

Arup  
**CO2 Performance ladder**  
GHG Inventory 2020

ISSUE | 25 may 2021

This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

Job number

**Arup bv**

Postal address:  
PO Box 57145  
1040 BA Amsterdam  
Visitor address:  
Naritaweg 118  
1043 CA Amsterdam  
The Netherlands  
[www.arup.com](http://www.arup.com)

**ARUP**

# Document Verification

# ARUP

<b>Job title</b>		CO2 Performance ladder		<b>Job number</b>		
<b>Document title</b>		GHG Inventory 2020		<b>File reference</b>		
<b>Document ref</b>						
<b>Revision</b>	<b>Date</b>	<b>Filename</b>	CO2-portfolio_GHG Inventory_FY 2020.DRAFT.docx			
Draft	22 feb 2021	<b>Filename</b>	CO2-portfolio_GHG Inventory_FY 2020.DRAFT.docx			
		<b>Description</b>	Review of 2019-2020 emissions and 2021-2030 goals for Arup bv			
			Prepared by	Checked by	Approved by	
		Name	Paul van Horn	Martin Koster	Tudor Salusbury	
		Signature				
Draft 2	9 may 2021	<b>Filename</b>	CO2-portfolio_GHG Inventory_FY 2020.DRAFT.docx			
		<b>Description</b>	Internal audit outcomes on first draft included and report updated			
			Prepared by	Checked by	Approved by	
		Name	Paul van Horn	Martin Koster	Tudor Salusbury	
		Signature				
ISSUE	25 may 2021	<b>Filename</b>	CO2-portfolio_GHG Inventory_FY 2020.ISSUE.docx			
		<b>Description</b>	Checked			
			Prepared by	Checked by	Approved by	
		Name	Paul van Horn	Martin Koster	Tudor Salusbury	
		Signature				

Issue Document Verification with Document



# Contents

---

	Document Verification	1
	<b>Contents</b>	<b>1</b>
<b>1</b>	<b>Introduction</b>	<b>2</b>
1.1	Organization	2
1.1.1	Organizational boundaries	3
1.1.2	Operational boundaries	3
1.2	Conformity to ISO-14064-1	4
<b>2</b>	<b>Method, Scope &amp; Assumptions</b>	<b>5</b>
2.1	CO <sub>2</sub> -emissions scopes	5
2.2	Data Sources	6
2.3	Calculation methods	7
2.4	Uncertainties	7
2.5	Checks proposed	8
<b>3</b>	<b>Carbon Footprint 2020 and forecast 2021</b>	<b>9</b>
3.1	Distribution emissions 2018-2019-2020 [kg]	9

Page

# 1 Introduction

At Arup we strongly feel the responsibility to contribute to the transition towards a more sustainable future. We have adopted the CO<sub>2</sub>-performance ladder as a tool to map and reduce our CO<sub>2</sub>-emissions. Measuring and reporting of the carbon footprint of our organization is a fundamental first step in our action cycle. Our footprint is reported every year in accordance with the GHG-protocol and ISO 14064-1, as to comply with our CO<sub>2</sub> Performance ladder certification. The reporting period for this report is April 2019 until December 2020.

The targets in the new Energy Management Plan 2020-2030 are set for the calendar year 2020 to 2030, effectively changing the reporting period from Arup Financial year to standard calendar year. In this way the data collection is more aligned with standard practice of reporting in energy and mobility. The reference period will remain the year 2018. This is also the reference year for the Arup internal zero carbon strategy [1].



Figure 1 Identification of the emissions of our organization and chain (Source: SKAO)

## 1.1 Organization

Arup b.v. was established in the Netherlands, Amsterdam in 2001. From 2019 onwards the group leader has been Tudor Salusbury. The management structure was divided into four business units:

- Aviation, Science & Industry (ASI)
- Infrastructure;
- Cities Energy Transition & Transport (CETT);
- Property & Social Infrastructure (PSI)
- Business services (internal business unit).

Person responsible for the GHG Inventory and compliance with CO<sub>2</sub> performance ladder is Paul van Horn.

### 1.1.1 Organizational boundaries

The CO2-ladder certification will be applicable to the firm Arup b.v. in the Netherlands. Arup b.v. has a permanent facility in Amsterdam and a facility in Groningen. The firm operates as a consultant for the planning, design, management and research of architectural and engineering related projects, primarily in the building- and infrastructure sector. There are no sub-companies operating under the control of Arup b.v.

