

NIRAS Climate Account 2018

NIRAS

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1 Introduction

This Climate Account is made for the Danish part of NIRAS (a Danish consultancy company), which constitutes more than 70 % of its business. NIRAS is an international multidisciplinary consultancy company with activities in Denmark and 26 other countries across the world.

The report estimates the greenhouse gas (GHG) emissions (calculated in CO₂-eq) caused by NIRAS activities, in Denmark in 2018. NIRAS GHG emissions have been documented since 2013.

The Climate Account includes both direct and indirect emissions. Direct emissions are related to the consumption of fuels in NIRAS' own equipment and vehicles (scope 1), where indirect emissions are associated with the production of purchased energy (scope 2) and the production of purchased goods and services (scope 3).

This account follows The Greenhouse Gas Protocol Corporate Standard¹.

1.1 Organisational and operational boundaries

The operational boundary covers scope 1, scope 2 and scope 3 caused by NIRAS' Danish operations. The scopes are defined by the GHG protocol and are further explained in section 5.2.

All Danish offices are included in NIRAS' Climate Account 2018. NIRAS have offices in:

- Allerød
- Aalborg
- Aarhus
- Esbjerg
- Kolding
- Odense
- Nykøbing Falster
- Holbæk
- Frederikshavn
- Holstebro
- København
- Virum

For this inventory all internal activities (within scope 1, 2 and 3) have been included. However, the canteen and sponsorships have been extracted from scope 3. The included activities are:

Scope 1

- Natural gas for heating
- Use of company cars
- Use of employee cars for business purpose

Scope 2

- Electricity used in offices
- District heating used in offices
- Production of renewable energy

Scope 3

- Transportation by train
- Transportation by airplane
- Procurement of goods and services

In future reports the organisational and operational boundaries may vary (new activities included/old activities excluded), and new measurements as well as new GHG emission sources may be applied. In case of such an occurrence, NIRAS can conduct a recalculation and back-cast these data points.

¹ <http://www.ghgprotocol.org/standards/corporate-standard>

1.2 Corrections and changes

The climate account for 2018 is the first year NIRAS includes a full scope 3 (all purchased goods and services). The climate accounts from 2013–2017 only covers emissions from scope 1 and 2 and business travel from scope 3.

Since 2013 a systematic error has occurred in the calculation of heat consumption in NIRAS' Esbjerg office(s). In 2016 and 2017 the energy consumption was calculated incorrect as well. The errors from 2013–2015 do not have a big impact on NIRAS' overall climate account. However, the miscalculations in energy and heat consumption in 2016 and 2017 are substantial, and therefore important to be aware of.

In previous years, distribution losses for electricity were not taken into account. In this climate account electricity is estimated based on a 5 percent distribution loss.

When comparing energy consumption for heating over a period of years, it is necessary to consider the weather/temperature fluctuations each year. In this report a weather/temperature correction has been made so the data reflects a more genuine increase or decrease in the consumption of heat.

The office in Holbæk use natural gas for heating, and the energy use is therefore categorized under scope 1. However, from 2015, when NIRAS moved into the office, the energy consumption has been included in scope 2. In the climate account for 2018, this mistake has been corrected.

In 2017 the office in Aarhus started to collaborate with Biotrans who collects their biological waste and use it for energy production. The energy produced from the waste in 2017 was deducted from the energy consumption in the office. This is incorrect since the produced energy is supplied to the national electricity grid and therefore the energy is included in the national emission factor. Deducting the green energy would result in double counting.

A new ticket system in the Danish public transport sector, has changed NIRAS' practice regarding registration and payment of public transport for employees. Transportation by train is therefore calculated different from 2018. The data from earlier years has been recalculated with the new method as well to ensure comparability.

