REDACTED

Arup
Report Measure List CO2 Performance Ladder 2021

Global measurement

CO_2 emissions, scope 1 and 2		349.4 tons
Revenue	REDACTED	
Staff members	240 FTE	1.456 tons/FTE

Overview of measures

Advice

Dialogue with commissioning body regarding CO2 Global measure		
Categorie A	CO2 reduction is an occasional agenda item in periodic consultations with major commissioning body	Implemented on 01/2019

Focus on CO2 reduction in projects NOT won through award advantage Global measure		
Categorie A	There is a demonstrable focus on CO2 reduction for at least 10% of the turnover from design commissions.	Implemented on 01/2019

Knowledge and attitude of staff with regard to CO2 reduction in projects Global measure		
Categorie A	Between 5% and 25% of engineers / designers / project leaders have completed a course with a demonstrable focus on the importance and materiality of CO2 reduction and associated design methods.	Implemented on 03/2021 DUBOCALC Training in house for 12 engineers

Research and innovation in relation to carbon emissions Global measure		
Categorie B	Between 10% and 20% of the research and innovation budget is spent on topics that could also cut carbon emissions	Implemented on 01/2019
Categorie C	Over 20% of the research and innovation budget is spent on topics that could also cut down carbon emissions	Implemented on 05/2021 participated in SBIR circular viaducts RWS

ICT services

No measures have been taken for this activity.

Offices

Accredited Measures for energy saving in offices Increasing the efficiency of the activity		
Categorie A	All Accredited Measures for energy saving in offices have been implemented, in so far as indicated in that list. Measures are implemented at natural times	Implemented on 01/2019 implemented all Infomil measures with payback time less than 5 years.

Purchase of green power and/or power made greener with GOs. Renewable energy		
Categorie A	Over 75% of the electricity consumed concerns green energy or energy made green through the use of Dutch GOs	Implemented on 01/2019

Use of sustainable heat and/or heat and cold storage Renewable energy		
Categorie B	Space heating using sustainable heat accounts for 50% to 80% of the total energy consumed in the organisation's offices for heating and cooling.	Implemented on 01/2019

People mobility

Check correct tyre pressure of cars made available by the organizations Increasing the efficiency of the activity		
Categorie A	Annual tyre pressure check for over 50% of lease cars.	Implemented on 01/2019

Encourage car pools and the use of car sharing. Increasing the efficiency of the activity		
Categorie C	All pool cars run on renewable fuel or natural gas or are zero emission vehicles.	Implemented on 01/2019

Provision of bicycles, electric bikes or electric scooters Global measure		
Categorie B	The company operates a scheme that offers all employees reimbursement for the purchase of a bicycle or an electric bike.	Implemented on 01/2019

Purchase/leasing of passenger vehicles based on carbon emissions measured in practice Increasing the efficiency of the activity		
Categorie C	The carbon emissions of new passenger vehicles (purchased or leased) average less than 120 g/km over the course of a year (according to data measured in practice)	Implemented on 01/2019

Reduce personal mobility by working from home and teleconferencing Restricting activity		
Categorie B	The average amount of travel (commuting, business trips) per employee with an administrative job is demonstrably reduced by 20% compared to before the coronavirus outbreak (2019)	Implemented on 10/2020 home working is the norm now until office reopens. After that we expect 20% homeworking.

Reducing car usage Restricting activity		
Categorie C	Introduction of an individual mobility budget for all staff with the aim of reducing the number of lease cars and/or cutting down on the number of kilometres travelled by car.	Implemented on 01/2019

Use of energy saving tyres Increasing the efficiency of the activity		
Categorie C	All tyres used within the company are classified as label A in the fuel consumption category of the European tyre label.	Implemented on 01/2019

Zero emission vehicles Electrification		
Categorie C	15% of the fleet (passenger and commercial vehicles, owned or leased) consists of zero emission vehicles.	Planned for 01/2022

Not selected activities

The following activities have not been selected: Subcontractors and suppliers, Material use, Hydraulic engineering ships, Material, Logistics & transport, Construction site, Material use / Scope 3, Waste, Business halls and areas, Procurement, Organizational policy general, Business processes, Use of materials that absorb CO2, (INACTIVE) Avoided emissions from third parties, Green maintenance.

