
# SBTi's annual report

Year 2022

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# 1. Target description.

Parmacotto is a leading Brand in the “Italian food” arena and identifies our Group, whose core business is the production and marketing of high-quality typical products that belong to the Italian tradition. The commitment to being sustainable and to creating value over time is in our Group’s DNA, as is the commitment to society, to our personnel, to the consumers of our products and to our business partners.
Parmacotto was founded in 1978 in Parma, the epicenter of Italian charcuterie, and specializes in high-end production of cooked hams at its production plant in San Vitale Baganza.
In 2010 the site in Marano was opened; it is not only the management headquarters but also a production plant where slicing operations are performed and logistic processes are managed.
In 2019 Parmacotto acquired Salumi Boschi Fratelli, whereby its range of products has been enriched with dry-cured ones.
Boschi F.lli comprises two production plants; one is in Felino (PR) and specializes in dry-cured meats, such as salame, coppa, pancetta; the other is in Palanzano (PR) and produces top-quality dry-cured hams.
Therefore, the Group has four production plants in Italy, which analyzed to measure its carbon footprint. The four plants under analysis are located in Italy, specifically in the Province of Parma.
Parmacotto’s pathway towards the reduction of its emission from the four production plants will be completed through a series of actions over different time horizons, whereby the carbon baseline will be progressively reduced to zero.
We have joined the Science Based Targets initiative since January 2022, embracing the commitment to curbing global temperature rise to below one degree and a half by 20230.
For Parmacotto, pursuing that target means the commitment to reducing its Scope 1 and Scope 2 emissions by 50% vs. 2018 (the baseline year) by 2030 and to start a study project to reduce Scope 3 emissions.
On top of that, Parmacotto has set itself an even more ambitious target. Indeed, the first step on its roadmap is to reduce scope 1 and scope 2 emissions to zero by 2026, orchestrating the related tasks along many action lines, including energy efficiency and the use of renewable energy sources.

## 2. Target progress

For each production plant, all scope 1 and scope 2 emissions from 2018 to 2022 were thoroughly analyzed.
Concomitantly, scope 3 emissions were measured in order to have a baseline, from which an exhaustive study can be started to identify the possible abatement actions to be deployed in the coming years for this type of emissions.

For ***scope 1*** emissions, the following figures were calculated for each production plant:

- Gas/LPG;
- Fugitive emissions of fluorinated gases (F-gases);
- Fugitive emissions from fire extinguisher systems;

On the other hand, for:

- Company fleet consumption:

Was measured primarily for each one of the Parmacotto S.p.A. and Salumi Fratelli Boschi S.p.a. companies, and then the obtained data were aggregated into a single figure, as the motor-vehicles owned by the companies are used for internal transfers and/or are however used exclusively in business operations.

For ***scope 2*** emissions, the total electricity consumption of the four plants was calculated.

The 2018 emission baseline, which had been reported on 12 November 2021, was recalculated within the thorough recalculation made on fugitive emissions of F-gases and on the Company fleet consumption (please, see *Paragraph 3. - Substantial emission variations and changes in target*).

The 2018 Baseline is reported below as updated with the new figures of Scope 1 and Scope 2 emissions:

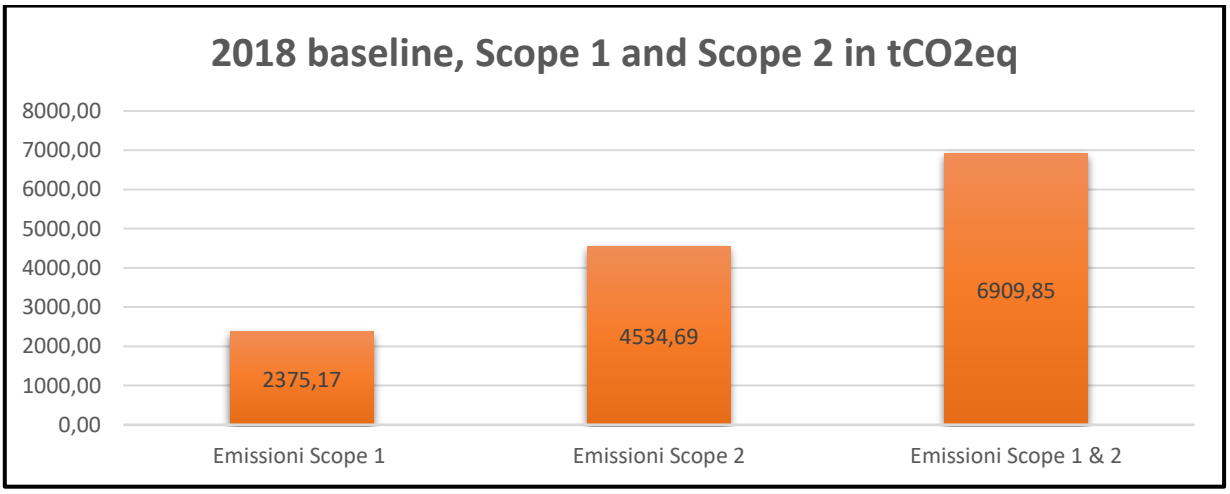


*Chart 1. 2018 baseline, Scopes1&2*

The calculation methods and the factors taken into account were applied to the years after 2018 following the same logic with specific conversion ratios by emission type and the following results were obtained in terms of tCO2eq emitted in the 2018 - 2022 period:

| tCO2eq /year | | | | | |
|---|---|---|---|---|---|
| **Emission type/Year** | **2018** | **2019** | **2020** | **2021** | **2022** |
| Scope 1 Emissions | 2375.17 | 2441.96 | 2940.55 | 2839.14 | 3377.86 |
| Scope 2 Emissions | 4534.69 | 4707.74 | 4253.52 | 4506.76 | 0.00 |
| Scopes 1 & 2 (tCO2eq) | 6909.85 | 7149.70 | 7194.07 | 7345.90 | 3377.86 |