Arup b.v. produced in 2020 a total amount of CO2 emissions below 500 tons a year, and therefore classifies as a small company. The size classification determines the specific set of CO2-ladder certification requirements.

Arup b.v.	2020 emissions in kg
Total Scope 1	27.982
Total Scope 2	291.520
Total Scope 3	29.918
Grand total	<b>349.421</b>

### 1.1.2 Operational boundaries

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

Facility location	Consolidation	Operational control
Amsterdam (permanent facility)	Equity share	<p>Arup b.v. rents 2 floors.</p> <p>Energy and central heating suppliers not chosen by Arup b.v.</p> <p>Energy/ climate is controlled centrally for the whole building, not falling under control of Arup b.v.</p> <p>Furniture, lighting and all operational devices such as computers and printers are property of Arup b.v.</p>
Groningen (temporary site office for P500)	Equity share	<p>Energy and gas suppliers, furniture, lighting devices are not chosen by Arup b.v.</p> <p>Office specific devices such as computers and printers are a property of Arup b.v.</p>

## 1.2 Conformity to ISO-14064-1

This report is written such as the minimal requirements of GHG-emissions reporting according to ISO 14064-1 are satisfied.

<b>Description report content 9.3 NEN-EN-ISO 14064-1:2019</b>		<b>Report section/remark</b>
a)	description of the reporting organization;	1.1
b)	person or entity responsible for the report;	1.1
c)	reporting period covered;	1.1.1
d)	documentation of organizational boundaries	1.1.1
e)	documentation of reporting boundaries, including criteria determined by the organization to define significant emissions;	1.1.2
f)	direct GHG emissions, quantified separately for CO <sub>2</sub> , CH <sub>4</sub> , N <sub>2</sub> O, NF <sub>3</sub> , SF <sub>6</sub> and other appropriate GHG groups (HFCs, PFCs, etc.) in tonnes of CO <sub>2</sub> e;	Direct CO <sub>2</sub> emissions quantified, other emissions not relevant. 3.1
g)	a description of how biogenic CO <sub>2</sub> emissions and removals are treated in the GHG inventory and the relevant biogenic CO <sub>2</sub> emissions and removals quantified separately in tonnes of CO <sub>2</sub> e;	Not applicable
h)	if quantified, direct GHG removals, in tonnes of CO <sub>2</sub> e;	Not applicable
i)	explanation of the exclusion of any significant GHG sources or sinks from the quantification;	Not applicable
j)	quantified indirect GHG emissions separated by category in tonnes of CO <sub>2</sub> e;	3.1
k)	the historical base year selected and the base-year GHG inventory;	3.1; year 2018 taken as base year
l)	explanation of any change to the base year or other historical GHG data or categorization and any recalculation of the base year or other historical GHG inventory, and documentation of any limitations to comparability resulting from such recalculation;	No recalculation of base year 2018, data included in datasheets and tables
m)	reference to, or description of, quantification approaches, including reasons for their selection;	2.2 and 2.3
n)	explanation of any change to quantification approaches previously used;	2.2 and 2.3 as far as applicable
o)	reference to, or documentation of, GHG emission or removal factors used;	<a href="https://co2emissiefactoren.nl/lijst-emissiefactoren/">https://co2emissiefactoren.nl/lijst-emissiefactoren/</a> as registered on 28-01-2020 (Well to Wheel data).
p)	description of the impact of uncertainties on the accuracy of the GHG emissions and removals data per category;	2.4
q)	uncertainty assessment description and results;	2.4 and 2.5
r)	a statement that the GHG report has been prepared in accordance with this document;	1.2
s)	a disclosure describing whether the GHG inventory, report or statement has been verified, including the type of verification and level of assurance achieved;	Internal audits and checks
t)	the GWP values used in the calculation, as well as their source. If the GWP values are not taken from the latest IPCC report, include the emissions factors or the database reference used in the calculation, as well as their source.	Not applicable

## 2 Method, Scope & Assumptions

---

### 2.1 CO<sub>2</sub>-emissions scopes

The inventory reports its CO<sub>2</sub>-emissions for direct and indirect emissions:

#### Direct emissions

Scope 1



Business travel by lease cars

#### Indirect emissions

Scope 2



Facility energy and heating consumption



Business travel (air, private car and public transportation)

Scope 3 (upstream)