Arup bv

CO2 Performance Ladder

Management Review 2021

ISSUE | 25 May 2021

Opdracht nummer 074764-56

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Document Verificatie

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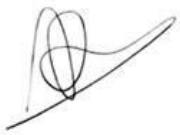
Opdracht titel		CO2 Performance Ladder			**Opdracht nummer** 074764-56
Document titel		Management Review 2021			**Dossier referentie**
Document ref					
Versie	**Datum**	**Dossiernaam**	Memo Directiebeoordeling CO2 Prestatieladder_2021_DRAFT1.docx		
Draft 1	16 May 2021	**Dossiernaam**	Memo Directiebeoordeling CO2 Prestatieladder_2021.docx		
		Omschrijving			
			Voorbereid door	Gecontroleerd door	Goedgekeurd door
		Naam	Paul van Horn	Martin Koster	Tudor Salusbury
		Handtekening			
ISSUE	25 May 2021	**Dossiernaam**	Directiebeoordeling CO2 Prestatieladder_2021.docx		
		Omschrijving	Checked		
			Voorbereid door	Gecontroleerd door	Goedgekeurd door
		Naam	Paul van Horn		
		Handtekening			
		Dossiernaam			
		Omschrijving			
			Voorbereid door	Gecontroleerd door	Goedgekeurd door
		Naam			
		Handtekening			
				Uitgifte Document Verificatie met Document	✓

Inhoud

1 Introduction

As part of the CO2-Performance Ladder (CO2-PL) the board of the organization annually reviews the implementation of the CO_2-performance ladder. This document is an overview of our status and progress to inform the management team. It records decisions made to proceed efficiently. The following chapters are an overview of the status of progress, a review of our CO2-portfolio, progress on goals and measures, proposed action and decisions made in the management meeting.

All figures used in this report originate from the source file Environmentaldata 20210428 v6.0. This file contains all historical data and calculations. The file was audited internally on 14 April 2021 and locked after close out. The date and version number reflect the file after closing out the audit remarks. The remarks of the internal audit are included as an appendix.

2 Status on actions, mitigation measures and audits

2.1 Actions

See Energy Management Plan 2020 for actions.

Action	Status
1. Contact Amsterdam landlord for a price quote on 100% green energy	done
2. Energy audit self assessment	done
3. External energy audit Amsterdam office	ongoing
4. Validation of historic energy use data	done

2.2 Mitigation measures

All required actions are set in motion, completion foreseen within the coming 3 months.

2.3 External audit

External audit by Bureau Veritas was postponed from November to March. The two day audit was concluded on 8 April 2021. The final review is planned for 28 May 2021.

Next external audit to be held not yet fixed.

2.4 Internal audit

The internal audit of documents was done on 14 April 2021. All audit findings were closed out. The audit reports are included for reference.

3 Changes relevant to CO2-ladder

The main changes relevant to CO2-performance ladder system comparing to 2019 and the previous years are:

1. Reporting shifted to calendar year to improve the quality of data;
2. The Energy management plan includes a forecast until 2030;
3. Reporting includes reference to the Arup Global Net Zero Emissions plan and effect of the measures on the GHG Inventory and Energy Management Plan;
4. Action to rectify change of electricity supplier has been set in motion for Amsterdam office, with Groningen office to follow suit.

For more information, see Energy Management Plan 2020, updated in May 2021.

4 Review CO2-portfolio

4.1 Communication

An important part of the CO2-ladder is the way we communicate. The communication plan was updated in May 2021.

Current ways of communication: Arup website, Sustainability report, SKAO website, Group meetings.

- Updates on TV screens were halted because the office was closed throughout 2020.
- Website information has last been updated in January 2018, this will be updated in June 2021.
- SKAO website has been updated in May 2021 with a new CO2 portfolio 2020 plan.
- Sustainability report 2020 is under preparation and is expected to be published in May 2021.
- Participation in the RWS SBIR Circular Viaducts has been published on LinkedIn and on the website of Arup and Heijmans.

4.2 Energy & Emission performance

The year 2020 was an exceptional year in terms of carbon reduction. We achieved all our goals due to extensive working from home and complete lack of air travel from March 2020 onwards.

For 2021 a slow return to the regular business cycle is expected starting from September 2021. To get a full picture refer to the Energy management plan 2021-2030. A summary of carbon emissions per FTE per year below.

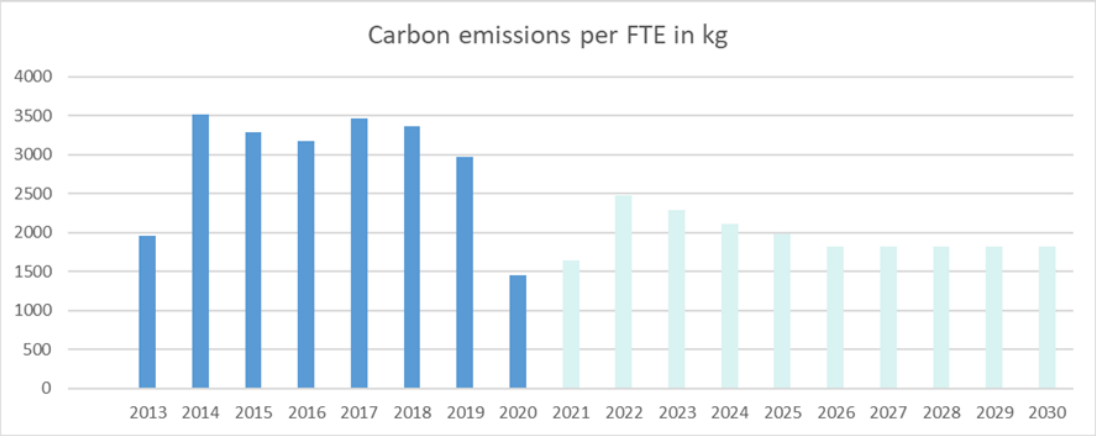


Figure 1 Total carbon emissions per FTE 2013-2030

[source Analysis 2020 tab Environmentaldata 20210428 v6.0]

