

# CO2 Performance ladder

## CO2 Inventory 2014

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This report is a draft version. After official external verification and corrections the report will be made final and communicated.

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**ARUP**

# Inhoud

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# 1 Introduction

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At Arup, we aspire to have a positive influence on the world, so sustainability is at the heart of our work. We believe that delivering sustainable outcomes for both current stakeholders and future generations will make our business stronger in the long run.

To comply with Arup's global sustainability strategy, policy and regional plans, Arup Netherlands is committed to promote environmental awareness within its circle of influence. Measuring and reporting of our carbon footprint is a fundamental first step in our action cycle.

To comply with our 'CO2 Performance ladder' certification, our footprint is reported every half a year.

## 1.1 Arup Netherlands

Established in Amsterdam in 2001, Arup in the Netherlands comprises consultants in all aspects of building and infrastructure design. The firm is active in three main sectors:

- Infrastructure design,
- Buildings and consultancy,
- And business services.

## 1.2 Organisational boundaries

Arup Netherlands is registered as Arup b.v. in the Dutch 'Kamer van Koop Handel'. To account for the carbon emissions related to Arup Netherlands, the organisational boundaries of Arup b.v. are determined according to the "GHG-protocol method" as described in the 'Handboek versie 2.2' published by SKAO in April 2014.

Our business practice and financial capacity is contained within the boundaries of our organization. There are no sub-companies operating under the control of Arup b.v.

The structure of Arup b.v. contains four cost-centres clustering projects by sector of practice under the leadership of a cost-centre leader. See figure 1.

## 1.3 Responsibility

The firm is currently under the leadership of Mr. Paul Coughlan and its management structure is divided into its four cost-centers.

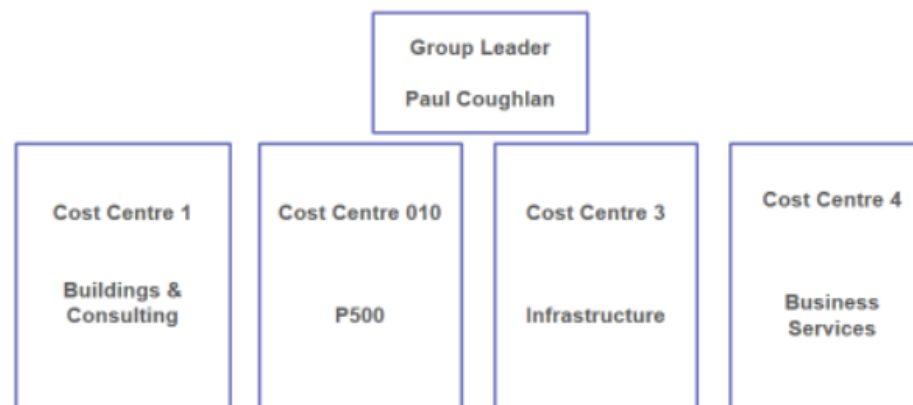


Figure 1: Actual organisation structure of Arup Netherlands (Arup b.v.)

## 1.4 Reporting method

The norm ISO 14064-1 is taken as a guideline for this report. Therefore, the relevance, transparency, completeness, consistency, accuracy and transparency are key aspects on which the inventory of our footprint is evaluated and constantly improved.

## 1.5 Conformity ISO-14064-1 for footprint 2013

This report is written such as the minimal requirements of GHG-emissions reporting according to ISO 14064-1 are satisfied. The reporting requirements are respected for both the footprints of 2013 and the first half of 2014. However, only footprint of 2013 will be used for the one-time verification by an external party to approve our procedure according to ISO 14064-1. This verification is valid during the certification period, which is three years in case no modifications have occurred to the initial (2013) footprint calculation method.

