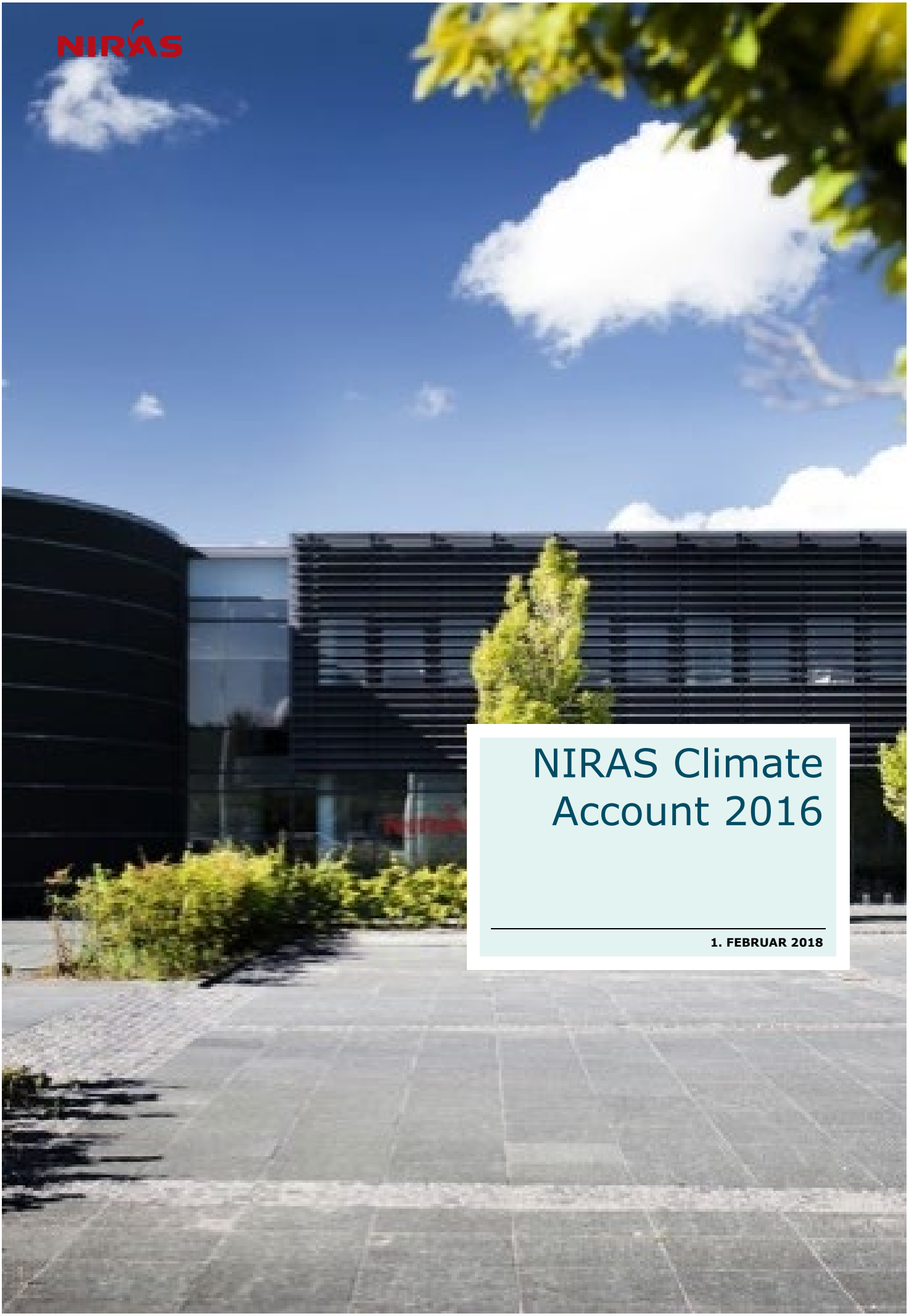

NIRAS Climate Account 2016

1. FEBRUAR 2018

Contents

Project no.: A20124
Document no.: 1222900506
Version 1
Prepared by ANSN
Verified by NYMB

1 Introduction

This climate account is prepared for the Danish consultancy company NIRAS A/S.

Denmark and 35 countries across the world.

The climate account follows The Greenhouse Gas (GHG) Protocol Corporate Standard[1].