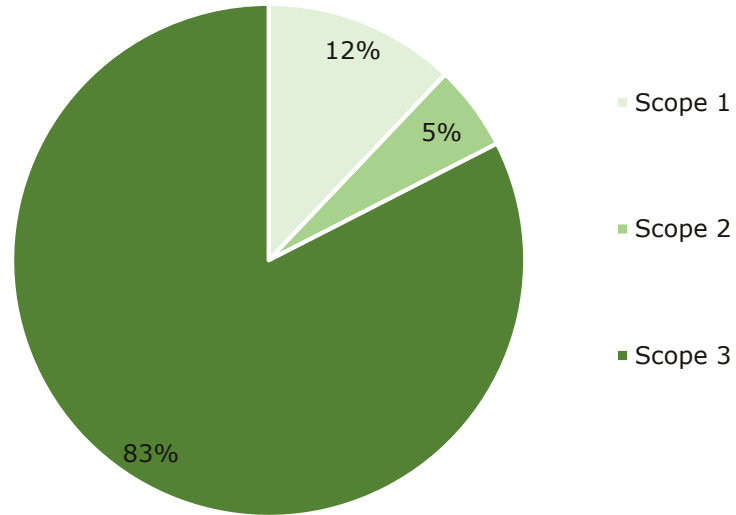
Both use of employee cars for business purpose and transportation by airplane is calculated significantly wrong in 2017. This correction causes a deduction in emissions in 2017.

2 Results 2018

In 2018 the total GHG-emissions for NIRAS were 10,361 ton CO₂-eq, which corresponds to 5.9 ton CO₂-eq per fulltime employee and 0.22 ton CO₂-eq per m².

In 2018 scope 3 counted for 83 percent of the total emissions, where scope 1 and 2 only represented 12 and 5 percent.

Figure 1: CO₂ emissions in 2018 allocated in scopes.



In Table 2,1 the distribution of the emissions is presented according to the different scopes and activities in 2018. The development in emissions from 2013 to 2018 are addressed in section 3.

Table 2.1 CO₂ emissions in 2018 divided according to the different scopes and activities.

2018		
Activities	Ton CO ₂ -eq	% share
Scope 1	1,252	12%
Natural gas for heating	337	3%
Use of company cars	261	2%
Use of employee cars for business purpose	654	5%
Scope 2	559	5%
Electricity used in offices	452	4%
District heating used in offices	107	1%
Scope 3	8,550	83%
Transportation by train	58	1 > %
Air transport	1,059	10%
Goods and services	7,474	72%
Total	10,402	100%

The top 5 contributing activities are:

1. Rent of premises
2. Air transport
3. Transport by car
4. Minor acquisitions equipment and tools
5. Software

"1. Rent of premises", "4. Minor acquisitions equipment and tools" and "5. Software" are parts of "Goods and services" in table 2.1. "3. Transport by car" is the sum of "Use of employee cars for business" and "Use of company cars" in table 2.1. These five activities account for 45 percent of NIRAS' GHG-emissions.

2.1 Production of renewable energy

NIRAS produces renewable energy (electricity) from solar panels in Allerød and Virum. In 2018, the solar panels produced 194,852 kWh in Allerød and 155,747 kWh in Virum.

8,446 kWh were sold back to the grid. The remaining 342,153 kWh were used in the offices. By producing electricity from solar panels, a reduction of 72,741 kg CO₂-eq has been accomplished.

Table 2.2: production, sale and consumption of electricity from solar own panels.

[kWh]	2013	2014	2015	2016	2017	2018
Production	193,521	182,290	180,842	182,092	164,601	350,599
Sale	14,396	6,566	10,659	8,409	7,737	8,446
Consumption	179,125	175,724	170,183	173,683	156,864	342,153

The increase in energy production from 2017-2018 is due to new solar panels in Virum.

NIRAS collects food waste from the canteen in Allerød and Aarhus, which is used to produce electricity and heat by a third party.

NIRAS' food waste is used for energy production by a company called Biotrans Nordic. The arrangement of food collection for district heating and electricity production was initiated in mid-2013, and the annual energy production depends on the amount of food waste generated from NIRAS' offices. The two largest offices - Allerød and Aarhus - are part of the "food waste to energy" arrangement.

Food waste collected at NIRAS in 2018 produced a total of 34,714 kWh of electricity and 43,393 kWh of heating.

Table 2.3: Production of energy and electricity from food collection 2013 to 2018. Aarhus office was included in the arrangement in 2017.

	2013	2014	2015	2016	2017	2018
Collected food waste [mt]	20	39	28	29	82	102
Electricity production, food [kWh]	6,618	14,661	9,333	9,944	28,016	34,714
Heat production, food [kWh]	8,288	18,360	11,688	12,455	35,020	43,393

It is important to note that the goal is minimize waste. Therefore an increase in energy and heat production, should not be seen as a positive development. However, expanding the collection of food waste to other offices is desirable.

