Corporate Carbon Footprint

2019

OMIRA GmbH (hereinafter referred to as OMIRA)

19 August 2020

This greenhouse gas emission balance sheet shows the greenhouse gas emissions of the company for the following reporting period and the locations indicated.

Period under review:	1 January 2019 to 31 December 2019
Organisational boundaries:	Main administration and Ravensburg and Neuburg a. d. Donau production sites.
Country:	Germany
Created by:	Dr Johannes Eder, Sustainability Officer

Abbreviations

GHG	Greenhouse Gas
EM factor	Emission factor
IPCC	Intergovernmental Panel on Climate Change
DEFRA	Department for Environment Food & Rural Affairs
GEMIS	Global Emission Model of Integrated Systems
WWF	World Wide Fund for Nature
TQP	Total quantity processed
CCF	Corporate Carbon Footprint
UBA	Federal Environment Agency
km	Kilometre
LEW	Lechwerke AG

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Basics and methodology

Principles of GHG calculation

The present calculation of greenhouse gas emissions was carried out in accordance with the Greenhouse Gas Protocol (GHG Protocol; 2004). The Greenhouse Gas Protocol is the most widely used and recognised international standard for the accounting of greenhouse gas emissions by organisations.

The following five basic principles have been observed for the preparation of GHG balances:

- Relevance: Selection of the correct organisational boundaries (selection of company components/locations and subsidiaries) and operational boundaries (selection of emission areas)
- Completeness: Registration of all relevant emission sources within the selected system boundaries
- Consistency: Use of calculation methods, emission factors and selection of system boundaries that allow comparability over years
- Transparency: Clear and comprehensible presentation of the data, emission factors, calculations and results used for external third parties
- Accuracy: Distortions and uncertainties have been minimised so that the results provide a solid basis for decision making

Greenhouse gas emissions covered and data sources

Included greenhouse gas emissions

The calculation of greenhouse gas emissions (GHG emissions) includes all six greenhouse gases defined by the Intergovernmental Panel on Climate Change (IPCC) and the Kyoto Protocol: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6). To simplify matters and to provide a better overview, these different greenhouse gases are converted into CO_2 equivalents (CO_2eq) and presented in this emissions report on the basis of the respective defined greenhouse gas potentials (Global Warming Potentials). The conversion of the collected consumption data (such as electricity consumption or fuel consumption) is carried out by means of emission factors which indicate the GHG emissions per unit (e.g. per kilowatt-hour or litre). The emission factors are taken from the data basis for emission inventories of DEFRA (Department for Environment, Food and Rural Affairs Version 1.01; 2019). Furthermore, the raw materials used for raw milk, the empirically collected GHG emissions from the "AgriClimateChange" project of OMIRA 2016 and the Lake Constance Foundation were used to assess the greenhouse gas emissions in Scope 3. The WWF study of 2012 (Klimawandel auf dem Teller ("Climate Change on Our Doorstep"); WWF Germany, 2012) served as a basis for measuring the GHG emissions of other raw material categories.

The emission factors used are listed in the Annex. The internationally known and used database systems of the emission factors used are scientifically recognised and are used internationally to calculate GHG emissions. Accordingly, the data quality of the emission factors is considered high. Most of the emission factors used in this report are taken from the DEFRA database (version 1.0, 2019, accessed on 17 August 2020).

Data sources of own consumption data

The consumption data for Scope 1 (stationary combustion, refrigerants and company vehicle fleet) and Scope 2 (electricity) of OMIRA represent real consumption quantities in the period from 1 January 2019 to 31 December 2019. The data basis in Scope 3 is largely based on real consumption quantities in the period mentioned. A 2019 survey was carried out to provide information on employee travel. The result was extrapolated to the total number of employees. If no data source was available, plausible average values were assumed (Scope 3, Point 2 Business trips "Taxi trips", Scope 3, Point 6 Arrival and departure of external service providers "Maintenance and repair").

The primary data for the consumption quantities in the company were provided by the respective departments (Controlling, Purchasing, Sales, Technology), compiled by the sustainability officer and checked for plausibility.

Stationary combustion

The fuels used by OMIRA are natural gas (standard cubic metres) for heat production in the production process and fuel oil (litres) for heating purposes.

Company vehicle fleet

The consumption of diesel was recorded for the company fleet. Petrol, natural gas and liquid gas are not consumed. The consumption quantities for internal transport between the plants, vehicles on the premises of the production sites, milk collection from farmers via transport vehicles and diesel quantities for outsourced milk collection are available. The diesel quantities for the use of company cars were settled via fuel cards and the diesel quantities were calculated using the euro amount from Controlling and the average diesel price per litre of 1.27 euros per litre (ADAC, 2019). In addition, the diesel quantities from external raw milk deliveries were also calculated by multiplying the exact number of deliveries by the average distance of 330 kilometres from the main delivery region and by a diesel consumption for long distances of 36 litres per 100 kilometres. These assumptions are based on expert data.

Refrigerant

The refrigerants used for cold rooms in the production process are specified. Only quantities consumed during the reporting period are recorded, e.g. as a result of leaks or other volatilisation.

Electricity

For purchased electricity, the consumption quantities of the energy service provider LEW (Lechwerke AG) were recorded in kWh (customer electricity mix LEW standard electricity products, residual mix). This consists of the following energy sources: 52.9% renewable energies, 0.01% other renewable energies promoted under the Renewable Energy Sources Act (EEG), 9.4% nuclear power, 33.9% coal, 3.1% natural gas, 0.6% other fossil fuels.

Employee commutes to the workplace

A questionnaire for our employees was used to record the number of kilometres per vehicle category in 2020 that they drive annually to get to work and back home. Around 17.1% of employees took part in the survey. The result was then extrapolated to 585 employees. One-way journeys were surveyed and the total was calculated for outward and return journeys. The vehicle categories were divided into public transport, cars (small cars), cars (medium class) and cars (luxury class). Motorbikes and mopeds/scooters were combined. OMIRA had 580 employees in the previous year.

