GHG Inventory

Quantification and reporting of greenhouse gas emissions in accordance with the Corporate GHG Protocol

16th April 2021

INDICE

INTRODUCTION

The purpose of this document is to analyse and report on the Greenhouse Gas (GHG) emissions produced by the Enel Group's activities, relating to the generation and distribution of electricity and the sale of electricity and gas.

The reporting of emissions is carried out in accordance with the international Greenhouse Gas Protocol – published by the World Business Council for Sustainable Development and World Resource Institute – and with the GRI standard (Global Reporting Initiative), and has been made public as part of Enel's Sustainability Report, which constitutes the consolidated non-financial Declaration (www.enel.com/investors/sustainability).

On the path to complete decarbonisation by 2050, Enel has provided a roadmap with medium-term objectives, certified by the Science Based Targets initiative (SBTi), with an expected 80% reduction in direct greenhouse gas emissions per kWh by 2030 compared to 2017 levels. It has also undertaken to reduce its indirect emissions associated with the sale of natural gas on the retail market by 16% by 2030, compared to 2017 data.

For the sake of transparency, Enel has responded to the CDP (former Carbon Disclosure Project) for several years and was placed on the 2020 A List.

BOUNDARIES AND CALCULATION METHODS

Organisational boundaries

Direct and indirect greenhouse gas emissions are reported based on the Group's financial consolidation scope. For the list of Companies included in the inventory, please refer to the list in Annex 1. Environmental data is collected for thermoelectric, renewable and nuclear plants, for photovoltaic panel production plants, for all distribution activities and for the Enel sites in its countries of operation.
The data is consolidated for the various activities at 100% of their value, regardless of Enel's percentage of ownership, except for the nuclear sector for which data is reported based on criteria in proportion to ownership.

Operating boundaries

Listed below are the GHG emission sources broken down into 1,2 and 3 scopes:

Scope 1

- combustion of fossil fuels in electricity generation activities;
- combustion of fossil fuels in generators used for electricity generation and distribution activities;
- combustion of fossil fuels in vehicles under the Company's control;
- SF_6 losses in electricity generation and distribution activities;
- HFCs gas losses from cooling systems;
- NF_3 losses from the production of solar panels;
- combustion of fuels for heating offices and canteens.

Scope 2

- consumption of electricity purchased by the network for civil use (electronic equipment, heating, lighting) or for electricity generation in thermoelectric and hydroelectric plants and for distribution. Since 2016, all supplies of electricity for the offices and Italian generation sites come from renewable sources. This supply includes the issue of green certificates by the competent authority.
- dissipation of energy from network losses relating to non-owned transmission systems and distribution losses from the network under the Enel's operational control (Joule effect).

Scope 3

Listed below are the sources in question divided into the categories of the GHG Protocol:

- Category 3. Fuels and energy-related activities (not included in Scope 1 and 2): fugitive emissions during the mining of coal used in thermoelectric power plants;
- Category 4. Transportation and distribution upstream of the energy generation: coal transportation by land and sea, transportation of fuels, raw materials and waste on wheels;
- Category 11. Use of sold goods: emissions due to the use in retail of electricity and gas by end customers.

Reference year and base year

This report refers to the GHG analysis and quantification for the calendar year 2020. The base year, which is used to monitor emission performance, is 2017.

Enel aims to reduce CO_2 emissions (Scope 1) by 80% by 2030 from the base year 2017, certificated Science Based Target Initiative, per kWh in line with the Group's strategy which plans to increase capacity from renewable sources and gradually phase out coal-fired plants, enabling an increase in zero-emission generation. With this mind, the CO_2eq emissions in the base year are not recalculated. With reference to the GHG inventory, the value of the emissions will be recalculated in the future, when necessary, for changes in assets for sale as indicated in the GHG protocol.

Enel has set a further goal, certified by SBTi, to achieve a 16% reduction in absolute indirect emissions associated with the consumption of gas by end customers by 2030 compared to the base year 2017 (Scope 3, category 11).

Inventory recalculation in the reference year

Following the exit from the boundary of financial consolidation of the Russian coal-fired thermoelectric power plant of Reftinskaya for sale on 1 October 2019, the greenhouse gas emissions for the year 2017 were recalculated, in line with the reference methodology, without the presence of the activity of this plant. The 2017 values reported in the Sustainability Report, as already descrived above, instead take into account the full scope of Enel's business in the base year.