To facilitate the verification of this document, the reporting requirements of ISO-14064-1 are indicated in the content of this report by the following table :

<b>ISO- 14064-1</b>	<b>Report section/ Remark</b>
Description reporting organisation	1.1
Responsibility	1.3
Reporting period	1.6
Organisational boundaries	1.2
Direct emissions in ton CO2	3.1 scope 1
CO2 emission related to biomass	None
Direct GHG removals	None
Excluded GHG emissions	All scope 3 other than commuting and paper. Business travel with public transportation is considered par scope 2.
Indirect emissions	3.1
Base year	2.3
Reference to base year data	Not applicable.
Quantification methods and explanation	2.1
Change in quantification method	Not applicable
Reference literature conversion factors	SKAO handbook version 2.2 edition April 2014
Description influence uncertainties in quantification on accuracy	2.2
Declaration conformity ISO 14064-1;	1.5
Statement on accuracy level and verification on the inventory	It will be certified with a limited level of assurance by DNV. GL.

## 1.6 Reporting period

This report contains two footprints, each covering the periods of:

- January until December 2013
- And January until June 2014.

## 1.7 Operational boundaries

Arup b.v. is responsible for the carbon emission related to all activities and projects that fall under its direct **operational control**.

In terms facility related GHG-emissions, two facilities were occupied by Arup b.v. in different levels of control and operational rights, depending on the lease- / rent conditions.

The facilities are listed below, specific to the type and function of each:

Facility location	Type	Address
Amsterdam	Permanent facility	Naritaweg 118, Amsterdam
Groningen	Temporary site office for P500 project/cost centre	--

The consolidation method applicable over the GHG-emissions reporting period for each of the facility is as follows:

Facility location	Consolidation	Notes
Amsterdam	Equity share	Arup b.v. rents 3 office spaces with limited operational/ control extend in an office building.

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Energy suppliers not chosen by Arup b.v.

Energy/ climate is controlled centrally for the whole building, not falling under control of Arup b.v. Arup b.v. controlled to a limited extend the office climate.

Furniture, lighting and all operational devices are a property of Arup b.v.

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Groningen

Equity share

Energy suppliers, furniture, lighting devices are not chosen by Arup b.v.

Office specific devices such as computers and printers are a property of Arup b.v.

## 2 Method, Scope & Assumptions

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### 2.1 Quantification of GHG emissions

#### 2.1.1 Identification of GHG emission sources

Since our activities are design-related and production-less, our energy consumption is purely linked to our facility/ office use that do not diverge from the standard average office. Travelling causes GHG emissions that are clearly related to our business activity, either business travel with all its categories or commuting travel. Furthermore, paper consumption is next on the list of important emissions we produce along our value-chain.

The identification of our GHS emissions is further specified in detail in:

- Energy audit reports, specifying the energy types used in facilities, and consuming devices and services (lighting, IT, coffee machines, printers, etc.)
- Mobility survey analysis reports that indicate the applicable travelling habits and modes of transport to our business travel and commuting travel of the employees).
- Travel agency reports that indicate the air travel booked for our business as well as travel made by high –speed train.
- Financial and accountancy records of declared costs of travel.

## 2.1.2 Identifying energy consumption sinks

The energy consumption sinks are identified as categories of energy consumption in the facilities based on intermitted energy audits. The office keeps track of all electronic devices that are used through its IT unit.

## 2.1.3 Quantification method

The selected quantification method is a **combination of measurement and calculation.**

The measurement is related to the part of:

- Monthly energy consumption for the building in which our facility is located in Amsterdam.
- The actual average mileage done by the leased cars of the firm.

The calculation method concerns the following aspects:



- Facility-specific correlation in terms of defining the share of Arup b.v. in the total energy consumption of the building based on the percentage of the surface occupied by Arup b.v. of the total surface of the building.
- (Generic) office facility related correlation for the site office in Groningen due to lack for facility-specific information for both 2013 and 2014.
- GHG activity data:
  - o Business travel by air delivered by travel agency,
  - o Commuting mileage done by lease cars,
  - o Travel business done by means of public transportation,
  - o Travel business done by private cars deduced from the declared costs for car-mileage,
  - o Private cars data used for business travel,
  - o Data on public transportation use by employees for business travel.
- GHG activity data related to commuting by private cars or public transportation for 2014.