*Table 1. Emissions in tCO2eq /year for Scopes 1&2 from 2018 to 2022*

## 2.1 Breakdown of Scope 1 emissions.

As described above, in calculating Scope 1 emissions, all four emission factors were taken into account (gas/LPG consumption; fugitive emissions of F-gases; fugitive emissions from the extinguisher system; company fleet consumption :), and the obtained results were:

| tCO2eq /year | | | | | |
|---|---|---|---|---|---|
| **Year** | **2018** | **2019** | **2020** | **2021** | **2022** |
| Scope 1 (tCO2eq) | 2375.17 | 2441.96 | 2940.55 | 2839.14 | 3377.86 |

*Table 2. Emissions in CO2 tonnes for Scopes 1&2 from 2018 to 2022*

The breakdown of this emission type shows that each plant/company has its own specific impact, which is expressed in quantitative terms as follows:

| **Plant/Year** | **2018** | **2019** | **2020** | **2021** | **2022** |
|---|---|---|---|---|---|
| Marano | 331.87 | 267.72 | 289.35 | 340.10 | 249.18 |
| S.Vitale | 1380.32 | 1383.12 | 1616.57 | 1687.73 | 1959.71 |
| Felino | 567.85 | 571.62 | 925.41 | 722.69 | 869.63 |
| Pratopiano | 55.15 | 176.56 | 66.44 | 45.07 | 221.42 |
| Company cars | 39.98 | 42.95 | 42.78 | 43.56 | 77.92 |
| Scope 1 (tCO2eq) | 2375.17 | 2441.96 | 2940.55 | 2839.14 | 3377.86 |

*Table 3. Breakdown by plant/company of Scope 1 emissions (from 2018 to 2022) in* tCO2eq

Converting these data into the % weight of the individual plants on the annual total figure, the results are:

| **Plant/Year** | **2018** | **2019** | **2020** | **2021** | **2022** |
|---|---|---|---|---|---|
| Marano | 13.97% | 10.96% | 9.84% | 11.98% | 7.38% |
| S. Vitale | 58.11% | 56.64% | 54.97% | 59.45% | 58.02% |
| Felino | 23.91% | 23.41% | 31.47% | 25.45% | 25.75% |
| Pratopiano | 2.32% | 7.23% | 2.26% | 1.59% | 6.56% |
| Company cars | 1.68% | 1.76% | 1.45% | 1.53% | 2.31% |
| **Annual total %** | **100.00%** | **100.00%** | **100.00%** | **100.00%** | **100.00%** |

*Table 4. Breakdown by plant/company of Scope 1 emissions (from 2018 to 2022) as their % weight*

Scope 1 emissions were calculated with the approach given below:

**Gas/LPG consumption**

- Gas from the national grid: the figure was calculated based on the billed monthly figures and converted into Standard Cubic Meters (SCM) equivalents, a parameter expressing the quantity of gas contained in a cubic meter of raw material at standard temperature and pressure.
- LPG: the billed monthly litres were also converted into SCM, in order to have a single unit of measurement for all the plants under analysis.

Gas and LPG are used at the various plants for the following purposes:

- *San Vitale*, mainly for steam generator boilers, to a lower extent for industrial cleaning water heating and, to a residual extent, for office area heating.
- *Marano,* mainly for industrial cleaning water heating and for office area heating.
- *Felino and Pratopiano*, for industrial cleaning and for manufacturing purposes, namely heat production in some specific manufacturing phases.

The conversion rates/year and the related source are reported in *paragraph 5 GHG emissions inventory.*

**Fugitive emissions of F-gases and Fugitive emissions from fire extinguisher systems**

Fluorinated gases (F-gases) are gases used in industrial processes and are contained in various pieces of equipment and systems, such as refrigeration and air conditioning ones. Specifically, besides being used in various industries and applications, such as refrigerating and air conditioning systems, hydrofluorocarbons (HFCs) are also used as foam blowing agents and in fire extinguishers.
Consumption of F-gases was calculated based on the log books and reports issued by the specialist firms in charge of servicing the related systems.
Fugitive emissions recorded from 2018 to 2022 were associated exclusively with refrigeration systems, as no fugitive emissions from fire extinguisher systems were detected.
Also in this case, the conversion rates/year and the related source are reported in *paragraph 5 GHG emissions inventory.*

**Company fleet**

The calculation was based on Km/Year figures for the individual motor-vehicles owned by the Company and used for intra-plant transfers or for activities at the plant. To each vehicle a specific conversion rate was applied, with the sources reported in *paragraph 5 GHG emissions inventory*

The analysis of Scope 1 emissions for each plant reported the following trends:

***Marano plant***

Every year (from 2018 to 2022) the emissions from this plant had a weight ranging between approximately 7% and 14% of the Group total.
For this plant, the emission factors comprise natural gas and fugitive emissions of F-gases.

| Emission factor/Year | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| F-Gas [tCO2eq] | 0.00% | 5.62% | 0.00% | 3.29% | 0.46% |
| NG/tCO2eq | 100.00% | 94.38% | 100.00% | 96.71% | 99.54% |
| **Annual total %** | **100.00%** | **100.00%** | **100.00%** | **100.00%** | **100.00%** |

*Table 5. Breakdown by plant of Scope 1 emissions (from 2018 to 2022) as the % weight of the Marano site*