Business trips

By means of the controlling and booking vouchers, we were able to record the number of business trips and the vehicle categories. The classification of the means of transport was based on a flat-rate evaluation of the distance of each one-way trip. These were divided into air travel (long distance); 4,200 km, air travel (medium distance); 1,900 km, air travel (short distance); 700 km, train journeys; 300 km, bus journeys; 5 km, taxi journeys; 10 km. The individual air trips were assigned to the categories of air travel by the sustainability officer. For train journeys, the actual travel distance was determined using Google maps. It was also assumed that there were two taxi trips per flight and train journey. The assumption is based on information provided by the responsible departments.

Water, waste water

The consumption figures for external water from both sites were provided by the technical department. The waste water volumes generated are made up of the proportion of external water, around 50% of Ravensburg's own water consumption and 50% of the vapour water generated in the production process for milk powder manufacture.

Waste

The waste quantities generated were compiled in a waste balance sheet by the waste officers at the Ravensburg and Neuburg sites. The waste was divided according to type. Wood (packaging from new machines, disposable pallets, waste wood), paper (office paper, material repackaging, cardboard, loose files), plastic (foil packaging, material repackaging), composite packaging (drinking milk packaging), residual waste, organic waste, construction waste, industrial waste. Industrial waste includes glass, flat glass, scrap, oil separator contents, solvents, antifreeze, acids, chemicals, lubricating oils, waste oil, paint and varnish waste). It is always attempted to collect all types of waste separately and to dispose of them separately. However, this cannot yet be guaranteed for all types of waste. A uniform emission factor of 0.021 kg CO_2 equivalent per kilogram of waste has therefore been chosen, assuming that all waste is sent for thermal recycling.

Paper

The consumption figures for paper come from Central Purchasing and include office paper as well as advertising material.

Transports by suppliers and service providers

For maintenance and repair work carried out by external service providers, an estimated flat-rate value of kilometres (50,000 kilometres) was assumed, as it was not possible to collect exact data. 30,000 kilometres more than in the previous year 2018 were assumed. This results from the major refurbishment measures at both sites.

This conservative estimate is based on expert assumptions. A supplier survey was conducted to evaluate the delivery of ingredients and materials.

The survey asked about the kilometres driven (one way) from the supplier's central dispatch department to the respective OMIRA production sites and the quantity of goods delivered. The survey covered about 90% of the total purchasing volume. The outward and return journeys were used as the basis for the calculations in the GHG balance sheet.

Raw materials used

The processing quantities for raw milk, additives and consumables were recorded by the Controlling and Central Purchasing departments.

The calculation is thus based on plausible data. The high proportion of real consumption quantities from the company's own data stock can be assessed as very good, with high data quality.

The total quantity processed (GHG) was chosen as the reference value for calculating the relative indicators, as the GHG emissions per GHG give a real picture of the greenhouse gas emissions per quantity of milk processed. The data quality of the TQPs can be classified as very high, as it reflects the real processing volumes of OMIRA in the period from 1 January 2019 to 31 December 2019.

Table 1: Total quantity processed

2019	2018	Veränderung	
kg	kg	kg	%
705.338.221	686.708.589	18.629.632	2,7%

The total quantity processed is made up of raw milk, skimmed milk, cream and concentrates. The total quantity processed increased by 2.7% compared to the previous year. The increase in the total volume processed is due to the increase in external purchases of primary raw materials.

Procedure for preparing the greenhouse gas balance sheet.

The absolute greenhouse gas emissions result from multiplying the consumption data of OMIRA and the respective emission factors. These are calculated for scope one to three and together result in OMIRA's total greenhouse gas emissions (see system limits).

The following steps were taken to prepare the GHG balances:

1. Definition of the balancing period, the organisational and operational system boundaries.
2. Research and provision of data by OMIRA and plausibility checks.
3. Calculation of greenhouse gas emissions.
4. Summary of the results in the present GHG report.

In the following section "System boundaries", the balancing period and the organisational and operational system boundaries are explained in more detail.

System boundaries

Period under review

The data contained in the GHG balance sheet cover the period from 1 January 2019 to 31 December 2019 and, in comparison, from 1 January 2018 to 31 December 2018.

Organisational boundaries

OMIRA GmbH is a dairy with two locations in Baden-Württemberg and Bavaria. OMIRA has 585 employees. The dairy is supplied with raw milk by about 1,500 farmers. The administrative headquarters with production facilities for industrial products (milk powder, butterfat) and fresh products is in Ravensburg. Another production site for drinking milk and desserts is located in Neuburg a. d. Donau. When defining the organisational system boundaries, it must be decided which organisation, with which locations, the GHG balance sheet should include. For the 2019 balance sheet, the Ravensburg and Neuburg sites were considered. The following greenhouse gas balance contains the cumulative GHG emissions of the two sites.

Operational boundaries

The operational system boundaries determine which emission sources are taken into account within the previously defined organisational boundaries. According to the GHG Protocol (2004), the operational boundaries are divided as follows (see below). It should be noted that only Scope 1 and Scope 2 emissions are regulated. The scope of the emission sources considered in Scope 3 depends on the objectives of the company management. In the present case, the major emission sources in OMIRA's value chain that go beyond Scopes 1 and 2 should be considered and presented at company level.

<u>Scope 1 – Direct emissions</u>

Scope 1 covers all greenhouse gas emissions that occur directly in the organisation, e.g. greenhouse gas emissions from combustion by stationary sources (natural gas, fuel oil) or mobile sources (company vehicle fleet), greenhouse gas emissions from chemical processes and fugitive greenhouse gas emissions from air conditioning system leakage.