#### 2.1.4 Identified GHS-emissions into scopes

The inventory reports the carbon footprint under the classification of emissions according to their controllability by Arup Netherlands. Direct emissions fall into the category of total control of the company, and indirect emissions fall under partial control (scope 2) or no control of the company, but are part the GHG emissions produced along its value-chain and considered important enough to be taken into account (scope 3).

##### **Direct emissions**

Scope 1: Business travel by lease cars.

##### **Indirect emissions**

Scope 2: Facility energy consumption, business travel (air, private car and public transportation),

Scope 3 (up-stream): paper use, commuting travel done by public transportation, private cars and lease cars.

## 2.1.5 Selection and Collection of Data for Calculated Quantification

In general, the main sources of data that are used to calculate the GHG emissions, are based on the following:

- Financial records of declared mileage by private cars.
- Records delivered by the car-lease company for actual mileage of the cars leased by Arup b.v.
- Mobility survey (preferences of transport modes and frequency use, average distances for commuters, frequency travel and destinations)
- Surveys on types of private cars, types of fuel and consumption rates and classes.
- Air –travel data delivered in details by travel agency, mileage per trip, name traveller, Air Company and price.
- Travel by high-speed train in prices and destinations by travel agency.
- Publically available data on distances by railway between two destinations (online-calculators).

The following table explains the data that was necessary for each of the calculation of each of the GHG emissions, collection of data and the assumptions taken upon each aspect in case of lack of more detailed information:

Aspect	Source data/ Assumption
Total surface facility	The surface occupied by Arup b.v. is based on the rent contract, plus a portion of the shared space of the building as well calculated by the building owner/operator.
Number of employees	The number of employees account working for Arup b.v. under direct employment contracts as well as under secondment conditions, both full- and part-time and free-lancers. Data delivered by Human Recourses. The data might have had changes in during the reporting period of each of the quantified footprints.
Lease cars mileage total	

The leased cars have a maximum mileage per year. The actual mileage is possible to track through the lease company records. The information used in our calculation is taken as an average mileage per car calculated based on the total actual mileage of all leased cars on the period of 2013 and the first half of 2014.

Facility energy consumption

The facility operated by Arup is part of a building managed by an external party (owner). The choice for the energy provider and type is not made with our participation. The consumption measurements are delivered by building operators to each of the occupying organisations. Measurement devices are linked to each rented space unit. The consumption of each organisation is calculated based on the measuring device directly connected to its rented out space and its share in common spaces and facility usage such as the entrance hall, hall ways and lift.

Business air travel

The business air travel of Arup is managed by an external travel agency. The inventory account for the travels booked for Arup's employees or externals when realising the travel for Arup's business operations and services.

Business travel by private cars

The calculation of the carbon footprint due to business travel done with private cars is based on the declared mileage. The distribution of the mileage according to the car type and energy category is done based on supporting statistical information resulting from a mobility survey. The answer rates indicate the composition of the private cars used for business travel according to the fuel used and their consumption rate. An equivalent conversion factor is calculated based on an average of all cars for each fuel type.

Business travel by public transportation

The business travel done by use of public transportation is deduced from relative percentages of use of different transport modes for business travel. The starting point for absolute quantification of mileage for each transport mode is the declared mileage by car and the total mileage done for business by lease cars.

Commuting travel

The emissions related to commuting travel is based on three main component:

- Distribution of commuting distances based on address register.
- Distribution of frequency of use of each transport mode for each distance-category /average distance based on survey.
- Estimation of number of journeys for each employee based on occupancy level at the office.
- Survey on the standard commuting distances for lease car holders.

Occupancy level

By random counts on different days of the week, certain estimation could be built of the occupancy level every day the week on a standard week out of holiday period.

## 2.1.6 Calculation methods

### GHG emission

### Quantification method

Facility energy consumption Amsterdam

= Total measured energy (kWh/Gj) x % Arup floor space

Business air travel

= Total Mileage/ Category distance ( $\leq 700$  km,  $> 2500$  km, etc.)