***San Vitale plant***

Every year (from 2018 to 2022) the emissions from this plant accounted on their own for a weight ranging between approximately 58% and 59.5% of the total and showed an increasing trend over the years.
For this plant, the decisive emission factor (see table 6) is the consumption of gas from the national grid for technological purposes; this is the plant where cooked hams and all the products requiring the use of gas from the grid are produced.
This energy source is also used, albeit to a residual extent, for industrial cleaning water heating.

| Emission factor/Year | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| F-Gas [tCO2eq] | 0.00% | 0.00% | 0.00% | 8.06% | 4.85% |
| NG/tCO2eq | 100.00% | 100.00% | 100.00% | 91.94% | 95.15% |
| **Annual total %** | **100.00%** | **100.00%** | **100.00%** | **100.00%** | **100.00%** |

*Table 6.* Breakdown by plant of Scope 1 emissions (from 2018 to 2022) as the % weight of the San Vitale site

Close correlation was found between the use of gas from the grid for production purposes and the plant production growth posted in the last few years.

| SAN VITALE: PRODUCED KGs/YEAR | | | | | |
|---|---|---|---|---|---|
| **Year** | **2018** | **2019** | **2020** | **2021** | **2022** |
| Produced KGs | 6,238,460 | 6,802,539 | 7,904,897 | 7,894,827 | 7,499,138 |

*Table 7. The San Vitale plant production output in KGs from 2018 to 2022*

Indeed, analyzing, by way of example, the relationship between natural gas consumption and the product KGs in 2022 at the San Vitale plant on a monthly basis, this strong correlation is quite obvious and can be seen in the following chart:

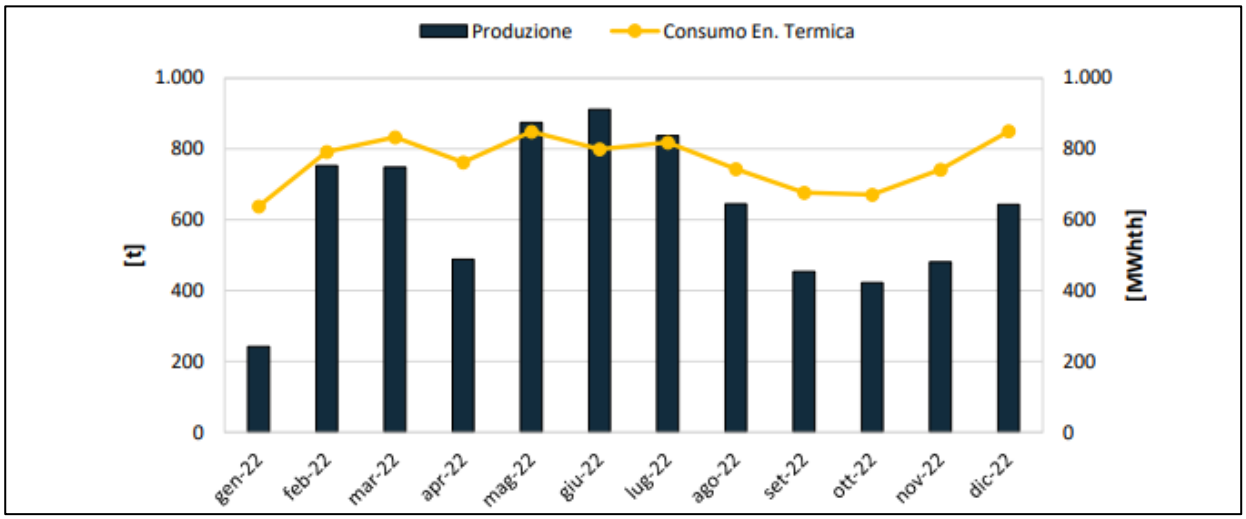


*Chart 2. Comparison between natural gas consumption in MWhth and total production output in tonnes for 2022*

**Felino and Pratopiano plants**

These two plants, which were part of an acquisition that took place in 2019, account for between 26% and 34% of the Group annual Scope 1 emissions. The highest percentages of these emissions are caused by fugitive emissions of F-gases.

| Emission factor/Year | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| F-Gas [tCO2eq] | 43.29% | 54.05% | 66.61% | 63.36% | 71.91% |
| NG/tCO2eq | 56.71% | 45.95% | 33.39% | 36.64% | 28.09% |
| **Annual total %** | **100.00%** | **100.00%** | **100.00%** | **100.00%** | **100.00%** |

*Table 8.* Breakdown by plant of Scope 1 emissions (from 2018 to 2022) as the % weight of Boschi F.lli (Felino and Pratopiano)

Those fugitive emissions are caused by problems associated with the normal time of use of the plants and with the use of gases with medium-high GWP.
In 2023 we conducted a thorough analysis of these fugitive emissions in order to start a process for the revamping of the plants concerned and retrofitting of the F-gases used.
As of 2024, compatibly with the technical features of those systems, we are going to preferably use gases with lower GWP, in order to progressively reduce the impact of these fugitive emissions thus keeping on tack in pursuing our 2026 goal. Concomitantly, the systems will also undergo structured revamping.

**Company cars**

The figure obtained is the sum of motor-vehicle fleet for business use only. As reported in table 4 above (*breakdown by plant of Scope 1 emissions from 2018 to 2022 in %*) these emissions account for annual weights ranging between 1.45% and 2.31% of the total. On the other hand, analyzing the contribution of the cars of each one of the two companies (Parmacotto and Salumi Fratelli Boschi) to that % weight, the obtained results are the following:

| Plants/Year | 2018 | 2019 | 2020 | 2021 | 2022 |
|---|---|---|---|---|---|
| Boschi F.lli | 76.35% | 65.83% | 69.68% | 66.94% | 59.93% |
| Parmacotto | 23.65% | 34.17% | 30.32% | 33.06% | 40.07% |
| **Annual total %** | **100.00%** | **100.00%** | **100.00%** | **100.00%** | **100.00%** |

*Table 9. Breakdown of emissions from Boschi and Parmacotto cars in % (from 2018 to 2022)*

## 2.2 Scope 2 emissions.

To measure ***Scope 2*** emissions, all electricity consumption figures of Parmacotto and Salumi Fratelli Boschi were calculated by individual plant and for every month, using the point-in-time values stated by the respective suppliers as emission factors on each reference year.