<u>Scope 2 – Indirect emissions from energy:</u>

Scope 2 covers all indirect greenhouse gas emissions caused by the provision of energy outside the organisation by an energy supply company. This includes electricity, district heating and district cooling. However, district heating and cooling are not used by OMIRA.

<u>Scope 3 – Other indirect emissions:</u>

Scope 3 includes all other significant greenhouse gas emissions caused by the organisation's activities. This includes greenhouse gas emissions from the use of products and services by the reporting organisation. For approx. 585 employees, the employees' commutes to the workplace were taken into account. Due to international sales, there is a significant amount of business travel by air, rail or car.

Water and wastewater volumes were taken into account, as well as waste and paper consumption, as these consumption volumes account for a large proportion of the CCF in Scope 3.

Travel to and from external service providers and suppliers was also taken into account. The materials consumed within the company, such as wooden pallets, aluminium for circuit boards, plastics and composite packaging, as well as the primary raw material quantities of milk are included, but are considered separately, as milk has a very high influence on the CCF and we are currently not having it made climate-neutral. Milk and the raw materials used are high drivers of the GHG balance, which is to be compensated for in the future via the suppliers. The milk and the raw materials used are evaluated using average values from the recognised databases already mentioned in the methods section. However, work is underway to ensure that this can be closely examined in the future and thus a real emission factor can be calculated.

Indirect greenhouse gas emissions from Scope 1 (stationary combustion of natural gas and heating oil, diesel consumption by the company's vehicle fleet and refrigerants), which have arisen through the chain of fuels (e.g. through transport, refining, storage and delivery), have also been calculated.

The following table shows which emission sources have been included in the present CO_2 balance:

Table 2: Operational system boundaries

Category	Emission source
Scope 1	Stationary combustion, recovery of process heat
Scope 1	Company vehicle fleet
Scope 1	Refrigerant
Scope 2	Electricity
Scope 3	Employee commutes to the workplace
Scope 3	Business trips
Scope 3	Water and sewage
Scope 3	Paper
Scope 3	Waste
Scope 3	Arrival and departure of external service providers
Scope 3	Indirect emissions through energy supply
Scope 3	Raw materials used

Results

Table 3: Scope 1 – Direct GHG emissions

Emissionsquelle	Menge	Einheit	EM-Faktor	Einheit	CO2e [t] 2019	CO2e [t] 2018
Scope 1 - Direkte THG-Emissionen						
I. Stationäre Verbrennung						
Heizöl	24.120	Liter	2,540	kg/l	61,26	57,25
Erdgas	16.781.567	Nm³	2,037	kg/Nm³	34.184,05	35.209,22
Summe I. Stationäre Verbrennung					34.245,32	35.266,47
II. Kältemittel						
HFC-134a	118	kg	1.430,000	kg/kg	168,74	28,46
R407c	0,0	kg	1.774,000	kg/kg	0,00	56,24
R410a	0,0	kg	2.088,000	kg/kg	0,00	6,26
R404a	0	kg	3.922,000	kg/kg	0,00	1,80
Summe II. Kältemittel					168,74	92,76
III. Unternehmensfuhrpark						
Diesel	3.467.600	Liter	2,687	kg/l	9.317,44	8.947,72
Summe III. Unternehmensfuhrpark					9.317,44	8.947,72
Gesamt Scope 1					**43.731,50**	**44.306,95**

Stationary combustion

Energy generation by burning fossil fuels was exclusively for own consumption. In 2019, a total of 16,781,567 standard cubic metres of natural gas and 24,120 litres of heating oil were required for production (primarily milk powder production) and for heating the sites. This corresponds to greenhouse gas emissions totalling 34,245.32 tonnes of CO_2 equivalents. Compared to 2018, the demand for heating oil rose moderately by 1,580 litres (7.01%), while natural gas consumption fell by 418,834 standard cubic metres (2.44%), meaning greenhouse gas emissions were reduced by a total of 1,021.16 tonnes of CO_2 equivalents (2.90%). One reason for the lower energy demand in 2019 in the form of natural gas was the higher production efficiency at the sites and the use of waste heat by the steam turbine. However, the conversion factor for natural gas also fell slightly from 2.047 kg CO_2 equivalents per cubic metre by 0.010 kg CO_2 equivalents per cubic metre (0.49%) from 2018 to 2019 to 2.037 kg CO_2 equivalents per cubic metre.

Refrigerant

In 2019, the refrigerant HFC-134a was used, resulting in greenhouse gas emissions of 168.74 tonnes of CO_2 equivalents. By 2018, the amount of greenhouse gases has increased by 140.28 tonnes of CO_2 equivalents. The background is the higher refill quantity of the refrigerant HFC-134a. The emission factors of the refrigerants used have not changed in contrast to the previous year.

Company vehicle fleet

While in 2018 the greenhouse gas emissions amounted to 8,947.72 tonnes of CO_2 equivalents, in 2019, 9,317.44 additional tonnes of CO_2 equivalents (4.13%) were produced. This can be attributed to the higher external raw material purchases, as the distances for the external raw material to the sites are longer. The emission factor used for diesel in 2019 has decreased slightly compared to the previous year and is 2.687 kg CO_2 equivalents per litre (Defra, 2019).