Business travel by private cars

= Total declared mileage x Average Conversion factor / fuel type

Business travel by public transport

= Mileage done/ transport mode (TM) x conversion factor TM

Energy Groningen facility = Energy consumption /work spot /month Amsterdam x Number of work spots Groningen/ month

Mileage/ TM<sub>i</sub> = Average commuting distance <sub>j</sub> x % commuters distance <sub>j</sub> who choose Transport Mode <sub>i</sub>

Average Conversion factor / fuel type 
$$\sum_i^n \text{conversion factor } car_i \times \text{use factor } car_i / \sum_i^n \text{use factor } car_i$$

## 2.2 Uncertainties

Aspect	Uncertainty/ influence
Accuracy survey related quantification due to extrapolation	The answer rates of surveys were not a 100 % for the Mobility survey. Therefore, these might carry an uncertainty about the distribution of preferences for transport modes, for business travel and commuting travel. The uncertainty related to this aspect influences the real distribution of distances done by each transport mode.
Business travel by private cars	The average car emission factor is calculated based on the data of cars belonging to a number of employees who were present on the day of the survey and said to do business travel with that specific car. The number is considered to be good because of the high occupancy of the office on that specific day.
Business travel by public transport	The response rates of the Mobility survey not 100 % representative of all choices. However, considered accurate enough. Random verification survey on much smaller scale indicated that choices could be representative.

The energy consumption in the rented work sport in Groningen

Lack of building specific data was compensated by use of the data related to the consumption in the facility in Amsterdam as an indication. The consumption/ month/ employee was multiplied by two, due to the fact that; the heating system in Groningen was fully electric and because the office might be less energy efficient compared to the office in Amsterdam.

Commuting travel

Occupancy level per week is taken as indicator to take into account the fact that not all employees commutes every day due to limited working days per week/ or two weeks. This indicator is build based on survey-rounds on different days of the week. Possible weeks might be more busy due to holidays / concentrated off-office work by deadline of large scale projects. However, the outcome is considered relevant to the average week.

Gas / electricity

Due the fact that Arup Netherland leases office space in an office building, the data provided by the building operator/ owner represent the total consumption records of the whole building. Therefore, an uncertainty due to the real consumption rates in our offices is comprised to having to approximate these numbers instead of actually measuring them.

Lease car

The data delivered by the lease company consisted of average mileage per car, based on the total mileage made by all cars of all energy categories. It would be more accurate to know the real consumption in litres of fuel per specific car. This aspect will be taken in our improvement plan and will be implemented starting 2015.

## 2.3 Base year:

- For scopes of emissions 1 and 2, the base year is 2013.
- For scopes 3, the reference year is 2014, in which reporting on this scope of emissions has started.