3 Development of Emissions from 2013 - 2018

Since 2018 is the first year to include a full scope 3, it is not possible to compare the result with earlier years. Therefore this section will only discuss the development of emissions from scope 1, 2 and the transportation from scope 3.

Since heat consumption is correlated to the outdoor temperature it is necessary to adjust the heat consumption based on weather data to get comparable results.

Table 1.1 below illustrates how scope 1, 2 and transportation from scope 3 has developed from 2013 to 2018.

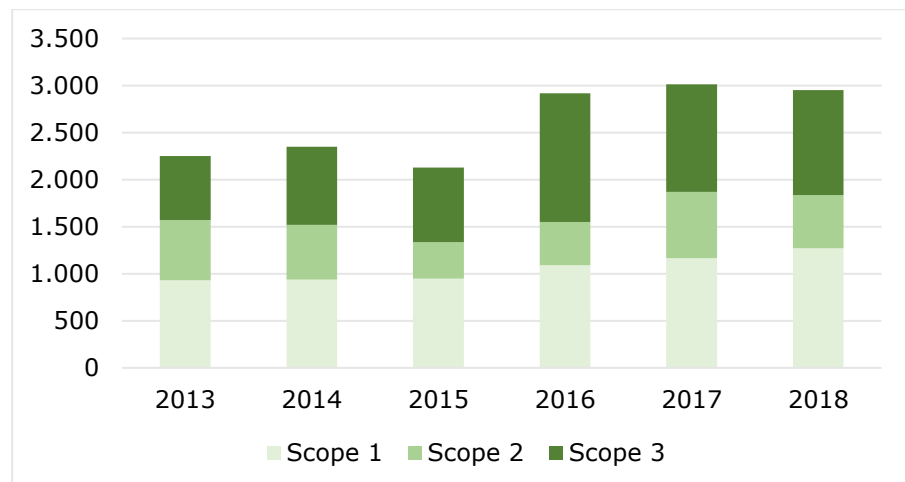
Table 1.1 Comparison of CO₂ emissions across scopes from 2013 to 2018.

*Weather/temperature correction

	2013	2014	2015	2016	2017	2018
Activities	Ton CO ₂	Ton CO ₂	Ton CO ₂	Ton CO ₂	Ton CO ₂	Ton CO ₂
Scope 1	930	939	947	1,092	1,167	1,272
Natural gas for heating	225	225	233	266	307	337
Use of company cars	318	346	320	397	238	261
Use of employee cars for business purpose	387	367	395	429	623	654
Scope 2	641	581	387	459	703	565
Electricity used in offices	538	485	293	375	468	452
District heating used in offices*	103	95	94	84	234	113
Scope 3	679	832	793	1,366	1,143	1,117
Transportation by train	90	98	65	79	62	58
Domestic air transport	51	55	42	35	161	220
Continental air transport	159	230	242	269	305	235
Intercontinental air transport	380	449	443	983	615	604
Total	2,250	2,351	2,128	2,917	3,013	2,954

Table 3.1 shows that the total amount of GHG emissions has increased with 704 ton CO₂-eq from 2,250 ton in 2013 to 2,954 ton in 2018. However, the level of GHG emissions have decreased with 243 ton CO₂-eq from 2017 to 2018. The development of emissions from scope 1, 2 and part of scope 3 are illustrated in figure 3.1.

Figure 3.1: Development of emissions from 2013 to 2018 from scope 1, 2 and part of scope 3



To compare the emissions in 2018 with the former years, key numbers indicating ton CO₂-eq per employee and square meter is listed in the section below.

3.1 Annual comparison of key figures

In order to compare the results inter-annually the emissions should also be compared to the number of employees and office square meters i.e. the key figures. In this section the key figures from 2013 to 2018 are represented.

Table 3.2 presents the emissions per full time employee and per office square meter in 2013 - 2017. The CO₂ emissions per office square meter is related to the activities *electricity, district-* and *natural gas* for heating used in the offices.