Table 4: Scope 2 – Indirect GHG emissions from energy

Emissionsquelle	Menge	Einheit	EM-Faktor	Einheit	CO2e [t] 2019	CO2e [t] 2018
Scope 2 (Indirekte THG-Emissionen aus Energielieferungen)						
I. Strom						
1. Tatsächlich angefallene THG-Emissionen						
Kundenstrommix LEW Standardstromprodukte	16.500.095	kWh	0,365	kg/kWh	6.022,53	0,00
Selbst erzeugter Strom (Dampf-, Gasturbine)	20.777.582	kWh	0,000	kg/kWh	0,00	0,00
Tatsächlich angefallene THG-Emissionen Strom					6.022,53	0,00
2. Hypothetisch angefallene THG-Emissionen auf Basis Bundesmix						
Kundenstrommix LEW Standardstromprodukte	16.500.095	kWh	0,435	kg/kWh	7.177,54	7.103,89
Selbst erzeugter Strom (Dampf-, Gasturbine)	20.777.582	kWh	0,435	kg/kWh	9.038,25	8.733,52
Hypotetisch angefallene THG-Emissionen auf Basis Bundesmix					16.215,79	15.837,41
3. Vergleich tatsächliche und hypothetisch angefallene THG-Emissionen						
Vergleichsrechnung					-10.193,25	-15.837,41
Gesamt Scope 2					**6.022,53**	**0,00**

Electricity

For 2019, we have procured electricity from LEW AG (Lechwerke AG). This is the LEW standard electricity product (residual mix). From 2015, the Greenhouse Gas Protocol requires that emissions in Scope 2 are also compared with the national average. In addition, proof of the emission factor used must be provided and a justification of any deviations must be provided. Using the average German emission factor of 435 g/kWh (2019) would have resulted in direct emissions of 16,215.79 tonnes of CO_2 equivalents in 2019 and 15,837.41 tonnes of CO_2 equivalents in 2018. The LEW residual mix includes 52.9% renewable energies, 0.01% other renewable energies supported by (EEG), 9.4% nuclear power, 33.9% coal, 3.1% natural gas, 0.6% other fossil energy sources.

Table 5: Scope 3 – Other indirect GHG emissions

Emissionsquelle	Menge	Einheit	EM-Faktor	Einheit	CO2e [t] 2019	CO2e [t] 2018
Scope 3 - Sonstige indirekte THG-Emissionen						
I. Anfahrt der Mitarbeiter						
Öffentliche Verkehrsmittel (Bus, Bahn, ...)	692.019	km	0,073*	kg/km	50,52	26,28
Pkw, Kleinwagen	1.354.882	km	0,150	kg/km	203,23	207,38
Pkw, Mittelklasse	3.503.724	km	0,181	kg/km	634,17	350,25
Pkw, Oberklasse	46.376	km	0,229	kg/km	10,62	9,05
Motorrad	131.013	km	0,103**	kg/km	13,49	9,40
Summe I. Anfahrt der Mitarbeiter					912,04	602,36
II. Dienstreisen						
Flugreisen, Langstrecke	12.754	km	0,196	kg/passanger km	2,50	0,00
Flugreisen, Mittelstrecke	29.382	km	0,158	kg/passanger km	4,64	7,28
Flugreisen, Kurzstrecke	24.955	km	0,255	kg/passanger km	6,36	17,31
Zugfahrten	33.235	km	0,041	kg/passanger km	1,36	1,67
Taxifahrten	5.000	km	0,210	kg/km	1,05	0,97
Summe II. Dienstreisen					15,92	27,24
III. Wasser und Abwasser						
Wasser	662.701	m³	0,344	kg/m³	227,97	214,78
Abwasser	1.223.072	m³	0,708	kg/m³	865,93	726,37
Summe III. Wasser und Abwasser					1.093,90	941,15
IV. Papier						
Papier, Frischfaser	8.987	kg	0,953	kg/kg	8,56	10,10
Summe IV. Papier					8,56	10,10
V. Abfall						
Holz	32.560	kg	0,021	kg/kg	0,70	0,50
Papier	520.120	kg	0,021	kg/kg	10,92	11,40
Kunststoff	186.680	kg	0,021	kg/kg	3,92	4,57
Verbundverpackungen	53.060	kg	0,021	kg/kg	1,11	1,12
Restmüll	163.350	kg	0,021	kg/kg	3,43	3,67
Biomüll	1.321.124	kg	0,021	kg/kg	27,74	25,95
Bauschutt	125.370	kg	0,021	kg/kg	2,63	0,33
Industrieabfall	102.278	kg	0,021	kg/kg	2,15	3,11
Summe V. Abfall					52,61	50,65

*Arithmetic mean of bus and train journeys (Defra, 2019).

**By combining motorbike, moped and scooter, the emission factor for "managed motorbikes medium" was adopted (Defra, 2019).

Other indirect GHG emissions include greenhouse gas emissions that are not directly influenced and are not under our direct control.

Directions for employees

Greenhouse gas emissions in relation to employee commutes to work represent a minor item in the greenhouse gas balance, with 912.04 tonnes of CO_2 equivalents in 2019 and 602.36 tonnes of CO_2 equivalents in 2018. The 51.41% increase in 2019 is due to the re-evaluation and survey of employees. The kilometres reported have increased by 53.4% from 3,758,683 km in 2018 to 5,728,014 km. However, the emission factors used have decreased. In general, OMIRA also has more employees compared to the previous year.

Business trips

Another item on the balance sheet is business travel, which was mainly by air, train and taxi, with 15.92 tonnes in 2019 and 27.24 tonnes of CO_2 equivalents in 2018. The 41.56% reduction from 2018 to 2019 is generally due to less travel as more meetings could be held via Skype.

Water and sewage

Greenhouse gas emissions for water and wastewater increased by 152.75 tonnes of CO_2 equivalents (16.23%) from 2018 with 941.15 tonnes of CO_2 equivalents compared to 2019 with 1,093.90 tonnes of CO_2 equivalents. Due to the increase in the production of dry milk products in Ravensburg in 2019, the drying process resulted in more vapour water, which was discharged into the waste water. At the same time, more extraneous water was also consumed, as the total amount processed also increased.