The calculation approach adopted is the *Marked Base* one.

That approach requires that GHG emissions from purchased electricity and heat be determined considering the specific emission factors notified by the suppliers for each reference year.

Purchased electricity from renewable sources is assigned an emission factor equal to zero as regards scope 2.

As shown by both the table and the chart, those emissions were reduced to zero in 2022 through contracts with the suppliers for guaranteed origin electricity (i.e. generated from renewable sources). The conversion rates/year and the related source are reported in *paragraph 5 GHG emissions inventory.*

| tCO2eq /year | | | | | |
|---|---|---|---|---|---|
| **Year** | **2018** | **2019** | **2020** | **2021** | **2022** |
| Scope 2 (tCO2eq) | 4534.69 | 4707.74 | 4253.52 | 4506.76 | 0.00 |

*Table 10. Total Scope 2 emissions in* tCO2eq *(from 2018 to 2022)*

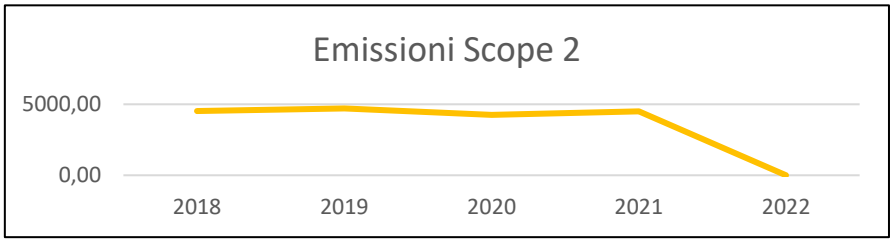


*Chart 3.* Trend of *total Scope 2 emissions in* tCO2eq *(from 2018 to 2022)*

## 2.3 Scope 1 and scope 2 emissions

The sum of scope 1 and scope 2 emissions of Parmacotto had an increasing trend for the years 2019, 2020 and 2021, due to the strong growth in its business, whereas it significantly decreased in 2022 (- 50%) as a result of the commitment that Parmacotto made in 2021 to reduce its carbon footprint

| tCO2eq /year | | | | | |
|---|---|---|---|---|---|
| **Year** | **2018** | **2019** | **2020** | **2021** | **2022** |
| Scopes 1 & 2 (tCO2eq) | 6909.85 | 7149.70 | 7194.07 | 7345.90 | 3377.86 |

*Table 11. Total Scope 1 and Scope 2 emissions in* tCO2eq *(from 2018 to 2022)*

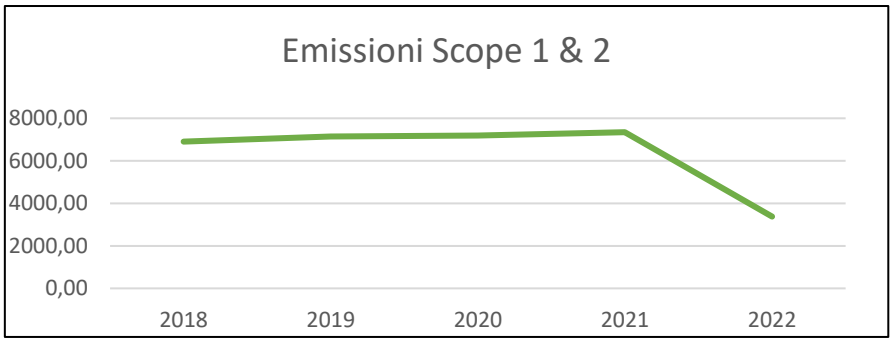


*Chart 4.* Trend of *total Scope 1 and Scope 2 emissions in* tCO2eq *(from 2018 to 2022)*

| tCO2eq /year | | | | | |
|---|---|---|---|---|---|
| **Emission type/Year** | **2018** | **2019** | **2020** | **2021** | **2022** |
| Scope 1 Emissions | 2375.17 | 2441.96 | 2940.55 | 2839.14 | 3377.86 |
| Scope 2 Emissions | 4534.69 | 4707.74 | 4253.52 | 4506.76 | 0.00 |
| Scopes 1 & 2 (tCO2eq) | 6909.85 | 7149.70 | 7194.07 | 7345.90 | 3377.86 |

*Table 12. Total Scope 1 and Scope 2 emissions in* tCO2eq *(from 2018 to 2022)*

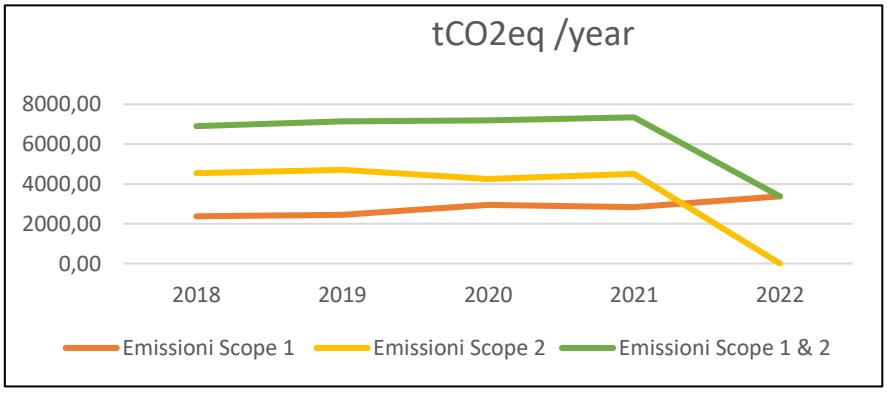


*Chart 5. Total Scope 1 and Scope 2 emissions in* tCO2eq *(from 2018 to 2022)*

# 3. Substantial emission variations and changes in target

When Parmacotto joined the SBT initiative, the year 2018 had been identified as the baseline. The calculated figure of Scope 1 and Scope 2 emissions amounted to 6.318t$CO_{2eq}$, breaking down as shown in the chart below:

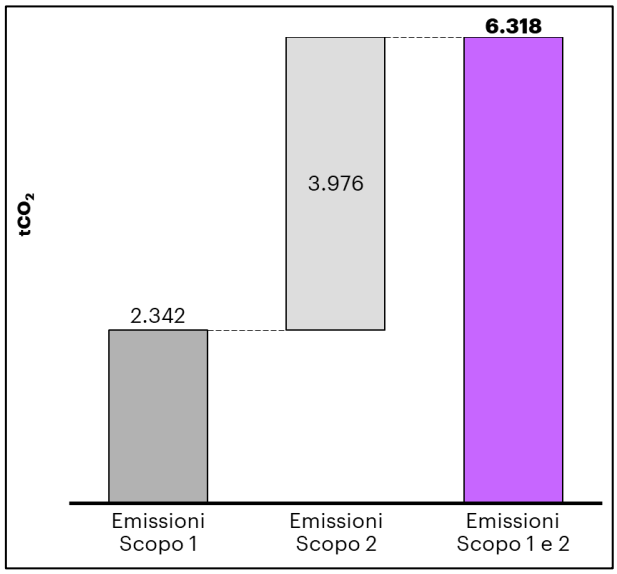


*Chart 6. 2018 old baseline, Scope 1 and Scope 2*

The calculations were reverified and a difference of 591.86 tons of CO2 was found, which was due to a mistake in the calculation base of fugitive emissions of F-gases and fuel consumption of the company fleet.
This is not prejudice to the target that Parmacotto stated in 2021, which we are going to reach via a series of actions to be deployed concerning:

- Gradual conversion to the use of F-gases with lower GWP (retrofit);
- Conversion (where possible) of systems using gas/LPG with electricity (such as projects for heat recovery and conversion to heat pump heating systems where possible, assessing the feasibility of a solar thermal system);
- Gradual regeneration of the fleet (switching to low-impact vehicles).

# 4. Actions towards meeting SBTs

## 4.1 Scope 1.

Based on the results reported in the previous chapters, in 2023 the Group started several studies to assess the technical solutions available to date on the market to invest in over the next few years, as of 2024, bearing in mind the specific features and impact of each one of its production plants. The goal is to take action on several plants at the same time; prioritizing those that have higher percentage weights on total emissions and on the most material items for each production plant.

***Marano plant***:

For this plant, gas consumption is the main contributor to emissions and results from office heating and from heating water used in industrial cleaning.
The assessments and studies underway are focusing on identifying the best technical solution to reduce gas consumption. Two technical feasibility and affordability studies were started aimed at:

- Discontinuing the use gas for heating shifting to an electrical system based on heat pumps;
- Reducing total consumption of gas from the national grid thanks to the installation of solar thermal panels in combination with the boilers currently in use;

After completing these two studies, based on their results it will be decided which solution to implement taking into account also the present plant engineering configuration.

***San Vitale plant:***

For this plant, the main emission factor is the use of gas for the steam generator boilers required in the production process. Besides this, small percentages of total consumption result from heating water for industrial cleaning.
This is the reason why in 2023 we are going to start a technical feasibility/affordability study, thanks to which, if it confirms our expectations, we will be able to reduce the use of gas by approximately 10%-10% replacing it with another fuel having lower emission impact; indeed, the process will enable to blend the other fuel with the gas currently used, thus reducing the overall emission impact.
Concomitantly, we are also assessing the technical feasibility/affordability of heat recovery from the drainage of the two steam generators and the alteration of the existing condensate return tanks. In this case, based on an early estimate, the expected reduction in gas consumption would be of approximately 15,000 SCM/year. The latter project will be subject to the findings of the former feasibility study.

***Felino and Pratopiano plants***

For these plants, the highest contribution to emissions results from F-gases.
In this case, we have engaged our current suppliers for the project of system revamping and for a campaign for gradual replacement of F-gases with others having lower GWP starting from 2024. Said replacement will take into account the compatibility of the systems and will not prevent direct action on the systems in order to stop and/or minimize fugitive emissions.

**4.2 Scope 2**.

At this first stage, Parmacotto has focused its actions on Scope 2 emissions. In order to reduce them, since January 2022 Guarantee of Origin (GOs) have been obtained to zero the set of electricity consumption of the plants; concomitantly the actions listed below were deployed:

- *Relamping :*
    - *Production plant in* Felino (Boschi F.lli), where 158 light fixtures were replaced with LED light fixtures achieving total saving of approximately 6,934 kwh/year;
    - *Production plant in* Pratopiano (Boschi F.lli): 95 light fixtures were replaced with LED light fixtures achieving total saving of approximately 5,833 kwh/year;

These actions are going to contribute to reducing electricity consumption, as well as to reducing structural Scope 2 emissions.