## 3 Footprint 2013

### 3.1 Quantified emissions per scope:

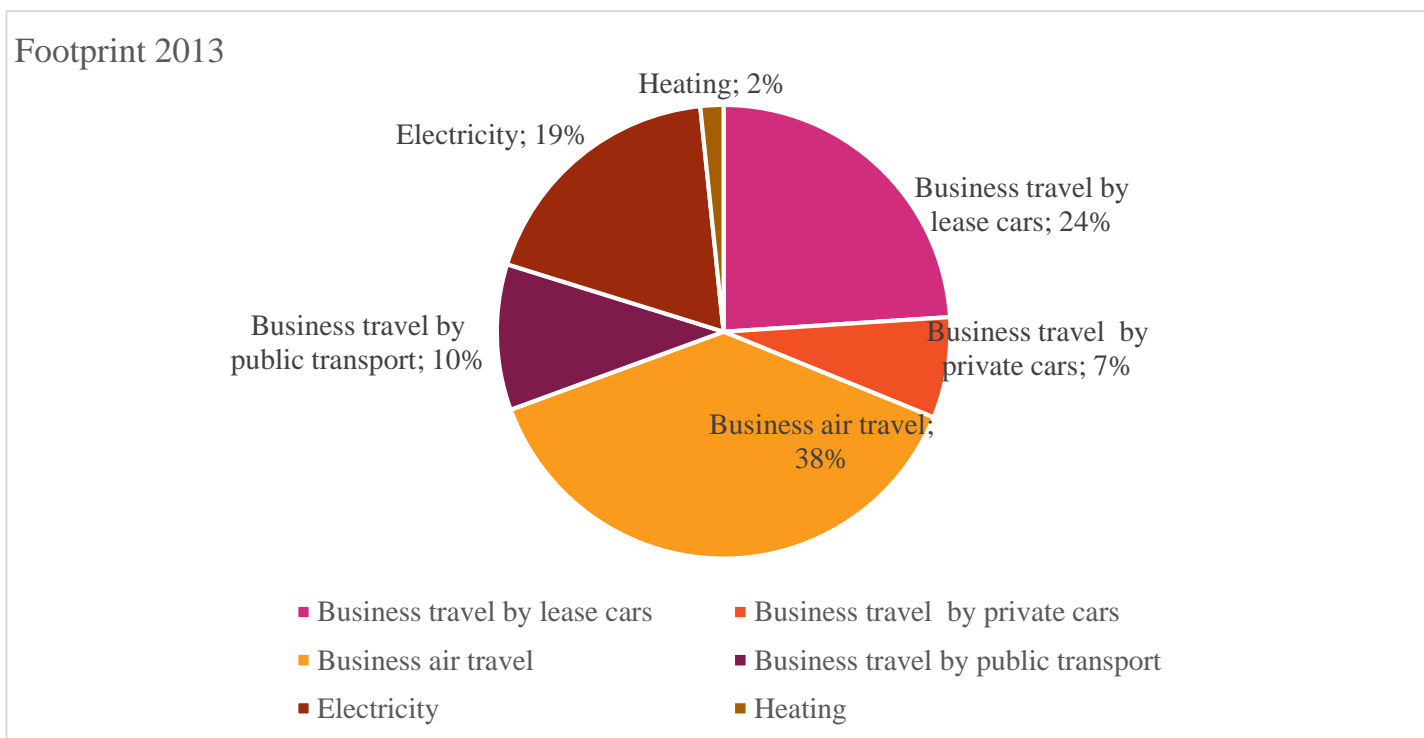
The footprint calculated over the period 2013, includes the identified GHG-emissions falling under scopes 1 and 2.

The footprint in tonnes is as follows:

Scope / source GHG emissions		Emission [ ton CO2]
Scope 1	Business travel by lease cars	67,79
	<b>Total scope 1</b>	<b>67,79</b>
Scope 2	Business travel by private cars	20,35
	Business air travel	108,18
	Business travel by public transport	29,39
	Electricity	52,44
	Heating	4,67
	<b>Total scope 2</b>	<b>215,03</b>
	<b>Total footprint scopes 1 and 2</b>	<b>282,81</b>



### 3.2 Relative important of emission sources:



### 3.3

## Business Air travel

Flight category	Total distance [km]	conversion factor	Emission [ton]
distance <700 km	146212	270	39,48
2500< distance >700	227697,9	200	45,54
distance >2500 km	171592,96	135	23,17
	545502,9	Total	108,18

### 3.4 Business travel by lease-cars

Fuel/ Energy type	Kilometres [km]	Conversion factor [gCO2 /km]	Emission [ton]
<b>Petrol</b>	207776	190,149	38,72
<b>Diesel</b>	187775,36	174,94	17,49
<b>Hybrid</b>	92570	125	11,57
<b>Total</b>	488121,36	■	<b>67,79</b>

### 3.5 Business travel by private car

The conversion factors are calculated as equivalent factors for each fuel type/energy based on all the cars belonging to this category, their consumption rates and classes, and the conversion factors directly assigned to them in the SKAO 'handboek' version 2.2 in the appendix C.