Commuting



Paper use

## 2.2 Data Sources

The main sources of data used to calculate the CO<sub>2</sub> emissions are:

Aspect	Data	Source
Total surface facility [m2]	The office facility is part of a building managed by an external party. The surface occupied by Arup b.v. is based on the rent contract, plus a portion of the shared space.	Building owner
Number of FTEs	Full -time equivalent for direct employment contracts as well as under secondment conditions, both full- and part-time and free-lancers.	Ovaview system, Centre Financial Report on number of FTE.
<b>Scope 1</b>		
Lease cars mileage total [km]	Up to 2019 the fuel consumption is tracked through the lease company refuelling records. Starting 2020 the records state the mileage during the year from the lease company data (verified during exchange of tires from winter to summer tires and vice versa). Quality of data expected to improve due to reduction of lease companies from 6 to 3.	Lease companies
<b>Scope 2</b>		
Facility heating [Gjoules]	Heating is centrally measured and then paid for through the service costs based on square meters used. In 2020 Arup used 3000 m2 in a building of 6000m2 (50%) with an additional 0,8% for the hallway.	Building Owner
Facility electricity [kWh]	Measurement devices are linked to each rented space unit. Electricity meters in the hallways, but up to 2021 no records kept.	Building Owner
Business air travel [km]	Flight distances are tracked for the categories <700 km, <2500 and >2500 km.	External travel agency
Business travel by private cars [km]	<b>As per January 1<sup>st</sup>, 2019</b> Mileage for business travel for the employees that have accepted the new mobility plan, effective as per January 01, 2019, is recorded by using GPS-tracking or manual registration through Reisbalans. Mileage for business travel for employees that have not accepted the new mobility plan, effective as per January 1, 2019: declared mileage for business travel. The calculation is based on the 'Car fuel and weight unknown' factors in the Emissiefactoren.	Finance External service provides Finance
Business travel by public transport [km]	<b>As per January 1<sup>st</sup>, 2019</b> Mileage for national business travel per transport mode for the employees that have accepted the new mobility plan, effective as per January 01, 2019, are recorded by using GPS-tracking or manual registration through Reisbalans Mileage for national business travel for employees that have not accepted the new mobility plan (21 employees),	External service provider Finance

	effective as per January 1, 2019: declared mileage for business travel.  Travel destinations are tracked for international business travel by train.	External travel agency
<b>Upstream Scope 3</b>		
Commuting travel [km] %	<b>As per January 1<sup>st</sup>, 2020</b> Commuting distances per transport mode for the employees that have accepted the new mobility plan, effective as per January 01, 2019, are recorded by using GPS-tracking or manual registration.  Commuting distances for employees (21) that have not accepted the new mobility plan, effective as per January 01, 2019 are calculated.	Reisbalans  Calculated
Paper consumed [kg]	Purchased paper	Paper suppliers

## 2.3 Calculation methods

GHG emission	Quantification method
Facility energy consumption (electricity/heating) [kWh/Gj]	= Total measured energy consumption (Gj) x % Arup floor space x conversion factor. = Total measured electricity consumption to calculate common space use (elevator etc), based on area in use. Metered consumption for each floor added to this. Total amount used. Close to half the use of the total building.
Business air travel [km]	= Total Mileage per category distance ( $\leq 700$ km, $> 2500$ km, etc.) x conversion factor
Business travel by private cars [km]	= Total (declared) mileage x Average Conversion factor for cars of unknown weight and fuel type.
Business travel by public transport [km]	= Mileage / transport mode (TM) x conversion factor TM
Business travel by lease cars [km]	= Total mileage reported x Conversion factor per fuel type
Commuting [km]	= Total amount of reported commuting km per mode (public transport and private car) x Conversion factor per mode.
Paper [kg]	= Total kgs x conversion factor

## 2.4 Uncertainties

Aspect	Uncertainty/ influence
Lease car	The data delivered by the lease company consists of mileage per lease car. This will include private trips.