1.1 Organisational and operational boundaries

This report estimates the GHG emissions caused by NIRAS A/S activities in the year 2016 and is the fourth of its kind. Hence, 2013 is the baseline year.

The operational boundary covers scope 1, scope 2 and part of scope 3 (business travel) caused by NIRAS' Danish operations. The scopes are defined by the GHG protocol and are further explained in section 2.

The offices which are included within NIRAS A/S in 2016 are:

- Allerød
- Ålborg
- Århus
- Esbjerg
- Kolding
- Odense
- Nykøbing Falster
- Holbæk
- Frederikshavn
- Holsterbro
- København

For this inventory a selected range of activities (within scope 1, scope 2 and scope 3) have been included, dependent on the accessibility of data and to which degree it is possible to influence the magnitude of the emissions.

The included activities are:

Scope 1

- Natural gas for heating
- Use of company cars
- Use of employee cars for business purpose (car allowance)

[1] http://www.ghgprotocol.org/standards/corporate-standard

Scope 2

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

Scope 3

- Transportation by train
- Transportation by airplane

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

In the following section the results of the 2016 climate account are presented.

2 Results 2016

The emissions are categorized into either direct or indirect emissions.

- Direct emissions are defined as emissions caused by a source that the company owns or controls.

- Indirect emissions arise from the company's consumption of energy products and services, where the company does not have direct control or ownership of the emission source.

In accordance with the GHG Protocol Corporate Standard the direct and indirect emissions are divided into the following three scopes:

- Scope 1: All direct emissions caused by the company, including 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, including IT equipment, consulting, food, outsourced activities, travel, advertising, marketing, waste, etc.

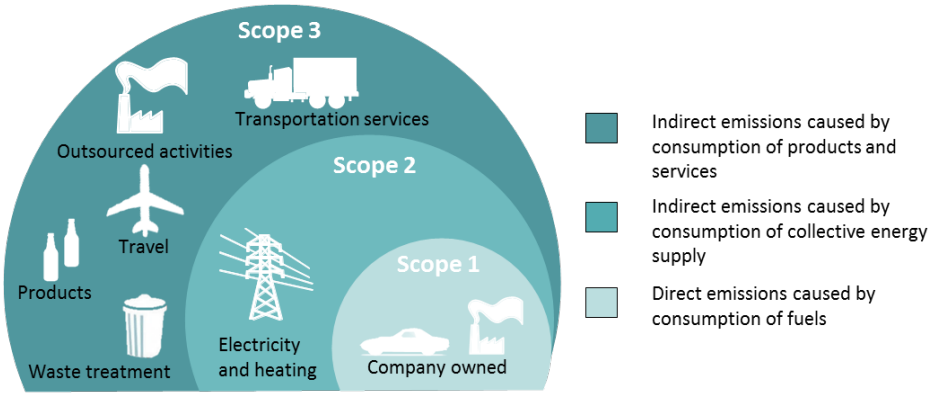

Figure 1: Scope 1-3 according to the GHG Protocol Corporate Standard.

2.1 The total CO_2-emission in 2016

In 2016 the total GHG-emissions for NIRAS A/S were 2,685 ton of CO_2, which corresponds to 2.3 ton per fulltime employee.

In figure 2, the distribution of the emissions is presented according to the different scopes and activities. The development in emissions between 2013 and 2016 are addressed in section 3.

	2016	
Activities	CO_2-emissions (ton)	% share
Scope 1	**1,071**	**40%**
Natural gas for heating	246	9%
Use of company cars	397	15%
Use of employee cars for business purpose	429	16%
Scope 2	**592**	**22%**
Electricity used in offices	472	18%
District heating used in offices	120	4%
Scope 3	**1,022**	**38%**
Transportation by train	14	1%
Domestic air transport	32	1%
Continental air transport	239	9%
Intercontinental air transport	737	27%
Total	**2,685**	**100%**

Figure 2: CO_2 emissions divided according to the different scopes and activities.