Table 3.2: Annual comparison of key figures from 2013 to 2018. Emissions related to employee number and office square meters. It should be emphasized that the key numbers for 2017 are expected to stand out due to the merger with Alectia

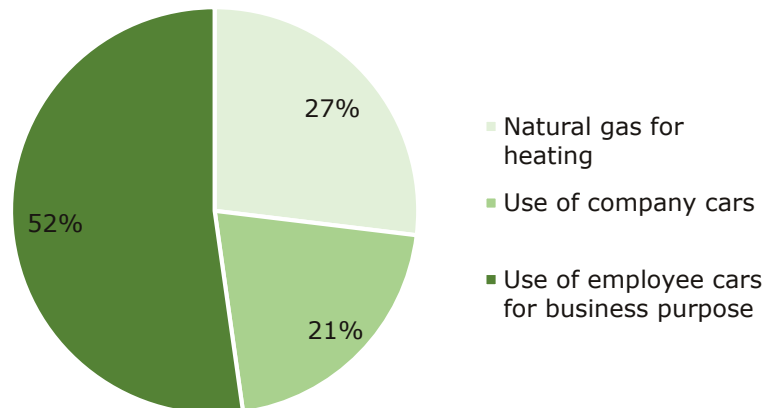
	2013	2014	2015	2016	2017	2018
Total ton CO ₂	2,250	2,351	2,128	2,917	3,013	2,954
Ton CO ₂ -eq from office buildings	866	805	620	725	1009	902
Number of full-time employees	1,009	1,089	1,090	1,151	1,532	1,760
Total heated area (m ²)	25,468	25,785	30,248	30,634	44,406	46,158
Ton CO ₂ -eq/ full time employee	2.23	2.16	1.95	2.53	1.97	1.68
Kg CO ₂ -eq/ m ²	88	91	70	95	68	64

In 2018 the level of CO₂-emissions per employee and per square meter have decreased significantly compared to all former years.

3.2 Scope 1

Scope 1 includes CO₂ emissions from natural gas for heating, use of company cars and use of employee cars for business purpose. Figure 3.2 illustrate the share of each category in scope 1.

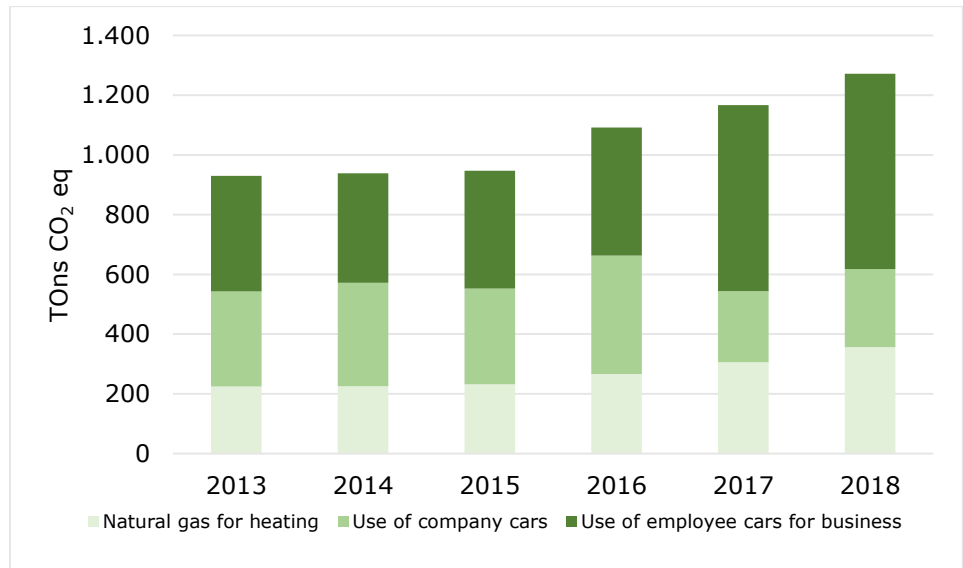
Figure 3.2: Distribution of CO₂ emissions in scope 1 without weather correction.



The total amount of GHG emissions from scope 1 activities were 1,252 ton CO₂-eq.

The development from 2013 to 2018, when weather conditions is taken into account, is illustrated in figure 3.3.

Figure 3.3: Development of emissions from scope 1 activities with weather correction.