In 2022, other efficiency-enhancing actions started and are currently being completed (their completion is expected in 2023), namely:

- *Relamping*
    - *Production plant in Marano*: as at 31 December 2022 350 light fixtures had been replaced achieving total saving of 41,682 kwh/year; at the project completion in 2023, another 764 light fixtures will have been replaced for a total of 1,114 light fixtures and total saving of 211,185 kwh/year;

- *Photovoltaic system*
    - *Marano plant*: in September 2022, works started for the installation of a 910 kwp photovoltaic system, which will be operational in the last quarter of 2023;

- *San Vitale plant*: in November 2022, works started for the installation of a 342 kwp photovoltaic system, which will be operational in the last quarter of 2023;

# 5. GHG emissions inventory.

## *5.1 Table summarizing Scope 1 and Scope 2 emission by plant.*

| | | | tCO2eq | | | | |
|---|---|---|---|---|---|---|---|
| | | | **2018** | **2019** | **2020** | **2021** | **2022** |
| Scope 1 | Natural gas/LPG | Marano | 331.87 | 252.67 | 289.35 | 328.92 | 248.03 |
| | | San Vitale | 1380.32 | 1383.12 | 1616.57 | 1551.66 | 1864.71 |
| | | Felino | 322.03 | 262.68 | 308.97 | 264.78 | 244.29 |
| | | Pratopiano | 0.24 | 0.17 | 0.16 | 0.17 | 0.14 |
| | Fugitive emissions of F-gases | Marano | 0.00 | 15.06 | 0.00 | 11.18 | 1.15 |
| | | San Vitale | 0.00 | 0.00 | 0.00 | 136.07 | 95.00 |
| | | Felino | 245.83 | 308.94 | 616.44 | 457.90 | 625.34 |
| | | Pratopiano | 54.91 | 176.39 | 66.28 | 44.90 | 221.28 |
| | Fugitive emissions from the fire extinguisher system | Group | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | Company fleet | Group | 39.98 | 42.95 | 42.78 | 43.56 | 77.92 |
| | **Scope 1 (Total)** | | **2375.17** | **2441.96** | **2940.55** | **2839.14** | **3377.86** |
| Scope 2 | Electricity | Marano | 1503.49 | 1622.63 | 1399.06 | 1444.53 | 0.00 |
| | | San Vitale | 2208.25 | 2352.89 | 2056.69 | 2179.15 | 0.00 |
| | | Felino | 551.25 | 499.15 | 545.34 | 588.23 | 0.00 |
| | | Pratopiano | 271.70 | 233.07 | 252.42 | 294.84 | 0.00 |
| | **Scope 2 (Total)** | | **4534.69** | **4707.74** | **4253.52** | **4506.76** | **0.00** |
| ***SCOPE 1 + SCOPE 2*** | | | **6909.85** | **7149.70** | **7194.07** | **7345.90** | **3377.86** |

## *5.2 Appendix on conversion factors of gas from the grid.*

| **2018** | | | | |
|---|---|---|---|---|
| EF | tGHG/TJ | tGHG/Smc*10^3 | tCO2eq/10^3*Smc | Fonte |
| CO2eq | 55,9 | 1,972 | 1,972 | Tabella parametri standard nazionali, UNFCCC, 2018 Disponibile al seguente link: https://www.mase.gov.it/sites/default/files/archivio/allegati/emission_trading/tabella_coefficienti_standard_nazionali_11022019.pdf |
| **2019** | | | | |
| EF | tGHG/TJ | tGHG/Smc*10^3 | tCO2eq/10^3*Smc | Fonte |
| CO2eq | 55,9 | 1,975 | 1,975 | Tabella parametri standard nazionali, UNFCCC, 2019 Disponibile al seguente link: https://www.mase.gov.it/sites/default/files/archivio/allegati/emission_trading/fattori_standard_2019.pdf |
| **2020** | | | | |
| EF | tGHG/TJ | tGHG/Smc*10^3 | tCO2eq/10^3*Smc | Fonte |
| CO2eq | 56,2 | 1,984 | 1,984 | Tabella parametri standard nazionali, UNFCCC, 2020 Disponibile al seguente link: https://www.ets.minambiente.it/News#201-pubblicazione-parametri-standard-nazionali-anno-2020 |
| **2021** | | | | |
| EF | tGHG/TJ | tGHG/Smc*10^3 | tCO2eq/10^3*Smc | Fonte |
| CO2eq | 56,2 | 1,983 | 1,983 | Tabella parametri standard nazionali, UNFCCC, 2021 Disponibile al seguente link: https://www.assolombarda.it/servizi/ambiente/informazioni/ets-tabella-parametri-standard-nazionali |
| **2022** | | | | |
| EF | tGHG/TJ | tGHG/Smc*10^3 | tCO2eq/10^3*Smc | Fonte |
| CO2eq | 56,3 | 1,991 | 1,991 | Tabella parametri standard nazionali, UNFCCC, 2022 Disponibile al seguente link: https://www.mase.gov.it |