The heating / electricity data for Groningen office	Consumption is measured for the whole building; Arup consumption is derived from % rented office space for heating.  Floor space and number of employee changes between 2018 and 2021, only partially recorded. The measurements for the 2 <sup>nd</sup> floor extension start from February 2018. There are no earlier measurements available.
Electricity Amsterdam office	Consumption is measured for the whole building; Arup consumption is derived from % rented office space. For electricity it is a mixed system. Metered on each floor with a occupied space % applied to the common use (elevator, cooling, air ventilation).  Actual consumption is said by the landlord to be annually checked through the service costs. Still to be verified for the years from 2018.
Business air travel	Included are all flights booked through the designated travel agency. This also includes staff that sit in our office but are part of the Europe Region. Any self-booked flights that are declared through expenses or other means of flights booked are not included.
Business travel by private cars	There are now two ways to declare travel miles: through Reisbalans and through Finance. Reisbalans is detailed, although some elements are odd. Finance is financially accurate, but needs assumptions to be converted into carbon emissions.
Business travel by public transport	Up to 31 <sup>st</sup> December 2018, an assumption was made for the distances travelled for business by public transport. This assumption involved large uncertainties.  From 2020 onwards Reisbalans also reports on business trips by public transport.
Commuting travel	<b>As per January 1<sup>st</sup>, 2020</b>  Number of people not on Reisbalans: Calculation made: 1. Average commuting distance and mode for all Reisbalans users, 2. then applying this average distance and mode to all 21 non-Reisbalans users.

## 2.5 Checks proposed

Category	Action
Facility energy consumption (electricity/heating) [kWh/Gj]	<ul style="list-style-type: none"> <li>Cross validate historical data reviewing the yearly service cost summaries for both AMS and GRO office. [20210504: done and included in the base figures, AMS figures accurate, GRO figures might be too high, especially heating]</li> <li>Record electricity on two dates on both floors to make own estimate of use.</li> </ul>
Business travel by public transport [km]	<ul style="list-style-type: none"> <li>Review Reisbalans report as this seems to be underreported now.</li> </ul>
Paper [kg]	<ul style="list-style-type: none"> <li>Review historical data</li> <li>Improve way of capturing use, now too inaccurate. Very limited impact as kg of paper equals kg emission.</li> </ul>

## 3 Carbon Footprint 2020 and forecast 2021

### 3.1 Distribution emissions 2018-2019-2020 [kg]

				% contribution to total emissions per year		
	2018	2019	2020	2018	2019	2020
Scope 1						
Lease cars 	82.080	52.289	27.982	9%	8%	8%
Scope 2						
Electricity 	30.874	23.112	92.366	3%	3%	26%
Heating	113.728	89.909	115.272	12%	13%	33%
Business travel with private car 	42.966	117.891	27.243	5%	17%	8%
Business travel with public transport	3.984	4.395	1.270	0,4%	1%	0,4%
Business travel airplane 	362.649	286.773	55.369	38%	42%	16%
Scope 3						
Commuting private car 	308.863	88.798	25.352	33%	13%	7%
Commuting public transport	-	14.178	4.567	0%	2%	1%
Total emissions (kg)	945.144	677.346	349.421			
<b>Per FTE</b>	<b>3.364</b>	<b>2.973</b>	<b>1.457</b>			

[source: Analysis 2020 tab in worksheet Environmentaldata 20210402 v6.0]

With the exceptional circumstances of the last year in mind, we present the figures for three years to enable a meaningful comparison. Anomalies are briefly discussed below.

**Lease cars** emissions in absolute sense went down due to electrification and reduction in numbers.

Emissions due to use of **electricity** went up because of the sale of Amsterdam office and change of supplier, from green electricity to grey electricity. This will be rectified, effectively ensuring return to the 2019 numbers, which were solely governed by the emissions of the Groningen office. A discussion with the Groningen landlord will also take place on switching to Green electricity.

**Heating** emissions of the Groningen office seem out of line with benchmarks, presumably due to mistakes in reporting. To be investigated. Figures now seem

overstated by a factor 3. Most probably connected to a correction factor linked to the floor space used.

**Business travel with private car** went down from 2018-2020, but shows a spike in 2019. Reported figures from 2019 seem overstated.

**Business travel airplane** went down drastically. The number for 2020 reflects three months of travel in early 2020. For the months after March 2020 the effective airplane travel was zero. The targets for the coming years reflect a transition to more videoconferencing, in line with the Arup global carbon reduction strategy.

The figures for **commuting by private car** show a decline, assumed to be the effect of the new Mobility policy in 2019. 2020 figures are non-representative due to the covid19 lockdown. In previous years this figure was reported to be around 20% of all carbon emissions.

**Paper consumption** was not correctly monitored, will be updated in the coming year. The overall impact is negligible. Carbon emissions of paper taken to be equal to the weight of the paper.