country	Facility	Project ID	Type	Capacity (MW)
Chile	CAP I	CL-12-0023	Solar	101.6

- Saeta (33 projects, 2019 power generation: 2461.4 GWh)

Country	Facility	Location	Type	Capacity (MW)
Spain	Seron 1	Almeria	Wind	50
Spain	Seron 2	Almeria	Wind	10
Spain	Tijola	Almeria	Wind	36.8
Spain	Colmenar 2	Almeria	Wind	30
Spain	La Noguera	Almeria	Wind	29.9
Spain	Las Vegas	Cadiz	Wind	23

Country	Facility	Location	Type	Capacity (MW)
Spain	Los Isletes	Cadiz	Wind	25.3
Spain	Abuela Santa Ana	Albacete	Wind	49.5
Spain	Santa Catalina Cerro Negro	Valencia	Wind	41.5
Spain	Viudo I	Valencia	Wind	40
Spain	Viudo II	Valencia	Wind	26
Spain	La Caldera	Burgos	Wind	22.5
Spain	Sierra de las Carbás	Zamora	Wind	40
Spain	Tesosanto	Salamanca	Wind	50
Spain	Monte Gordo	Huelva	Wind	48
Spain	Valcaire	Granada	Wind	16
Spain	Extresol 1	Badajoz	CSP	49.9
Spain	Extresol 2	Badajoz	CSP	49.9
Spain	Extresol 3	Badajoz	CSP	49.9
Spain	Manchasol 2	Ciudad Real	CSP	49.9
Spain	Casablanca	Badajoz	CSP	49.9
Spain	Mar	Andalucia	CSP	4.415
Uruguay	Carape I	Maldonado	Wind	52.275
Uruguay	Carape II	Maldonado	Wind	43.05
Portugal	Penamacor 1	Penamacor	Wind	20
Portugal	Penamacor 2	Penamacor	Wind	20
Portugal	Penamacor 3A	Penamacor	Wind	14.7
Portugal	Penamacor 3B	Penamacor	Wind	25.2
Portugal	Penamacor 3B Ext1	Penamacor	Wind	14.7
Portugal	Penamacor 3B Ext 2	Penamacor	Wind	8
Portugal	Sabugal	Sabugal	Wind	25.2
Portugal	Sabugal Ext1	Sabugal	Wind	4
Portugal	Sabugal Ext2	Sabugal	Wind	12