Paper

With 8.56 tonnes of CO_2 equivalents in 2019 and 10.10 tonnes of CO_2 equivalents in 2018, paper consumption is not a major source of emissions. The slight reduction of 15.25% in paper consumption can be attributed to lower order volumes.

Waste

Greenhouse gas emissions from waste also make a small contribution to the overall greenhouse balance, with 52.61 tonnes of CO_2 equivalents in 2019 and 50.65 tonnes of CO_2 equivalents in 2018. Greenhouse gas emissions from waste have increased by 3.86% from 2018 to 2019 due to an increase in waste generation, especially organic waste and construction waste.

Table 6: Scope 3 – Other indirect GHG emissions

Emissionsquelle	Menge	Einheit	EM-Faktor	Einheit	CO2e [t] 2019	CO2e [t] 2018
Scope 3 - Sonstige indirekte THG-Emissionen						
VI. An- und Abreise externer Dienstleister						
Wartung / Instandsetzung	50.000	km	0,252	kg/km	12,60	5,14
Materialanlieferung LKW	2.758.500	km	1,661	kg/km	4.581,87	2.049,64
Summe VI. An- und Abreise externer Dienstleister					4.594,47	2.054,78
VII. Indirekte Emissionen durch Energiebereitstellung						
Heizöl	24.120	Liter	0,528	kg/l	12,74	11,90
Erdgas	16.781.567	Nm³	0,263	kg/m³	4.413,55	4.902,11
Diesel	3.467.600	Liter	0,626	kg/l	2.170,72	2.083,81
Strom	16.500.095	kWh	0,070	kg/kWh	1.155,01	1.262,16
Selbst erzeugter Strom	20.777.582	kWh	0,070	kg/kWh	1.454,43	1.551,70
Summe VII. Indirekte Emissionen durch Energiebereitstellung					9.206,44	9.811,69

Arrival and departure of external service providers

For the determination of emissions by external service providers, the journeys for maintenance and repair as well as the delivery to the goods receiving area by forwarding agents were taken into account. The greenhouse gas emissions amounted to 2,054.78 tonnes of CO_2 equivalents in 2018 and 4581.87 tonnes of CO_2 equivalents in 2019. The increase is 2539.96 tonnes of CO_2 equivalents from 2018 to 2019 (123.6%). Firstly, the distances travelled for maintenance and repair work have increased from 20,000 km in 2018 to 50,000 km in 2019. In addition, a more detailed evaluation and query of the kilometres travelled suppliers resulted in an increase of 49.93% in the kilometres driven. One reason for this is the longer distances travelled by suppliers and the increase in the total processing volume.

Indirect emissions through energy supply

Indirect greenhouse gas emissions of 9,811.69 tonnes of CO_2 equivalents in 2018 and 9,206.44 tonnes of CO_2 equivalents in 2019 are incurred for the provision of energy sources in Scope 1 and Scope 2. The reduction can be attributed mainly to lower consumption of natural gas. The emission factors used have also decreased compared to the previous year.

Raw materials used

When looking at the greenhouse gas emissions of the raw materials used, it can be seen that these account for the largest share (96.34%) in the overall balance with 1,294,613.95 tonnes of CO_2 equivalents in 2019 and 1,136,122.76 tonnes of CO_2 equivalents in 2018. The increase in GHG emissions can be derived from the significantly higher purchase of concentrates and raw milk in 2019. More volume was processed in 2019 than in 2018 and, in addition, the purchased concentrate has a significantly higher conversion factor than normal raw milk.

Table 7: Scope 3 – Other indirect GHG emissions

Emissionsquelle	Menge	Einheit	EM-Faktor	Einheit	CO2e [t] 2019	CO2e [t] 2018
Scope 3 - Sonstige indirekte THG-Emissionen						
VIII. Eingesetzte Rohstoffe						
Rohmilch eigen	585.036.000	kg	1,000	kg/kg	585.036,00	654.463,00
Rohmilch Zukauf	82.550.102	kg	1,000	kg/kg	82.550,10	4.068,96
Magermilch/Buttermilch	12.162.084	kg	14,700	kg/kg	178.782,63	151.055,51
Konzentrat	23.148.915	kg	14,700	kg/kg	340.289,05	249.959,68
Rahm	2.441.120	kg	3,280	kg/kg	8.006,87	2.941,13
Zwischensumme VIII. Primärrohstoffe Milch					**1.194.664,66**	**1.062.488,28**
Aluminium (Platinen)	180.351	kg	12,871	kg/kg	2.321,30	1.920,73
Holz (Paletten)	2.507.626	kg	0,414	kg/kg	1.038,16	714,44
Kartonagen	4.084.587	kg	0,843	kg/kg	3.443,31	3.705,52
Kunststoffe	3.583.846	kg	3,116	kg/kg	11.167,26	8.445,59
Papier	209.740	kg	0,953	kg/kg	199,88	127,95
Verbundverpackungen	4.187.068	kg	1,999	kg/kg	8.369,95	10.241,04
Zutaten	26.217.654	kg	2,800	kg/kg	73.409,43	48.479,22
Zwischensumme VIII. zusätzliche Rohstoffe					**99.949,29**	**73.634,49**
Summe VIII. Eingesetzte Rohstoffe					**1.294.613,95**	**1.136.122,76**