Calculation method

Environmental data for the generation and distribution of electricity is collected on an annual basis in an internal database called EDEN (Enel Data on Environment). The data was entered for technology directly from the various organisational levels responsible for the data (plant or country). As soon as any data is entered it undergoes formal controls and consistency assessments and subsequent series of validations.
The Group's GHG emissions are calculated centrally, except for CO_2 emissions from thermoelectric generation, which are collected directly from plants and submitted annually for certification by the relevant bodies by country (for Italy, Spain and Portugal, verified emissions are registered in the European Union registry which includes all countries participating in the EU ETS).

The fuel emission factors used for calculations are those required by the IPCC guidelines (Intergovernmental Panel on Climate Change): 2006 IPCC Guidelines for National Greenhouse Gas Inventories https://www.ipcc-nggip.iges.or.jp/public/2006gl/

The GWP figures (Global Warming Potential) refer to the 'Global Warming Potential values' document of the GHG Protocol, Fifth Assessment Report (AR5 – 100 year) https://www.ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf

The CO_2 specific emissions are a component of the calculation of the energy emissions from the network calculated on the basis of the national production mix and the energy dissipated due to technical network losses. The calculation is carried out by multiplying the country-specific emission factors by the quantity of energy withdrawn / dissipated in the country and adding all the contributions. A similar calculation is made for scope 3 emissions, use of electricity by end users, for the portion of the sold electricity that exceeds the energy produced in the country by Enel, whose emissions are already accounted for in scope 1.

The country-specific emissions, expressed in CO_2/kWh, used in the calculations of Scope 2 and Scope 3 are taken from the Enerdata provider, which reports the best estimates/updates on the current figures for the previous year (-1). Where this is not available, the specific emission for year (-2) is considered valid.

Qualitative estimation of uncertainty

Scope 1

Emissions from thermal, coal, oil, gas and combined cycle plants account for over 99% of the value for Scope 1. The plants are located in Europe (Italy, Spain, Portugal), in Russia and South America (Argentina, Brazil, Chile, Colombia and Peru). 53% of direct CO_2 emissions from thermoelectric generation is subject to the Emission Trading EU ETS Directives and over 91% of these emissions come from Class C plants (emissions over 500,000 t CO_2 per year, Commission Regulation (EU) No. 601/2012).

The CO_2eq emissions for the generation of CH_4 and N_2O are calculated based on the fuels in the EDEN database on annual base. The fuel amounts used in power plants are subject to metrological checks also for billing purposes.

For the other CO_2 emission values (losses and refills of refrigerant gases and SF_6) the basis for calculation is the data put into EDEN using the IPCC emission factors (Fifth Assessment Report (AR5 - 100 year) and GWP of the GHG Protocol.

Scope 2

To calculate the energy taken from the network or from energy dissipation due to distribution network and transmission system losses, the level of uncertainty is key (fiscal measuring device).

The technical network losses, due to the heat generated by the passage of electric current in a conductor (Joule effect), are not calculated by means of an energy balance mechanism as is the case for total losses (technical and commercial) but with recognized standards with minimum degree of uncertainty.

Measures are also implemented to manage / decrease the associated uncertainty through periodic internal reviews of the process of managing business data and the results obtained.

The application of these considerations allows to minimize the error associated with the calculation of direct and indirect emissions.

Scope 3

Calculations related to the extraction and transport of coal and those relating to the transport of fuels, raw materials and waste are based on assumptions constructed with the use of all the possible relevant information. The details of the assumptions are reported annually in the notes of the

numerical annex of the Environmental Sustainability of the Sustainability Report. This approach was selected in consideration of the high number of plants and countries in which Enel operates.

The calculation of the emissions deriving from the use of electricity and gas sold by Enel in the retail market is quantified on the basis of Enel's certified sales values, the uncertainty of which is instrumental (tax counters). IPCC factors are used in the calculations (2006 IPCC Guidelines for National Greenhouse Gas Inventories, Table 1.4, page 1.24).

RESULTS

Scope 1 Emissions

In 2020, direct emissions (Scope 1) amount to 45,255,000 tCO_{2eq}.

The share of emissions from the thermal power generation sector amounted to 44,670,284 tCO_2 and accounts for more than 99% of the total value of Scope 1.

		2020	2017
CO_2 emissions from electricity generation and heat	(Mt)	**44.70**	**85.52**

The significant decrease in the value of CO2 emissions from thermoelectric sources compared to the base year is mainly due to the lower production from coal (-75%) vs 2017 compared to an overall decrease for the same perimeter of thermoelectric production equal to 38% in three years.