Fuel/ Energy type	Kilometres [km]	Conversion factor [gCO2 /km]	Emission [ton]
Petrol	60029,50	201,09	12,07
Diesel	29450,22	165,29	4,86
Hybrid	5679,73	115,38	0,65
unknown	13106,87	210,00	2,75
	108266,34		
		<b>Total</b>	<b>20,34</b>

### 3.6 Business travel by public transportation

	Distances [km]	conversion factor	Emission [ton]
High speed train		60	1,39
	23.242,61		
Bus	70898,75	120	8,51
Intercity train+ stop-train	299.840,32	65	19,49
<b>Total</b>			<b>29,39</b>

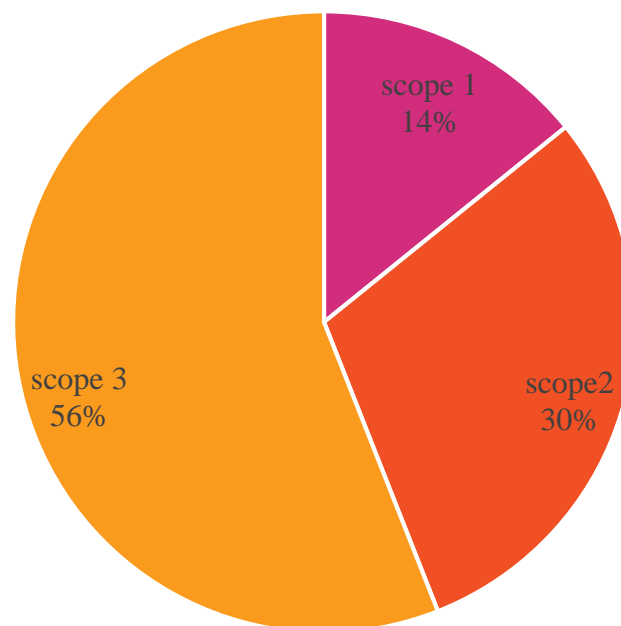
## 4 Footprint First Half 2014

### 4.1 Quantified emissions per scope:

Scope / source GHG emissions		Emission [ ton CO2]
Scope 1	Business travel by lease cars	59,28
	<b>Total scope 1</b>	<b>59,28</b>
Scope 2	Business travel by private cars	10,14
	Business air travel	20,03
	Business travel by public transport	47,76
	Electricity	44,85
	Heating	1,87
	<b>Total scope 2</b>	<b>124,64</b>
	<b>Total footprint scopes 1 and 2</b>	<b>134,30</b>
Scope 3	Commuting	231,66
	Paper use	2,14
<b>Total</b>	<b>Scope 1, 2 and 3</b>	<b>233,80</b>

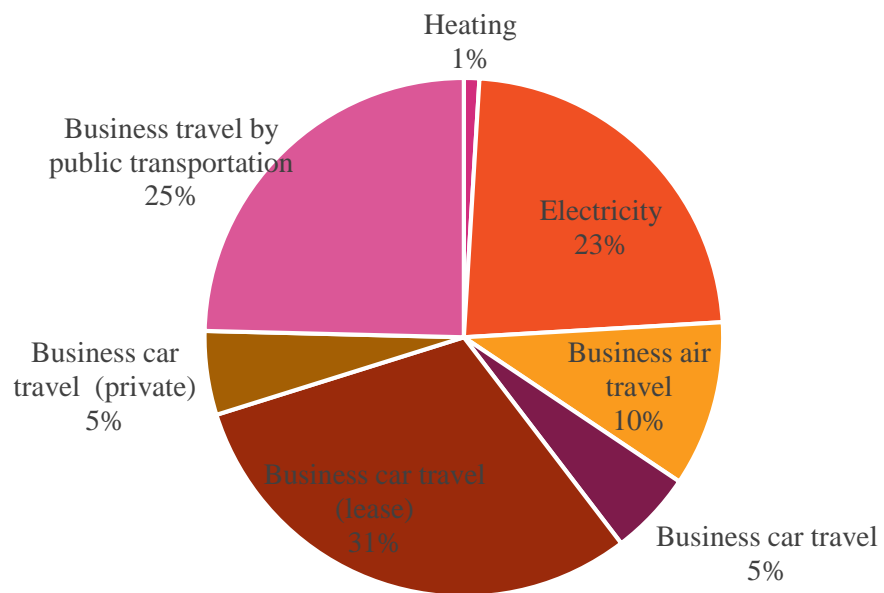
## 4.2 Relative importance scope emissions