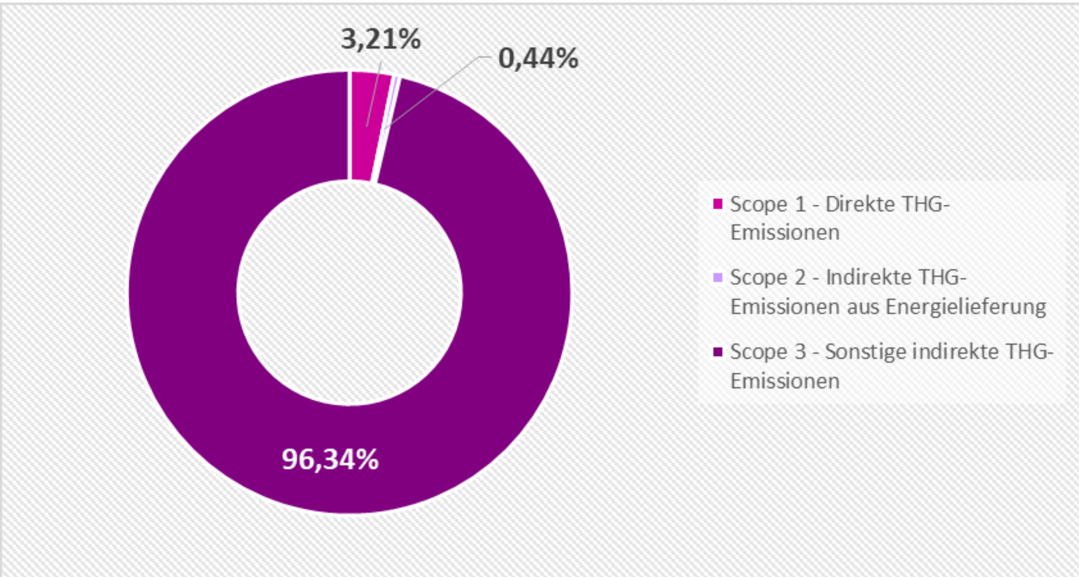

Figure 1: Breakdown of the scopes with GHG emissions of the raw materials used in Scope 3

Figure 1 shows that Scope 3 with the quantities of raw materials used accounts for the largest share (96.34%) with 1,294,613.95 tonnes of CO_2 equivalents of the greenhouse gas balance, followed by Scope 1 with 43,731.50 tonnes of CO_2 equivalents (3.21%). Scope 2 had a small impact, amounting to 0.44% with 6,022.53 tonnes of CO_2 equivalents. The main driver is the raw material milk in Scope 3.

Table 8: Total greenhouse gas balance with GHG emissions of the raw materials used in Scope 3

Emissionsquelle	CO2e [t] 2019	[%]	CO2e [t] 2018	[%]
Scope 1 - Direkte THG-Emissionen				
Stationäre Verbrennung	34.245,32	2,52%	35.266,47	2,95%
Kältemittel	168,74	0,01%	92,76	0,01%
Unternehmensfuhrpark	9.317,44	0,68%	8.947,72	0,75%
Scope 2 - Indirekte THG-Emissionen aus Energielieferung				
Strom	6.022,53	0,44%	0,00	0,00%
Scope 3 - Sonstige indirekte THG-Emissionen				
Anfahrt der Mitarbeiter	912,04	0,07%	602,36	0,05%
Dienstreisen	15,92	< 0,01%	27,24	< 0,01%
Wasser und Abwasser	1.093,90	0,08%	941,15	0,08%
Papier	8,56	< 0,01%	10,10	< 0,01%
Abfall	52,61	< 0,01%	50,65	< 0,01%
An- und Abreiser externer Dienstleister	4.594,50	0,34%	2.054,78	0,17%
Indirekte Emissionen durch Energiebereitstellung	9.206,44	0,68%	9.811,69	0,82%
Eingesetzte Rohstoffe	1.294.613,95	95,17%	1.136.122,76	95,16%
Gesamt THG-Emissionen	**1.360.251,95**	**100,00%**	**1.193.927,69**	**100,00%**

When considering total greenhouse gas emissions including the raw materials used, it can be seen that they increased by 166,324.26 (13.93%) tonnes of CO_2 equivalents from 2018 to 2019.

Taking into account the total quantities processed (TQPs) in 2019 and 2018, this increase can also be confirmed. In 2018, the share was 1.739 kg CO_2 equivalents per tonne of TQPs and in 2019 1.929 kg CO_2 equivalents per tonne of TQPs. The increase in diesel volumes and the switch to the residual mix of another electricity supplier and the increase in processing dairy raw materials had the biggest impact on the increase in GHG emissions in 2019. The emission factors used have decreased somewhat.

The raw materials/materials used in the company, such as the primary raw material quantities of milk and the packaging materials such as wooden pallets, aluminium for circuit boards, plastics and composite packaging, together account for a considerable share of the total GHG emissions. In future, these are to be offset via suppliers, which is why a consideration without these raw materials/materials follows.

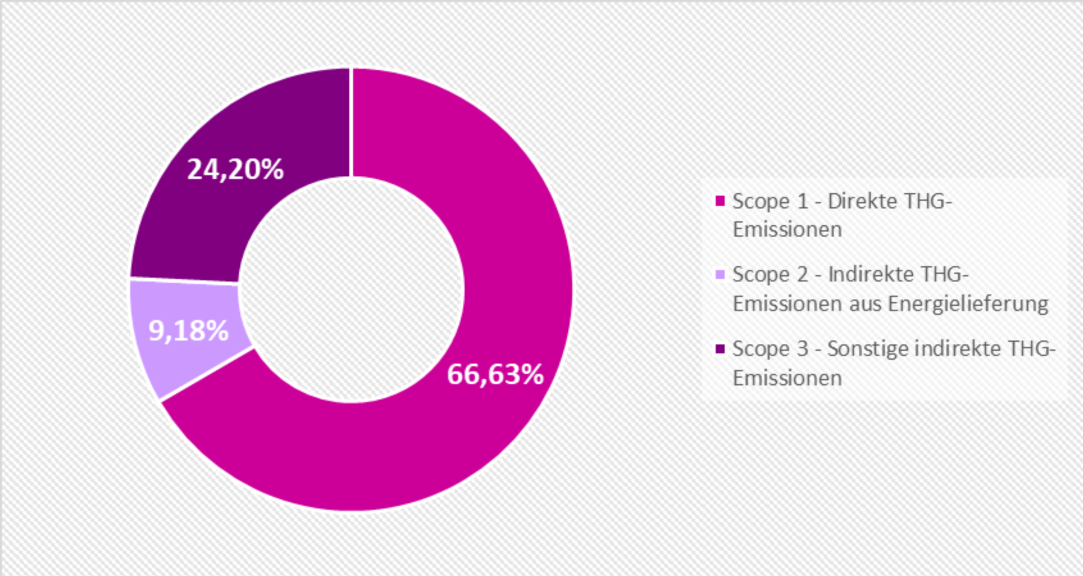

Figure 2: Breakdown of the Scopes without GHG emissions of the raw materials used in Scope 3