The results of figure 2 are additionally presented in the figure below:

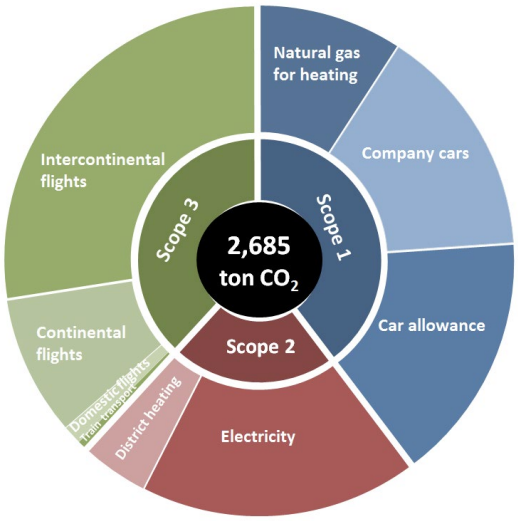

Figure 3: The distribution of CO_2 emissions in 2016 – divided into scopes and activities.

2.2 Production of renewable energy

NIRAS produces renewable energy (electricity) from solar panels. The company additionally collects food waste, which is collected and used to produce electricity and district heating by a third party.

In 2016 the solar panels produced a total of 182,092 kWh at the Allerød office. From these 8,677 kWh were sold back to the grid. The remaining 173,415 kWh were used at the Allerød office and constituted 15 % of the electricity consumed in the building.

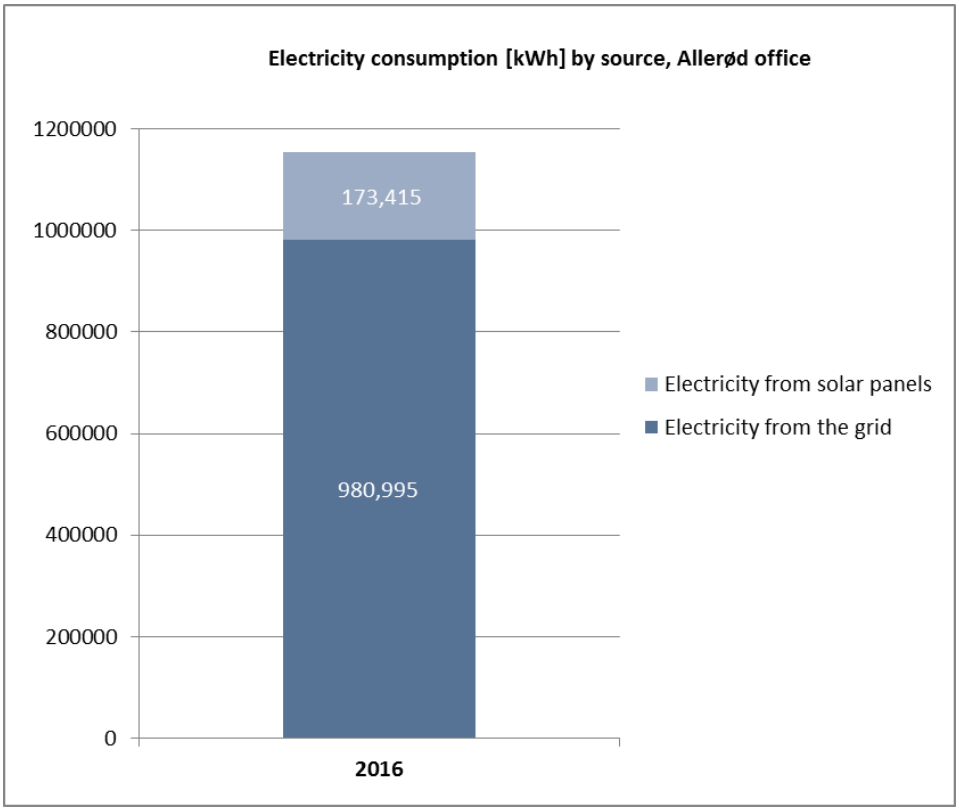

Figure 4: Division of the total consumption of electricity at the Allerød office between electricity from the grid and from solar panels (2016).

By producing electricity from solar cells a reduction of 42,140 kg CO_2 has been accomplished. Please note that the CO_2 emissions related to electricity in figure 2 only include electricity purchased from the grid, and the reduction of 42,140 kg CO_2 has been accounted from the solar cell electricity.

As presented in figure 5, the amount of electricity consumption at the Allerød office based on solar panels has been stable since 2013, and varies between 15 – 18 % of the total electricity consumption.