## *5.3 Appendix on conversion factors of F-gases*

| Refrigerant | GWP [tCO2eq/tGHG] | Source |
|---|---|---|
| R-410A | 2088 | *Regulation (EU) No 517/2014 on fluorinated greenhouse gases - Tabella prodotti e sostituti HFO a ridotto GWP* https://www.generalgas.it/storage/fgas/Tabella_ITA_GWP_marzo_2020.pdf |
| R449-A | 1397 | *Regulation (EU) No 517/2014 on fluorinated greenhouse gases - Tabella prodotti e sostituti HFO a ridotto GWP* https://www.generalgas.it/storage/fgas/Tabella_ITA_GWP_marzo_2020.pdf |
| R134-A | 1430 | *Regulation (EU) No 517/2014 on fluorinated greenhouse gases - Tabella prodotti e sostituti HFO a ridotto GWP* https://www.generalgas.it/storage/fgas/Tabella_ITA_GWP_marzo_2020.pdf |
| R-507 | 3985 | *Regulation (EU) No 517/2014 on fluorinated greenhouse gases - Tabella prodotti e sostituti HFO a ridotto GWP* https://www.generalgas.it/storage/fgas/Tabella_ITA_GWP_marzo_2020.pdf |
| R-513 | 631 | *Regulation (EU) No 517/2014 on fluorinated greenhouse gases - Tabella prodotti e sostituti HFO a ridotto GWP* https://www.generalgas.it/storage/fgas/Tabella_ITA_GWP_marzo_2020.pdf |
| R-427A | 2138 | *R-427 A - Refrigerant blend HFC A1 https://nippongases.com/it-it/gas/r427a* |
| R-404 A | 3922 | *GWPs for blended refrigerants https://www.epa.gov/sites/default/files/2015-07/documents/emission-factors_2014.pdf* |
| R 507 | 3985 | *GWPs for blended refrigerants https://www.epa.gov/sites/default/files/2015-07/documents/emission-factors_2014.pdf* |
| R 407 C | 1774 | *GWPs for blended refrigerants https://www.epa.gov/sites/default/files/2015-07/documents/emission-factors_2014.pdf* |

## *5.4 Appendix on conversion factors of cars*

| FE [kgCO2/km] | Descrizione | Fonte | |
|---|---|---|---|
| 0,376 | *Transport, passenger car petrol, medium size, EURO 4, RER* | Ecoinvent 3 (IPCC, 2021) | https://v391.ecoquery.ecoinvent.org/Details/LCIA/302dd923-2513-4001-92b7-d01e38462116/290c1f85-4cc4-4fa1-b0c8-2cb7f4276dce |
| 0,419 | *Transport, passenger car, diesel, large size, EURO 4, RER* | Ecoinvent 3 (IPCC, 2021) | https://v391.ecoquery.ecoinvent.org/Details/LCIA/285261e7-f213-42e8-9488-1bcc58e49e01/290c1f85-4cc4-4fa1-b0c8-2cb7f4276dce |
| 0,45 | *Transport, passenger car, petrol, large size, EURO 4, RER* | Ecoinvent 3 (IPCC, 2021) | https://v391.ecoquery.ecoinvent.org/Details/LCIA/0d20b129-1068-4af7-af42-86ce962826bd/290c1f85-4cc4-4fa1-b0c8-2cb7f4276dce |
| 0,336 | *Trasnport, passenger car, diesel, medium size, EURO 4, RER* | Ecoinvent 3 (IPCC, 2021) | https://v391.ecoquery.ecoinvent.org/Details/LCIA/ec5f91b7-7bb9-4bd0-97bb-a86381bd9b3f/290c1f85-4cc4-4fa1-b0c8-2cb7f4276dce |
| 0,259 | *Transport, passenger car, diesel, small size, EURO 4, RER* | Ecoinvent 3 (IPCC, 2021) | https://v391.ecoquery.ecoinvent.org/Details/LCIA/fcf095de-907c-4690-a676-d3201a0f30d1/290c1f85-4cc4-4fa1-b0c8-2cb7f4276dce |
| 0,302 | *Trasnport, passenger car, petrol, small size, EURO 4, RER* | Ecoinvent 3 (IPCC, 2021) | https://v391.ecoquery.ecoinvent.org/Details/LCIA/247e7b39-9059-41d3-accc-8fef26778a5a/290c1f85-4cc4-4fa1-b0c8-2cb7f4276dce |
| **FE [kgCO2/km]** | **Descrizione** | **Fonte** | |
| 0,583 | *Transport f, freight, lorry 3,5-7,5 metric ton, EURO 6* | Ecoinvent 3 (IPCC, 2021) | https://v391.ecoquery.ecoinvent.org/Details/LCIA/6f97deed-5574-468e-90f3-850044f062ae/290c1f85-4cc4-4fa1-b0c8-2cb7f4276dce |

## *5.5 Appendix on Electricity Conversion Factor*

| | Anno | FE [kgCO2eq/KWh] | Fonte | |
|---|---|---|---|---|
| ENEL | 2018 | 0,369 | *Bilancio di sostenibilità 2018 https://www.enel.com/content/dam/enel-com/documenti/investitori/sostenibilita/2018/bilancio-di-sostenibilita_2018.pdff* | |
| | 2019 | 0,296 | *Bilancio di sostenibilità 2019 https://www.enel.com/content/dam/enel-com/documenti/investitori/sostenibilita/2019/bilancio-sostenibilita_2019.pdf* | |
| | 2020 | 0,376 | https://www.enel.it/content/dam/enel-it/documenti-supporto/mercato-libero-luce/tabella-mix-energetico-enel-energia.pdf | |
| | 2021 | 0,403 | https://www.enel.it/content/dam/enel-it/documenti-supporto/mercato-libero-luce/tabella-mix-energetico-enel-energia.pdf | |
| | 2022 | 0,379 | https://esgnews.it/governance/enel-trimestre-in-crescita-rinnovabili-trainano-il-mix-energetico/ | **Acquisto di GO nel 2022** |