Looking at the overall GHG emissions balance, excluding GHG emissions from the raw materials used in Scope 3, direct GHG emissions in Scope 1 form the largest block with 66.63%, followed by Scope 3 with 24.20%. Scope 2 had an impact of 9.18%. The main driver of GHG emissions in Scope 1 was natural gas consumption. Natural gas is used for heat generation. This analysis also makes it possible to identify specific effects associated with energy-saving measures in the production process.

Table 9: Total greenhouse gas balance excluding GHG emissions of the raw materials/materials used in Scope 3

Emissionsquelle	CO2e [t] 2019	[%]	CO2e [t] 2018	[%]
Scope 1 - Direkte THG-Emissionen				
Stationäre Verbrennung	34.245,32	52,17%	35.266,47	61,01%
Kältemittel	168,74	0,26%	92,76	0,16%
Unternehmensfuhrpark	9.317,44	14,20%	8.947,72	15,48%
Scope 2 - Indirekte THG-Emissionen aus Energielieferung				
Strom	6.022,53	9,18%	0,00	0,00%
Scope 3 - Sonstige indirekte THG-Emissionen				
Anfahrt der Mitarbeiter	912,04	1,39%	602,36	1,04%
Dienstreisen	15,92	0,02%	27,24	0,05%
Wasser und Abwasser	1.093,90	1,67%	941,15	1,63%
Papier	8,56	0,01%	10,10	0,02%
Abfall	52,61	0,08%	50,65	0,09%
An- und Abreiser externer Dienstleister	4.594,50	7,00%	2.054,78	3,55%
Indirekte Emissionen durch Energiebereitstellung	9.206,44	14,03%	9.811,69	16,97%
Gesamt THG-Emissionen * ohne eingesetzte Rohstoffe*****	**65.638,00**	**100,00%**	**57.804,93**	**100,00%**

When considering the total greenhouse gas emissions without the share of raw materials/materials used, it can be seen that they have increased by 7,833.08 tonnes of CO_2 equivalents (13.55%) from 2018 to 2019. Taking into account the total quantities processed (TQPs) in 2018 and 2019, the increase can be confirmed. In 2018, the proportion will be 0.084 kg CO_2 equivalents per tonne of TQPs and in 2019 0.093 kg CO_2 equivalents per tonne of TQPs.

Options for improving the emissions balance

Scope 1 – Direct emissions

The greatest leverage effect for reducing the greenhouse gas balance under Scope 1 can be derived from the reduction of natural gas volumes. Natural gas is needed to generate process heat in Ravensburg for milk powder production. By constantly optimising production processes with regard to our energy management (ISO 50.001), we could successively reduce the demand for natural gas. The use of new, more energy-efficient technologies will also enable us to reduce the proportion of GHG emissions from stationary combustion. As regards the reduction of diesel, there is the possibility of extending the use of diesel in new purchases of electrically powered vehicles, and of paying attention to lower diesel consumption or purchasing hybrid vehicles. Optimisation of fleet management and driver training as well as fuel-saving training or the conversion to biodiesel round off the measures. Consideration should also be given to minimising the demand for heating oil, e.g. when implementing local heating networks.

Scope 2 – Indirect emissions from energy

To reduce the energy required in the form of electricity, the use of more efficient drives and the demand-based operation of plants can be very effective. In addition, production and administration can be successively converted to LED lighting. Regular energy training courses for the entire workforce can also raise awareness of how to save electricity. The switch to green electricity would have a further positive impact.

Scope 3 – Other indirect emissions

One possible option to reduce GHG emissions in Scope 3 would be to provide monetary or other incentives for employees to carpool or use public transport when travelling to work. Here, among other things, consideration is already being given to integrating a cycle to work campaign. As the majority of business trips consist of short-haul flights, these could be reduced. Rail travel would be an alternative here. In order to reduce business travel in the long term, video conferencing would be an option. In the use of paper, GHG emissions can be reduced by using copier paper more economically and switching to recycled paper. New, optimised logistics concepts should be developed together with suppliers to reduce GHG emissions during delivery. The largest part of the GHG emissions in the dairy are the raw materials used, with a share of almost 97% in 2018. In the upstream sector, milk production, the AgriClimateChange project can save up to 15% of GHG emissions in milk production. However, in 2019 and 2018, the same emission factor was calculated for milk, as the AgriClimateChange project cannot yet be applied to all farms. The following measures could be taken, for instance by farmers, to reduce GHG emissions. The use of biodiesel, conversion to regional feed, more energy efficient cooling, switch to LED lighting. In general, however, it has been shown that on average in Germany, approximately 1 kg of CO_2equivalents per litre of milk is applicable.

Conclusion

The present greenhouse gas balance provides a clear overview of the greenhouse gas emissions caused by OMIRA. This report thus forms an important building block in the environmental management of the company. In addition to the reduction measures already proposed, Scope 3 should increasingly work with stakeholders to develop measures to reduce GHG emissions throughout the supply chain. Furthermore, we can offset the greenhouse gases produced with emission rights in order to achieve a balance of the GHG emissions currently generated. We are striving to become a climate-neutral company in this respect.