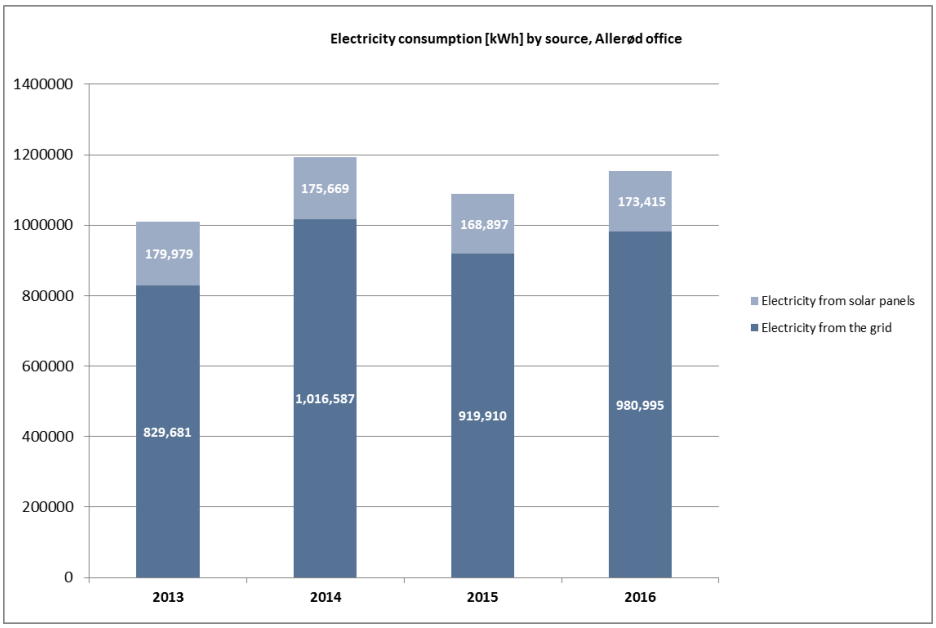

Figure 5: Division of the total consumption of electricity at the Allerød office between electricity from the grid and from solar panels (2013 - 2016).

As mentioned above NIRAS sells food waste for energy production to a third party – a company called Biotrans Nordic. Food waste collected at NIRAS in 2016 produced a total of 9,944 kWh of electricity and 12,455 kWh of heating. This equivalents to 4,963 kg CO_2 reduction, which is included in the climate account.

The arrangement of food collection for district heating and electricity production was initiated in mid-2013 and Figure 6 shows how the production more than doubled from 2013 to 2014. The amount of food waste has decreased with 25 % in 2016 compared to 2014. This has led to a decrease in district heating and electricity production from food waste in 2016 (see the table below).

	2013	2014	2015	2016
Electricity production from food (kWh)	6,618	14,661	9,333	9,944
District heating production from food (kWh)	8,288	18,360	11,688	12,455

Figure 6: Production of electricity and district heating from food collection.

3 The Development of Emissions from 2013 to 2016

Figure 7 below illustrates how the total emissions from NIRAS has developed from 2013 to 2016.

	2013	2014	2015	2016
Activities	CO_2-emissions (ton)	CO_2-emissions (ton)	CO_2-emissions (ton)	CO_2-emissions (ton)
Scope 1	**934**	**909**	**924**	**1,071**
Natural gas for heating	229	196	209	246
Use of company cars	318	346	320	397
Use of employee cars for business purpose	387	367	395	429
Scope 2	**610**	**537**	**368**	**592**
Electricity used in offices	504	455	274	472
District heating used in offices	106	82	94	120
Scope 3	**605**	**752**	**739**	**1,022**
Transportation by train	15	18	12	14
Domestic air transport	51	55	42	32
Continental air transport	159	230	242	239
Intercontinental air transport	380	449	443	737
Total	**2,149**	**2,198**	**2,031**	**2,685**

Figure 7: Comparison of CO_2 emissions between scopes from 2013 to 2016[2].

Figure 7 shows that the total emissions have increased with 815 ton CO_2 from 2,149 ton in 2013 to 2,685 ton in 2016. Compared to the former years scope 3 CO_2 emissions increased in particular during 2016.

3.1 Scope 1+2

As presented in the introduction, scope 1 includes CO_2 emissions related to the activities natural gas for heating, use of company cars and use of employee car allowance. Scope 2 includes electricity and district heating use in offices and production of renewable energy.

In 2016 the total emissions from scope 1 and 2 activities is 1,663 ton CO_2, which corresponds to an increase of 371 ton CO_2 from 2015 to 2016. As showed in figure 7, all scope 1 and 2 activities have contributed to the increase.