The indicators relating to the Group's specific CO2 emissions are as follows:

- The ratio between total emissions from thermoelectric plants, which is undergoing the verification, and the Group's total production including heat (expressed in energy units).

For 2020, this ratio amounts to 211 g/kWh.

- The ratio between total emissions from scope1, which is undergoing the verification, and the Group's total production including heat (expressed in energy units).

For 2020, this ratio amounts to 214 g/kWh.

Scope 1 also includes the CO_2 emissions generated during the petrol and diesel combustion process in the engines of vehicle controlled by the Company and by the combustion of diesel in generators used in energy generation technologies, as well as in electricity distribution activities. The combustion processes from fossil fuels also include the generation of **N_2O** (GWP=265) and **CH_4** (GWP=28) expressed as a CO_2 equivalent. For 2020, the sum of the two components totalled 114,805 tCO_{2eq}

Other direct CO_2 equivalent emissions originated from the **leakage to the atmosphere of SF_6** (GWP=23,500), which occurs mainly within the scope of electricity Distribution and, secondarily in energy power plants. The quantities released to the atmosphere in 2020for the entire scope of the Group amount to 6,656 kg and 156,418 tCO_{2eq}, of which Distribution accounts for 84%. As regards Scope 1, Enel considers the emissions of leakage to the atmosphere of gases and refrigerant gas mixtures calculated by applying the average GWP value of the gas. The emissions of these substances in 2020 correspond to 71,153$tCO_{2eq.}$

As of 2020, reporting also covered emissions from **NF_3** losses amounting to 10t CO_{2eq} in the year for the production of photovoltaic panels.

Scope 2 emissions

Scope 2 emissions relate to indirect emissions deriving from the generation of electricity purchased and consumed by the Company. Scope 2 includes the CO_2 emissions associated with **electricity consumption** taken from the network for civil use or for energy generation in thermoelectric and hydroelectric plants. Since 2016, all supplies of electricity for the offices and Italian generation sites come from renewable sources. This supply includes the issue of green certificates by the competent authority. In 2020, a volume of energy equal 170.859 GWh had supply green certificates for supplies for offices. The calculation of Scope 2 for the consumption of energy taken from the network is shown with a double view: location-based amounting to 1.430 $MtCO_{2eq}$, and market-based calculated using the residual mix values for Europe, amounting to 2.285 $MtCO_{2eq}$ (the market-based calculation did not take into account the Italian share for supplies from renewable sources).

		2020	2017
Emissions from energy acquired by the network (Scope 2, location based)	(Mteq)	**1.430**	**1.498**
Emissions from energy acquired by the network (Scope 2, market based)	(Mteq)	**2.285**	**2.194**

The market based scope 2 shows a greater increase between the two years compared to the location based for the increase in the country-specific emissions of the residual mix in 2020 compared to 2017.

In compliance with the GHG protocol directives, this category includes **indirect emissions deriving from dissipated energy emissions from technical losses from Enel's distribution network** and from the transmission system, calculated for all countries of operation. With its business, the Group covers the entire generation and sales chain in Europe (Italy and Spain) and in five Latin American countries (Argentina, Brazil, Colombia, Chile and Peru). To calculate emissions, it has been assumed that the vertical chain of activities takes place within the country. The emissions caused by the losses were calculated based on the part of energy that exceeds the share produced in the country in question, so as to avoid any double counting of emissions already included in Scope 1. The calculation of Scope 2 for the consumption of energy taken from the network is shown with a double view: location-based amounting to 3.561$MtCO_{2eq}$, and market-based calculated using the residual mix values for Europe, amounting to 5.571 $MtCO_{2eq.}$

		2020	2017
Emissions from technical losses on the distribution network (Scope2, location based)	(Mteq)	**3.561**	**3.505**
Emissions from technical losses on the distribution network (Scope2, market based)	(Mteq)	**5.571**	**5.017**

Scope 3 emissions

Scope 3 emissions are generated as a consequence of Company activities and do not derive from controlled or owned sources. These indirect emissions concern Enel's entire value chain, from generation and transportation through to the sale of energy.

Electricity generation activities: CO_2eq emissions resulting from the energy generation of thermal plants have been estimated for all countries of operation, with a particular focus on coal-fired generation.

The emissions fall into the following Scope 3 categories of the GHG Protocol:

Category 3. Fuel and energy related activities (not included in scope 1 or 2)

In this group, the fugitive methane emissions from coal during the mining stage has been estimated for the amount used by coal-fired power plants over the year reported as CO_2eq (GWP = 28).