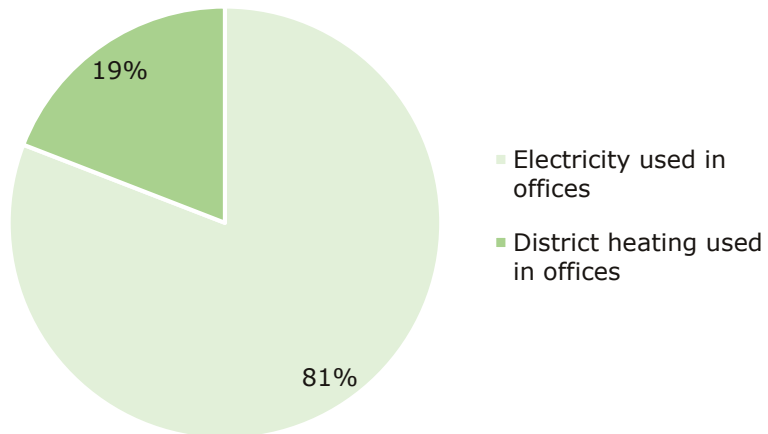


NIRAS' CO₂ emissions have since 2013 increased with 342 ton CO₂-eq.

3.3 Scope 2

Scope 2 includes CO₂ emissions from electricity and district heating used in the offices. Figure 3.4 illustrates how much of the impact in scope 2 that is caused by heat and electricity respectively.

Figure 3.4: Distribution of CO₂ emissions in scope 2 without weather correction.



Scope 2 is dependent on the national emission factors for electricity and district heating, which vary annually. The annual emission factors for electricity and district heating are determined by the composition of energy sources in the national electricity grid and the district heating network, i.e. the amount of renewable energy (e.g. wind and sun energy) versus fossil energy (e.g. coal and natural gas).

This means that the development in CO₂ emissions does not necessarily show initiatives and actions from the company but just as well a development in the Danish electricity grid and district heating network. In table 3.3 and 3.4 some key figures have been added to better reflect the development.

Table 3.3: Electricity use and emissions hereof from 2013-2018.

Electricity	2013	2014	2015	2016	2017	2018
CO ₂ emissions [ton CO ₂ -eq]	538	485	293	375	468	452
Total electricity use [MWh]	1,407	1,579	1,438	1,606	2,566	2,314
Electricity use per employee [MWh]	1.01	1.45	1.32	1.40	1.67	1.32
Electricity use per m ² [kWh]	54	57	48	52	58	50

Table 3.4: Use of district heating and emissions hereof from 2013-2018.

District heating	2013	2014	2015	2016	2017	2018
CO ₂ emissions [ton CO ₂ -eq]	103	95	94	84	234	113
Total district heating [MWh]	844	802	709	778	2,604	2,241
District heating per employee [MWh]	0.84	0.74	0.65	0.68	1.70	1.27
District heating per m ² [kWh]	32	29	23	25	59	49

Table 3.3 and 3.4 show an overall positive development from 2017-2018. Furthermore, NIRAS' electricity consumption pr. m² is the lowest in five years.

3.4 Scope 3

All activities in scope 3 has been included in the Climate Account for the first time in 2018.

The inclusion of scope 3 has made it possible to identify new "hot spots" and thereby make recommendations for the most effective actions to reduce GHG emissions across all scopes and activities.

The total GHG emissions in 2018 are divided into scope 1, 2 and 3 to the left in figure 3.5. To the right in figure 3.5 the pie chart has been generated only including transport in scope 3 as the climate accounts from former years.

Figure 3.5: right pie chart shows the distribution of scope 1, 2 and 3, with a full scope 3 and the left chart shows the distribution when only transport from scope 3 is included.

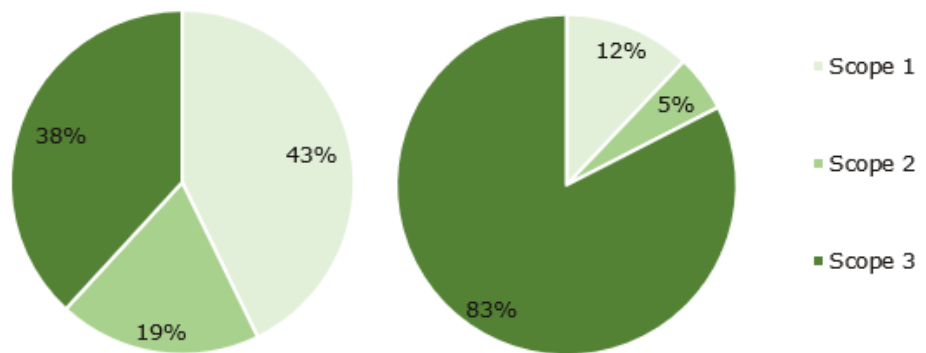


Table 3.5 highlights the 18 most CO₂ contributing categories. "Other" is the sum of all the categories that contribute less than 2%. The coloured categories indicate that the impact belongs to scope 1 (orange) and 2 (grey), the non-highlighted belongs to scope 3.