Carbon Footprint 2014



### 4.3 Relative importance emission sources in scope 1 & 2

scope 1 & 2



- Heating
- Electricity
- Business air travel
- Business car travel
- Business car travel (lease)
- Business car travel (private)
- Business travel by public transportation

## 4.4 Business travel ( excl. Air)

### Lease cars

Fuel/ Energy type	Kilometres [km]	Conversion factor [gCO2 /km]	Emission [ton]
<b>Petrol</b>	207776	166,96	20,37
<b>Diesel</b>	187775,36	173,71	31,03
<b>Hybrid</b>	92570	125	7,87
<b>Total</b>	364581,07	■	<b>59,28</b>

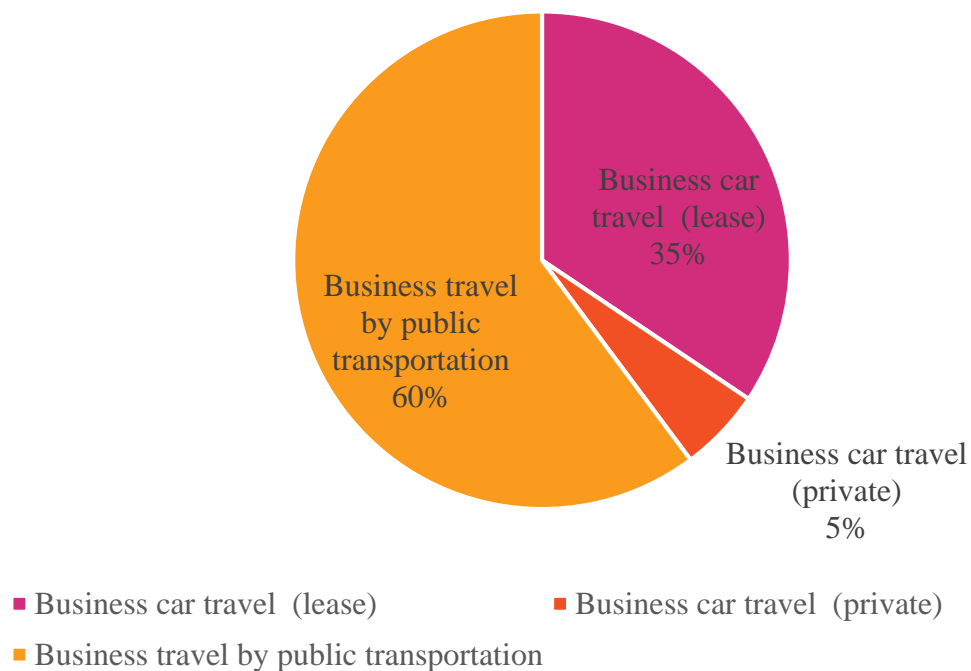
### Private cars

Fuel/ Energy type	Kilometres [km]	Conversion factor [gCO2 /km]	Emission [ton]
Petrol	35175,40	179,06	6,30
Diesel	13301,76	163,73	2,18
Hybrid	2512,53	125,00	0,35
Unknown	6281,32	210,00	1,32
<b>Total</b>	364581,07	■	<b>10,14</b>
		■	

## Public Transportation

	Distances [km]	conversion factor	Emission [ton]
<b>Train</b>	522873,45	65	13,77
<b>Bus</b>	114741,67	120	33,99
<b>Total</b>			<b>47,76</b>

Mileage business travel (excl. air travel)