		2020	2017
Coal mining	(Mteq)	1.061	3.816

The decrease in value in 2020 compared to 2017 is due to the lower use of coal due to the reduction in coal thermal production.

Category 4. Upstream transportation and distribution

This category includes the reporting of emissions due to the transportation of used fuels (coal, diesel oil, fuel oil, biomass), consumables (e.g. chemical compounds) for the operation of plants and the transportation of waste. For coal, the share of emissions relating to transportation by sea (ship) has been calculated; trucks were taken into account for other transportation. For all calculations, basic assumptions were made regarding the length of the trip, the emissions of the mode of transport used and its frequency. From 2020 the calculation of the emissions related to the transport by ship is based on the real transport of the fossil fuel.

		2020	2017
Coal transportation by sea	(Mteq)	0.104	0.805
Coal transportation by train	(Mteq)	0	0

The decrease in values in 2020 compared to 2017 is due to the lower coal and thermoelectric production which led to a lower use of fuels and raw materials, with a lower production of waste.

Electricity and gas market activities: the emissions deriving from the use of electricity and gas by end customers in the retail market were calculated.

Category 11- Use of the sold products

Calculation is provided for the emissions relating to the gas and electricity market in Europe and the electricity market in Europe and Latin America generated during the final phase of use of the products sold to end customers.

Retail gas market: Enel operates in this market in Europe (Italy, Spain and Romania). The emission value resulting from the combustion of natural gas is calculated based on the energy value (TWh) of gas sold, multiplied by its emission factor (source: IPCC for CO_2, N_2O and CH_4).

Retail electricity market: With its business, Enel covers the entire generation and sales chain in Europe (Italy and Spain) and in five Latin American countries (Argentina, Brazil, Colombia, Chile and Peru). To calculate emissions, it has been assumed – as already described for emissions from network losses under Scope 2 – that the vertical chain of activities takes place within the same country. The emissions of the share sold and produced by the company have not been included in the calculation since they already fall under Scope 1. The share for the fraction sold but not produced by country was calculated by multiplying the energy amount by the specific country-level emission (source: Enerdata). Emissions from network losses are not included in the calculation since they are reported under Scope 2.

		2020	2017
Use of products sold by end users: electricity market	(Mteq)	25,041	25,460
Use of products sold by end users: gas market	(Mteq)	21,483	25,290

Exclusions

This reporting was based on a materiality criterion, with the following exceptions:

- Companies belonging to the business line of Enel X
- The calculation of the Scope 1 emissions of biogenic carbon emissions from the decomposition of organic matter in hydro-electric dams
- The calculation of the Scope 3 emissions relating to lignite (which became marginal after leaving the scope of Slovak plants in 2016)

The GHG inventory statements for 2020 were audited by DNV GL, with a reasonable level of certainty for Scope 1, Scope 2 and Scope 3 emissions, limited to the sale of natural gas, and with a limited level of certainty for the other Scope 3 emissions included in the inventory's scope of application. The audit was conducted according to Standard ISO 4064-3 for the compliance of Greenhouse Gas (GHG) Inventories with the WBCSD/WRI Corporate accounting and Reporting Standard (GHG Protocol). This activity also included an analysis of GHG emissions for the base year 2017 due to a change in the boundary for the exit for sale of a coal-fired thermoelectric asset in Russia.

DNV

VERIFICATION STATEMENT

Statement No:
10000456232-Assessment
Services-ACCREDIA-ITA

First Issuance Date:
16 April 2021

Statement Validity:
16 April 2021 – 15 April 2022

DNV Business Assurance has verified, in accordance with the Standard ISO 14064-3, the Greenhouse Gas (hereinafter "GHG") emissions of the organization

ENEL SpA

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reported in the GHG inventory descriptive document entitled "Quantificazione e rendicontazione delle emissioni di gas a effetto serra secondo lo standard corporativo 'The Greenhouse Gas Protocol' del anno 2020" (hereinafter "the GHG Inventory Report") issued the 15 April 2021 by ENEL SpA using a financial control consolidation approach and relative to the direct and the indirect activities below reported carried out worldwide by the Group companies described in the aforementioned GHG Inventory Report.