Climate neutrality means that no additional greenhouse gases are emitted into the atmosphere by a process. This is achieved through an emissions-reduced process, the remaining greenhouse gas emissions of which are offset by an investment in climate protection projects.

Sources

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Annex

GHG emissions

Term	Emission factor	Unit	Source	Comment
Fuel oil	2.540	kg/l	Defra, 2019	
Natural gas	2.037	kg/m³	Defra, 2019	
Diesel	2.687	kg/l	Defra, 2019	
HFC-134a	1430.000	kg/kg	Defra, 2019	
R407c	1774.000	kg/kg	Defra, 2019	
R410a	2088.000	kg/kg	Defra, 2019	
R404A	3922.000	kg/kg	Defra, 2019	
LEW residual mix	0.365	kg/kWh	LEW, 2019	
Electricity DE	0.435	kg/kWh	LEW, 2019	
Public transport	0.073*	kg/km	Defra, 2019	
Car, small car	0.150	kg/km	Defra, 2019	Unknown fuel
Car, middle class	0.181	kg/km	Defra, 2019	Unknown fuel
Car, luxury class	0.229	kg/km	Defra, 2019	Unknown fuel
Motorcycle	0.103	kg/km	Defra, 2019	Motorbike medium
Air travel, long haul	0.196	kg/passenger km	Defra, 2019	Long haul, average passenger
Air travel, medium-haul	0.158	kg/passenger km	Defra, 2019	Short haul, average passenger
Air travel, short haul	0.255	kg/passenger km	Defra, 2019	Domestic, average passenger
Train journeys	0.041	kg/km	Defra, 2019	National rail
Taxi journeys	0.210	kg/km	Defra, 2019	Regular taxi
Water	0.344	kg/m³	Defra, 2019	
Wastewater	0.708	kg/m³	Defra, 2019	
Paper, fresh fibre	0.953	kg/kg	Defra, 2019	Paper and board
Wood waste	0.021	kg/kg	Defra, 2019	
Paper waste	0.021	kg/kg	Defra, 2019	
Plastic waste	0.021	kg/kg	Defra, 2019	
Residual waste	0.021	kg/kg	Defra, 2019	
Organic waste	0.021	kg/kg	Defra, 2019	
Building rubble	0.021	kg/kg	Defra, 2019	
Industrial waste	0.021	kg/kg	Defra, 2019	
Fuel oil TL	0.528	kg/l	Defra, 2019	Burning oil
Natural gas TL	0.263	kg/m³	Defra, 2019	100% mineral blended, natural gas
Diesel TL	0.626	kg/l	Defra, 2019	
Electricity DE-TL	0.070	kg/kWh	Defra, 2019	WTT electricity Germany
Service trips, van	0.252	kg/km	Defra, 2019	Vans, average, diesel
Truck – journeys	1.661	kg/km	Defra, 2019	all HGVs, refrigerated, average load

* arithmetic mean of the emission factors for coach travel (0.105 kg CO_2 equivalents per kilometre) and train travel (0.041 kg CO_2 equivalents per kilometre), (Defra, 2019).

For natural gas, the emission factor of "natural gas" was assumed to be 2.037 kg CO_2 equivalents per Nm^3, for fuel oil the emission factor of 2.540 CO_2 equivalents per litre and for diesel the emission factor of "diesel 100% mineral" of 2.687 CO_2 equivalents per litre. The emission factor for public transport is made up of the arithmetic mean of bus and train journeys. For the journeys of tradesmen for maintenance and repair, the emission factor of "vans, average diesel" was assumed at the level of 0.252 kg CO_2 equivalents per km and for the delivery of material by lorries, the value of "all HGVs, average laden refrigerated" was assumed at the level of 1.661 kg CO_2 equivalents per km. For the different types of waste (wood, paper, plastic, residual waste, organic waste, construction waste and industrial waste), the emission factor was chosen under the category "Combustion", depending on the type of waste, since the largest share of the waste quantities is sent for thermal recycling.

Term	Emission factor	Unit	Source
Raw milk	1.000	kg/kg	Own data
Skimmed milk/buttermilk	14.700	kg/kg	WWF, 2012
Concentrate	14.700	kg/kg	WWF, 2012
Cream	3.280	kg/kg	WWF, 2012
Aluminium *	12.871	kg/kg	Defra, 2019
Wood	0.414	kg/kg	Defra, 2019
Cardboard boxes	0.843	kg/kg	Defra, 2019
Plastics**	3.116	kg/kg	Defra, 2019
Paper	0.953	kg/kg	Defra, 2019
Composite packaging	1.999	kg/kg	Defra, 2019
Ingredients	2.800	kg/kg	WWF, 2012

*This is primary material
**This is an average value for various plastics

Through the AgriClimateChange programme, which we ran together with our farmers, the GHG emissions per kg of milk were calculated and evaluated in practice. The starting point is 1,000 kg CO_2 equivalents per kilogram of milk. For skimmed milk/buttermilk, the figure of 14,700 kg CO_2 equivalents per kilogram of skimmed milk powder/buttermilk was assumed. The same value was used for the concentrate. For cream, the published value for cream products (WWF, 2012) was used. The main ingredients are sugar, jam, pudding powder and cocoa. The value of sugar and cocoa (WWF, 2012) has been used for this purpose. For composite packaging, a self-calculated emission factor was defined, as none was found in the literature. Composite packaging consists of approx. 75% cardboard, 12.5% aluminium and 12.5% plastic. With an emission factor for cardboard packaging of 0.843 kg/kg, for aluminium of 12.871 kg/kg and for plastics of 3.116 kg/kg, an estimated emission factor for composite packaging of 1.999 kg/kg results in connection with the composition of composite packaging.