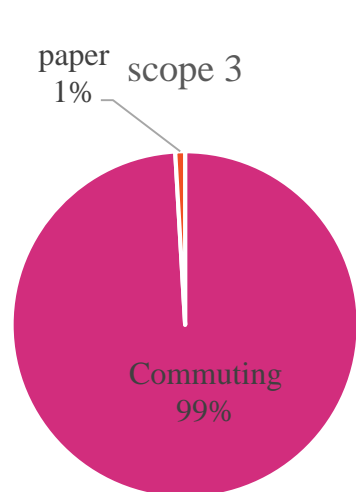




## 4.5 Scope 3 emissions

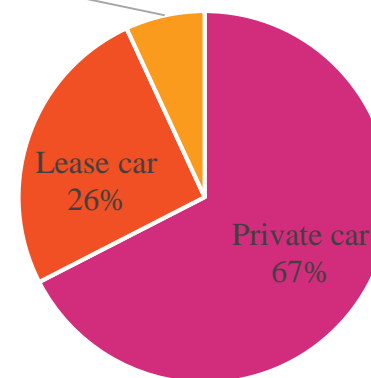
### Commuting

Transport	Kilometres [km]	Conversion factor [gCO2 /km]	Emission [ton]
Cars Lease	364581,07	--	59,42
Private Cars	779973,61	--	156,26
Public Transportation	243489,25	--	15,98
<b>Total</b>		■	<b>231,66</b>



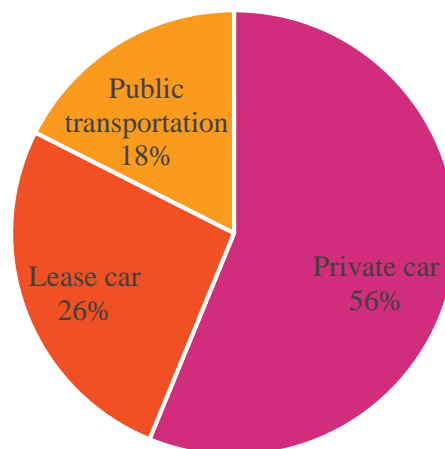
■ Commuting ■ paper

Public transportation 7%  
Commuting Footprint by Transport mode



■ Private car ■ Lease car ■ Public transportation

### Mileage commuting travel

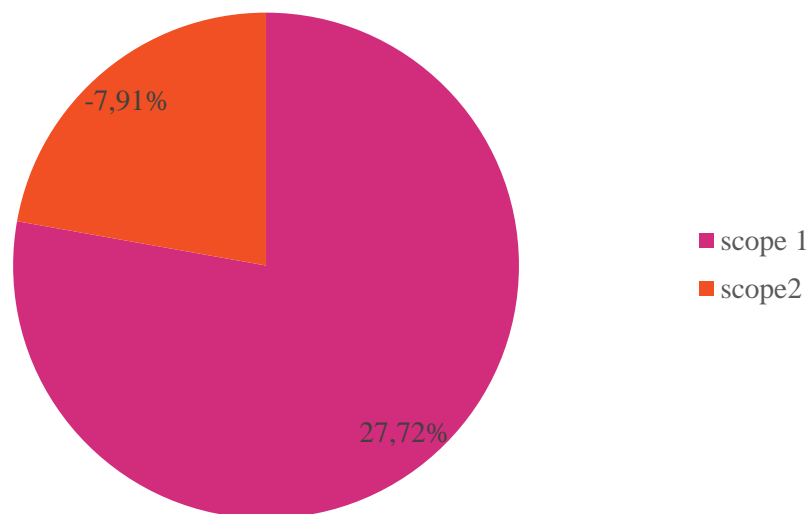


■ Private car ■ Lease car ■ Public transportation

## 4.6 Comparison emissions to base year 2013

In total the footprint of Arup b.v. increased by 1.2 % over the last half a year. This is calculated based on the average carbon emission per employee/ month as an average over the whole reporting period. Divided into scopes, we can see that scope 1 had increased compared over 2014, which refers to business travel by lease cars. This matches our expectation due to the operations of an expectation unit, that has a high mobility in Groningen. The leased cars numbers had also increased by 6 extra cars over the last 6 months.

Progress emissions per scope compared to 2014/ employee/ month



## 4.7 Document maintenance

This document is updated very half a year. Internal and external communication of the footprint is based on the outcome of measurement and calculation reported in this report.