Based on our verification process procedures, DNV GL states that:
- the aforementioned GHG Inventory Report has been issued by ENEL SpA in compliance with the revised edition of "The Greenhouse Gas Protocol" corporate standard. The report covers the reporting period from the 1 January 2020 to 31 December 2020 with the following results (values rounded to tons):

GHGs (tons CO_{2-eq})	2020							2017
	CO_2	CH_4	N_2O	NF_3	SF_6	HFCs	TOTAL	BASELINE
DIRECT EMISSIONS (SCOPE1)	44,561,758	24,571	101,089	18	156,418	71,153	45,255,000	86,156,850
From Electricity Power Generation	44,731,697	23,934	96,815	---	24,964	9,628	44,886,928	85,918,515
From Electricity Distribution	15,404	18	1,588	---	131,863	0	148,873	160,292
From Services	102,312	618	2,880	---	---	61,625	267,230	88,052
From Other Activities	12,345	6	6	18	0	0	12,367	0
ENERGY INDIRECT EMISSIONS LOC (SCOPE2)	---	---	---	---	---	---	4,990,685	5,003,304
From electricity purchased from the grid (location based)	---	---	---	---	---	---	1,430,881	1,497,912
From grid trasmission & distribution losses (location based)	---	---	---	---	---	---	3,560,804	3,505,392
ENERGY INDIRECT EMISSIONS MKT (SCOPE2)	---	---	---	---	---	---	7,855,954	7,200,693
From electricity purchased from the grid (market based)	---	---	---	---	---	---	2,284,890	2,194,024
From grid trasmission & distribution losses (market based)	---	---	---	---	---	---	5,571,064	5,006,669
OTHER INDIRECT EMISSIONS (SCOPE3)	46,615,125	1,070,832	11,690				47,701,647	55,397,102
Cat.3 Fuel and Energy related activities	---	1,061,268	---	---	---	---	1,061,268	3,015,630
Cat.4 Upstream transportation and distribution	115,519	---	---	---	---	---	115,519	831,265
Cat.11 electricity sold in the retail market	25,041,014	---	---	---	---	---	25,041,014	25,460,116
Cat.11 natural gas sold in the retail market	21,462,592	9,564	11,690	---	---	---	21,483,846	25,289,089
TOTAL EMISSIONS (Location Based)	---	---	---	---	---	---	97,947,332	146,557,265
TOTAL EMISSIONS (Market Based)	---	---	---	---	---	---	100,812,601	148,754,654

- Scope 1 and Scope 2 emissions and Scope 3 emission associated to use of natural gas sold in the retail market provide, in our opinion and with the qualification listed in the annex of this Statement, a balanced representation of GHG emissions associated to the reported activities of the organisation in the reporting period.
- with regards to the Scope 3 emissions not associated to use of natural gas sold in the retail market, nothing has come to our attention showing that what reported by the organization is not a balanced representation of GHG emissions associated to the reported activities carried out by third parties in the reporting period

Place and date:
Vimercate 16 April 2021

For the issuing DNV GL office:
DNV GL – Business Assurance

Zeno Beltrami
Management Representative

Lack of fulfillness with the conditions laid down in the certification contract may render this certificate not valid
DNV GL Business Assurance Italia S.r.l. - Via Energy Park, 14 - 20871 Vimercate (MB) - Italy – Tel. 039.68 99 905 – www.dnvgl.com/it

Annex

List of Companies within the scope of the inventory

Note: Group companies with thermoelectric, nuclear and renewable energy production plants, photovoltaic panels production, and offices in the countries of operational presence relating to energy production and distribution activities fall within the perimeter.

Central Dock Sud
Condensa
Edesur
e-distribuzione
Emgesa
Endesa
Enel Cien
Enel Distribución Ceará
Enel Distribución Chile
Enel Distribución Goias
Enel Distribución Perú
Enel Distribución Río
Enel Distribución Sao Paulo
Enel Distributie Banat
Enel Distributie Dobrogea
Enel Distributie Muntenia
Enel Generación Costanera
Enel Generación Chile
Enel Generación El Chocon
Enel Generación Fortaleza
Enel Generación Perú
Enel Generación Piura
Enel Green Power Brasil partecipacoes Ltda
Enel Green Power Cachoeira Dourada
Enel Green Power Chile Ltda
Enel Green Power Costa Rica
Enel Green Power Espana
Enel Green Power Guatemala
Enel Green Power Hellas
Enel Green Power India Privated Limited
Enel Green Power Mexico S de RL de CV
Enel Green Power North America Development LCC
Enel Green Power Panama
Enel Green Power Romania
Enel Green Power RSA (Pty)
Enel Green Power SpA
Enel Green Power Volta Grande
Enel Produzione IT
Enel Servizi