The figure below illustrates the annual development in electricity use (blue bars) and the CO_2 emissions from electricity use (red dots) from 2013 to 2016.

[2] Please note that the national electricity emission factor for 2014 was incorrectly applied in the 2015 climate account. As a result the total CO_2 emissions were presented as 2,089 ton CO_2 in the 2015 report, rather than 2,031 ton CO_2. This error has been corrected in this report.

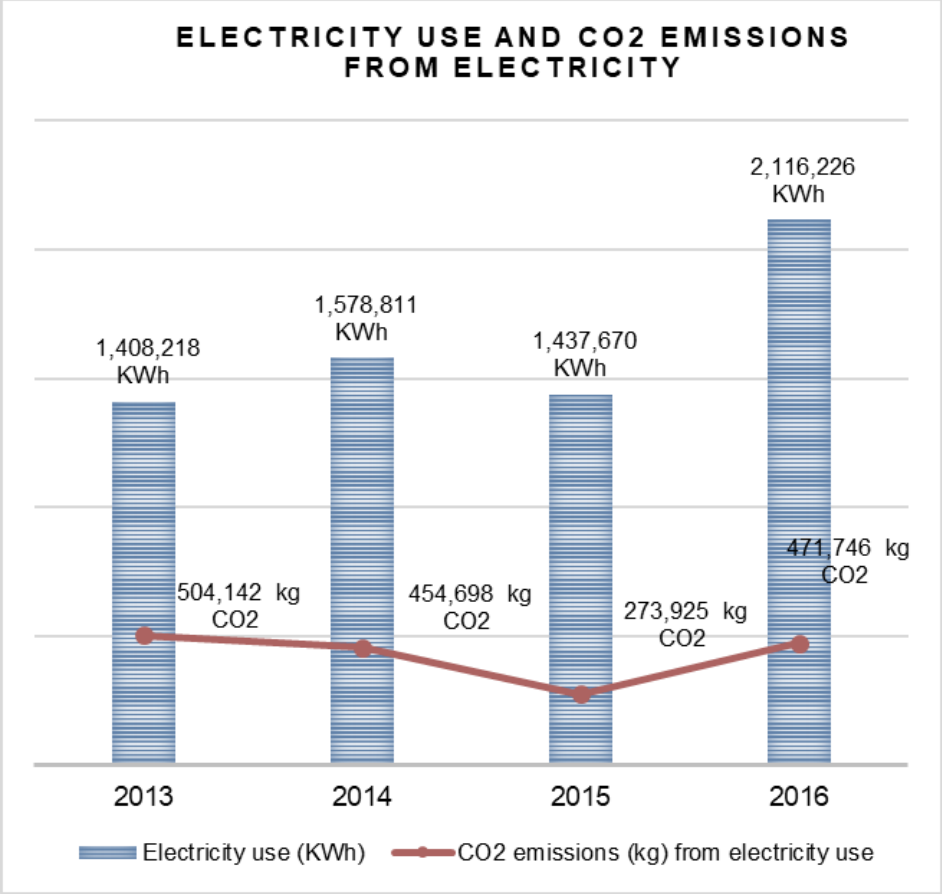

Figure 8: Electricity use and CO_2 emissions 2013 to 2016..

From figure 8 it is evident that CO_2 emissions from electricity use is affected by more than solely electricity use. E.g. from 2013 to 2014 electricity use increased, whereas the total emissions from electricity decreased. This non-linear relationship is explained by the changing national CO_2 emission factor provided by Energinet[3]. The emission factor is determined by the yearly composition of fossil and renewable energy sources for electricity production for the Danish electricity grid. The figure below outlines the annual emission factor from 2013 to 2016.

Year	2013	2014	2015	2016
National electricity emission factor (g CO_2/KWh)	358	288	192	243

Figure 9: The development of the national emission factor from electricity.

As showed in the figures above, the annual change of the national electricity emission factor affects the inter-annual comparison in climate accounts. If for example the 2016 emission factor is applied for the 2013 account, the total CO_2 emissions from electricity would decrease to 342 ton CO_2 compared to the calculated 504 ton. Moreover, electricity use in 2016 is significantly higher that electricity use in 2013. However, due to the fact that the emission factor is higher

[3] Under the auspices of the Danish Ministry of Energy, utilities and climate.

in 2013, the total emissions form electricity become higher in 2013 compared to 2016.