| | Anno | FE [kgCO2eq/KWh] | Fonte | |
|---|---|---|---|---|
| EDISON | 2018 | 0,354 | *Dichiarazione consolidata di carattere non finanziario 2018 https://www.edison.it/sites/default/files/art_accordion_files/2018-Edison_DNF.pdf* | |
| | 2019 | 0,327 | *Dichiarazione consolidata di carattere non finanziario 2019 https://www.edison.it/sites/default/files/documents/Edison_5_DNF_ITA19_def_0.pdf* | |
| | 2020 | 0,269 | *Dichiarazione consolidata di carattere non finanziario 2022 https://www.edison.it/sites/default/files/documents/Edison-DNF2022-ITA-v.interattiva.pdf* | |
| | 2021 | 0,272 | *Dichiarazione consolidata di carattere non finanziario 2022 https://www.edison.it/sites/default/files/documents/Edison-DNF2022-ITA-v.interattiva.pdf* | |
| | 2022 | 0,293 | *Dichiarazione consolidata di carattere non finanziario 2022 https://www.edison.it/sites/default/files/documents/Edison-DNF2022-ITA-v.interattiva.pdf* | **Acquisto di GO nel 2022** |

| | Anno | FE [kgCO2eq/KWh] | Fonte | |
|---|---|---|---|---|
| A2A | 2020 | 0,310 | *A2A Bilancio integrato 2021* https://a2a-be.s3.eu-west-1.amazonaws.com/a2a/A2A-bilancio-integrato-2021.pdf | |
| | 2021 | 0,332 | *A2A Bilancio integrato 2021* https://a2a-be.s3.eu-west-1.amazonaws.com/a2a/A2A-bilancio-integrato-2021.pdf | |
| | 2022 | 0,386 | *A2A Bilancio integrato 2022* https://www.borsaitaliana.it/documenti/documenti.htm?filename=/oneinfo/documents/124559_oneinfo.pdf | **Acquisto di GO nel 2022** |

| Mix energetico | FE [kgCO2eq/KWh] | Fonte |
|---|---|---|
| Carbone | 1,0731 | *Electricity production, hard coal, IT*<br>Ecoinvent 3 (IPCC, 2021)<br>https://v391.ecoquery.ecoinvent.org/Details/LCIA/678fe369-d003-48dd-813c-7f05240710df/290c1f85-4cc4-4fa1-b0c8-2cb7f4276dce |
| Gas naturale | 0,76 | *Electricity production, natural gas, 10 MW, RoW*<br>Ecoinvent 3 (IPCC, 2021)<br>https://v391.ecoquery.ecoinvent.org/Details/LCIA/1484c36f-5746-444c-8d29-a38c2dfda8c4/290c1f85-4cc4-4fa1-b0c8- |
| Prodotti petroliferi | 1,12 | *Electricity production, oil IT*<br>Ecoinvent 3 (IPCC, 2021)<br>https://v391.ecoquery.ecoinvent.org/Details/LCIA/d934f25e-ae85-4cea-ab84-a9ff7a6e50f9/290c1f85-4cc4-4fa1-b0c8-2cb7f4276dce |
| Nucleare | 0,0076 | *Electricity production, nuclear, boiling water reactor, RoW*<br>Ecoinvent 3 (IPCC, 2021)<br>https://v391.ecoquery.ecoinvent.org/Details/LCIA/b92fefdb-117b-4e80-9560-ef83ed82907a/290c1f85-4cc4-4fa1-b0c8-2cb7f4276dce |
| Altre fonti | 0,149 | Valore medio fra:<br>**Biomassa :** Figure 1 (IPCC) in Life-cycle emissions of electricity options<br>https://www.world-nuclear.org/information-library/energy-and-the-environment/carbon-dioxide-emissions-from-electricity.aspx<br>E **Geotermia:** Electricity production, deep geothermal, IT<br>Ecoinvent 3 (IPCC, 2021)<br>https://v391.ecoquery.ecoinvent.org/Details/LCIA/8c643122-861a-4995-9430-35d0e66ad891/290c1f85-4cc4-4fa1-b0c8-2cb7f4276dce |

| Mix Rinnovabile | FE [kgCO2eq/KWh] | Fonte |
|---|---|---|
| Idroelettrico | 0,0068873 | Electricity production, hydro, reservoir, alpine region, RoW<br>Ecoinvent (IPCC, 2021)<br>https://v391.ecoquery.ecoinvent.org/Details/LCIA/0b8a3b04-18d6-4553-90a4-193b4ee2e51f/290c1f85-4cc4-4fa1-b0c8-2cb7f4276dce |
| Fotovoltaico + eolico | 0,04750 | **Valore medio fra:**<br>Electricity production, photovoltaic, 570kWp open ground installation, multi-Si, RoW Ecoinvent 3 (IPCC, 2021)<br>https://v391.ecoquery.ecoinvent.org/Details/LCIA/2d71db89-661d-4986-9bf0-aa665ee612bd/290c1f85-4cc4-4fa1-b0c8-2cb7f4276dce<br><br>Electricity production, wind, 13 MW turbine, onshore, RoW<br>https://v391.ecoquery.ecoinvent.org/Details/LCIA/81b45ceb-1218-4453-a0a9-244df0ba643a/290c1f85-4cc4-4fa1-b0c8-2cb7f4276dce |
| Geotermia | 0,069968 | Electricity production, deep geothermal, IT<br>Ecoinvent 3 (IPCC, 2021)<br>https://v391.ecoquery.ecoinvent.org/Details/LCIA/8c643122-861a-4995-9430-35d0e66ad891/290c1f85-4cc4-4fa1-b0c8-2cb7f4276dce |
| TOTALE 2020 | 0,027 | Considerando mix come segue: 4,81% geotermico, 52,77% idraulico, 16,85% eolico, 25,55% solare |
| TOTALE 2021 | 0,031 | Considerando mix come segue: 6,04% geotermico, 44,58% idraulico, 21,15% eolico, 28,24% solare |
| TOTALE 2022 | 0,033 | Considerando mix come segue: 8,19% geotermico, 39,66% idraulico, 20,65% eolico, 31,46% solare |