Table 3.5: the top 18 most CO₂ contributing categories.

Other	18%
Rent of premisis	15%
Transport (air)	10%
Minor acquisitions equipment and tools	7%
Transport by car	9%
Software	4%
Electricity	4%
Hotel and meals	4%
Gifts employees	4%
Natural gas	3%
Depreciation leasehold improvement	3%
Other staff costs	3%
Repair and maintenance of premises	3%
Newspapers and magazines	3%
Contracted benefits - Executing	2%
Leasing cars	2%
Office supplies	2%
Meetings and consumption without VAT	2%
Cleaning	2%

The largest contributor in scope 3 is rent of premises. However, great uncertainty is related to this category and it is difficult to reduce the direct impact from the branch offices.

Air transport is the second largest contributor. It is possible to reduce this impact by reducing the number of flights. Substituting the flights with skype meetings or train travels whenever possible could be a strategy to reduce the impact.

Minor equipment and tools are responsible for 7%. It is difficult to reduce the impact related to the purchase of this equipment since NIRAS is depended on the equipment to deliver tasks and services for the clients.

Gifts for employees is the eighth largest contributor. The impact hereof can be reduced by including CO₂-emissions as a parameter when selecting the list of gifts and the option for donating the gifts could also be for a cause that includes subtraction of CO₂ from the atmosphere e.g. planting trees or sustaining forests.

In this account NIRAS' canteen operations is excluded due to the fact the impact of the canteen is affiliated with the employees and not directly under the control of NIRAS.

Sponsorships (e.g. for hospital clowns) has been excluded as well, since the impact is allocated to the non-profit organisations.

Sponsorships and the canteen emits respectively 8 and 2,071 tonnes of CO₂.

4 Conclusions and recommendations

NIRAS activities in Denmark emitted 10,361 ton CO₂-eq in 2018. The result cannot be compared to earlier assessments since it is the first time scope 3 is fully accounted for. The new assessment outline the total CO₂-emissions caused by NIRAS' internal activities but does not include emissions that are related to projects, in which NIRAS function as consultants or similar.

Looking at the same scopes and activities as former climate accounts (year 2013-2017) the level of CO₂-emissions in 2018 corresponds to an increase of 31 percent compared to 2013 and a 2 percent decrease from to 2017. However, the levels of CO₂ per employee and office square meters are significantly reduced in 2018 when comparing with the results from all former years.

From 2017 to 2018 the impact per fulltime employee is reduced with 15% and considering the impact per square meter the impact is reduced with 6%. The reduced CO₂-emissions are caused by a decrease in consumption of heat and electricity compared to 2017 and by an increased share of renewable energy sources in the production of district heat. Furthermore, the supplementary solar panels in Virum and the food waste collection increased NIRAS' own production of renewable electricity and heat in 2018. This results in a larger share of energy that NIRAS can subtract from the total energy consumption.

From the account for 2018 it is possible to identify hot spots and specific target areas with potential for CO₂ reductions, since the full picture of the CO₂-emissions are mapped. Areas of potential are among others the canteen, air transport and gifts.

The method can be further developed and enhanced to handle CO₂ reducing initiatives and actions. However, individual methods must be defined to estimate the CO₂ saving for every initiative. Depending on the action/initiative the level of CO₂ can be delivered by a supplier (e.g. the canteen), or it can be calculated by NIRAS in SimaPro or estimated based on literature.