Hence, when comparing emissions of CO_2 from electricity it is important to account for the annual emission factor for electricity to obtain a more nuanced picture.

3.2 Scope 3

The activities within scope 3 presented in this report are from transport by train and airplane. Emissions from scope 3 activities increased from 36 % to 38 % of the total emissions from 2015 to 2016, which is due to an increase in intercontinental air transport.

In 2016, CO_2 emissions from intercontinental air transport contributes with 737 ton CO_2 compared to 442 CO_2 in 2015, which corresponds to an increase of 66 %. In 2015 emissions from intercontinental air transport accounted 22 % of NIRAS' total emissions, which increases to 27 % in 2016.

Compared to other modes of transportation airplane is especially CO_2 intensive (0.21 kg CO_2/km compared to 0.06 CO_2/km for trains), which explains the influence on the overall climate account.

Due to the significance for the overall results, it would be relevant for NIRAS to investigate the increase in air transportation.

3.3 Annual comparison of key figures

In order to compare the results inter-annually emissions are related to a number of key figures including the number of employees and office square meters.

Figure 9 presents the development of CO_2 emissions/full time employee and the CO_2 emissions/ office m2. The number of fulltime employees at NIRAS' Danish offices increased with 137 employees from 2013 to 2016. Additionally the CO_2 emissions per full time employee increased from 2.1 ton CO_2 in 2013 to 2.3 ton CO_2 in 2016.

The office square meters expanded from 25,468 m^2 in 2013 to 30,634 m^2 in 2016. The CO_2 emissions/m2 is related to the activities electricity, district- and natural gas for heating used in offices. As presented in figure 9, the emissions decreased from 33 kg CO_2/m^2 in 2013 to 19.1 kg CO_2/m^2 in 2015. In 2016 the emission increased to 27.4 kg CO_2/m^2.

However, it should be mentioned that a wide number of expansions and reallocations of NIRAS' offices including temporary leases occurred in 2016. Due to these additional activities, the emissions from energy were expected to be higher in 2016 compared to the former years.

	2013	2014	2015	2016
Total CO_2 Emissions (ton)	2,149	2,198	2,031	2,685
Office CO_2 Emissions (ton)	839	733	577	840
Full time employees	1,009	1,089	1,090	1,151
M^2	25,468	25,785	30,248	30,634
Total CO_2/employee (ton)	**2.1**	**2.0**	**1.9**	**2.3**
CO_2/m^2 (kg)	**82**	**80**	**67**	**88**

Figure 9. Emissions related to employee number and office square meters.

4 Conclusion

The emissions of CO_2 caused by NIRAS A/S activities in Denmark increased from 2,031 ton in 2015 to 2,685 ton in 2016, which corresponds to an increase of 32.2 %.

The total scope 1 and scope 2 emissions increased with 28.7 % from 2015 to 2016. With most significance to the overall results, scope 3 emissions increased with 38,3 % (283 ton) from 2015 to 2016 - primarily due to increased intercontinental air transportation. The intercontinental air transportation increased from 3.779.927 km in 2015 to 5.145.355 in 2016 (36 %).

The size of NIRAS offices (in m^2) increased with 1.3 % from 2015 to 2016, and the emissions/m^2 increased from 67 kg CO_2/m^2 in 2015 to 88 kg CO_2/m^2 I 2016.

The number of employees increased with 5.6 % from 2015 to 2016, however due to the overall increase of emissions on 32.2 % from 2015 to 2016, the emissions pr. employee increased from 1.9 to 2.3 ton CO_2.

5 Assumptions and Estimations

From 2016 NIRAS' climate account includes a section that outlines assumptions and estimations necessary to prepare the climate account.

5.1 2016 – assumptions and estimations

- **Estimation of office square meters:** Due to a number of completed and initiated office leases during 2016, the physical size of NIRAS (m^2) varied noticeably throughout the year.

  For instance, the Aalborg office changed location in September and the floor space (m^2) decreased for the rest of the year. In order to account for the change a weighted average, based on the number of leased months, was applied to estimate the actual size of floor space for the Aalborg office in 2015. The same methodology was applied to all other relevant locations.

- **Assumption of office energy consumption:** The energy statement for 2016 is missing for one address at the København office. Therefore an assumption of energy consumption for 2016 was applied. The estimated energy use is based on the consumption from a similar address of the same size (m^2), the same number of employees and a number of building characteristics.