5 Methodology

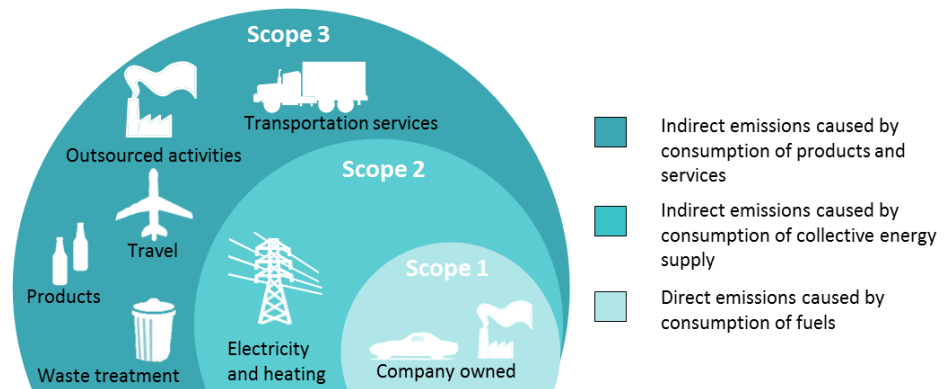
5.1 Scope 1, 2, and 3 emissions

The GHG emissions are categorized into either direct or indirect emissions. Direct emissions are defined as emissions that are directly caused by a source operated or owned by NIRAS. Indirect emissions arise from the NIRAS' consumption of energy products and services, i.e. sources for which NIRAS does not have direct control or ownership.

The direct and indirect emissions are divided into the following scopes (see The GHG Protocol Corporate Standard):

- Scope 1: All direct emissions caused by the company, e.g. emissions from company cars and from company owned boilers for energy production.
- Scope 2: All indirect emissions caused by the company's purchase of energy, including electricity and district heating.
- Scope 3: Other indirect emissions caused by the company's procurement of goods and services, for example procurement of IT equipment, consulting, food, outsourced activities, travel, advertising, marketing, waste, etc.

Figure 5.1: Scope 1, 2 & 3 according to the GHG Protocol Corporate Standard.



The assessment of emissions in **Scope 1** is based on consumption of fuel, natural gas and mileage stated in physical units [L, km driving and m³]. The consumption is multiplied with emission factors to calculate the contribution of CO₂ from transport by cars and natural gas for heating.

When calculation the emissions from employee cars for business purpose it is necessary to estimate what percentage of cars is diesel and what is gasoline. To make this assumption, statistics from Statistics Denmark is used.

Scope 2 is based on the same principles as scope 1. National emissions factors are multiplied with the use of electricity and district heat given in kWh.

Since heat consumption is correlated to the outdoor temperature it is necessary to adjust the heat consumption based on weather data to get comparable results. This weather/temperature correction is based on data from DMI, and the assumption that 20% of the heat is used for hot water, which is not related to the outdoor temperature.

The assessment of **Scope 3** is a mix of two methods. The main part of scope 3 is based on procurement data. The different procurement categories are matched

with emission factors, which indicate an impact per monetary unit. Where the consumption of a specific service/action is known in physical units or the CO₂ emissions are known from other parties (e.g. air transport), the category and the associated budget is removed from the procurement list. The associated budgets that are accounted for in scope 1 and 2 are also removed from the procurement list. The impact is calculated with same method as described in scope 1 and 2 if the consumption is known in physical units and then the final impact for the category is added to the procurement based assessment.

CO₂-reducing initiatives will only be incorporated in the climate account if the initiatives also results in a monetary saving since the account is based on an economic model. If the initiatives do not result in an economic saving, the categories will be removed from the procurement list and the emissions will be calculated with an alternative method (e.g. CO₂ data from supplier, own estimates made in SimaPro based on typical products or literature).

The canteen and sponsorships have been deduced from the assessment since NIRAS is not responsible for the decisions made. However, NIRAS can make demands for the suppliers, therefore the canteen is calculated and handled on its own.

Depreciations have been included in the climate account as is. This means that emissions are allocated to the expenses used every year (even though the products/service were delivered in a previous year where the emissions actually occurred).

5.2 Data in physical units

The categories that have been removed from the procurement list and calculated with other methods in NIRAS' Climate account are:

Air transport - CO₂ emissions has been delivered by CWT.

Transport by car (except from taxa) - since it is included in scope 1 and the emissions are calculated based on mileage [km] and liter of diesel and gasoline.

The remaining budget for public transport in the procurement list have been compared with the amount spend on public transport in 2017, which for both years is around 500.000 DKK. It is not possible to estimate the budget used on public transport in 2018 since NIRAS' have changed practice regarding registration and payment of public transport for employees.

Heat and electricity consumption are in some cases only provided in expenses. In this case an estimated is made based on empirical data.

In NIRAS Climate account 2018 it was not possible to get heat consumption from the office in Frederikshavn. This is a small office and does not have a big impact on the overall results. It was therefore decided to copy the heat consumption from 2017, since no changes have been made to the office.