At this moment the reference year for carbon emissions is 2018 and any progress will be measured against those figures. Leaving out 2020 and 2021 as anomalies, the next full regular year of measuring will be 2022. The carbon reduction ambitions of the Arup ER Net zero emissions plan and the local CO2 Performance ladder have been incorporated into these targets.

Scope	**Source of emission**	**CO_2 -emission [kg CO_2-/FTE]*** **	**Reduction Ambition**	
		2018	2022	2022 target
Scope 1	Business travel: lease cars	292	60%	117
Scope 2	Business travel: private cars	153	Equal	158
	Air travel	1291	20%	1055
	Electricity	110	Equal	81*
	Heating	405	Equal	446**
	Business travel: public transport	14	70%	4
Scope 3	Commuting	1099	76%	271**
Total				
Scope 1,2 en 3		3.364	26 %	2.484

* Assumes green power for Amsterdam office, if not the total for Amsterdam and Groningen will be 781 tons per year per FTE.

** Figures look distorted. Need to improve measurements.

*** Targets per FTE differ slightly from overall targets due to changing number of FTE.

Figure 2 CO2 Emission Reduction Ambition

For more detailed information on our CO2 emission performance see the CO2-portfolio_GHG Inventory_FY 2020

The report outlines the CO2 emission performance boundaries, the method, assumptions and data sources used for the calculation of our CO2 footprint, as well as the uncertainties included in the calculation. Moreover, it gives a detailed overview of our CO2 performance in 2020.

4.3 Comparison with competitors

The previous report showed a lower carbon emission than our competitors in 2017. Due to the exceptional circumstances this comparison can’t be made for 2020. We will again publish a comparison for the year 2022.

4.4 Measures list

The SKAO has a list of mitigation measures that can be implemented, with different ambition levels. For our offices and mobility, we are at B level Vooruitstrevend and for our project work we are working at A level Standaard, see CO2-PL Measures List 2021. Relevant targets in this list were incorporated into the Energymanagementplan. The SKAO report is added as an appendix for reference.

4.5 Initiatives

Active participation to chain initiatives related to CO2 reduction is required. Our participation is reported in the CO2-portfolio_Participationplan_2020.

Currently we are involved in the following sector initiatives;

- Duurzaam GWW
- Madaster
- Circle Economy
- Leeromgeving ‘Circulair viaducts & Bridges’
- SBIR Circulaire viaducten
- Green business club Sloterdijken
- Bouwcampus Materialen met toekomst: Hout in de GWW
- RWS Roadmap naar klimaatneutrale en circulaire kunstwerken in 2030.

5 Progress on implementation energy management plan

The focus point of the current energy management plan is on our air travel emissions and our commuting emissions. An important action is the implementation of the new mobility plan, which has the goal to set actions and make the necessary changes in the way we travel that are in line with our ambition in the energy management plan.

The current progress is;

- The effects of the Mobility plan introduced in January 2019 have been remarkable, in part also because of the 2020 COVID19 crisis. Commuting is at an all-time low, as is airtravel. Overall emissions in 2020 were 63% lower than in 2018.
- The policy regarding short distance business air travel emission is included in the new mobility plan with a steering mechanism for controlling this. Destinations in Belgium, Germany, United Kingdom and France are preferably traveled by train (first class allowed).
- More accurate measurement of commuter emission is developed as part of the new mobility plan (Reisbalans). The figures for 2020 provide good data, but the year 2020 is not a typical year.

GHG inventory			2018=100
	2018	2020	2020
Scope 1			
Lease cars	82.080	27.982	-66%
Scope 2	554.201	291.520	-47%
Electricity [1]	30.874	92.366	199%
Heating	113.728	115.272	1%
Business travel private car	42.966	27.243	-37%
Business travel public transport	3.984	1.270	-214%
Business travel airplane	362.649	55.369	-85%
Scope 3	308.863	29.918	-90%
Commuting private car [2]	308.863	25.352	-92%
Commuting public transport	-	4.567	
Paper consumption	-	-	
Total	945.144	349.421	-63%

[1] Note: electricity up in 2020 due to shift in energy supplier, from green to grey. Objective is to go back to green energy, saving around 110 tons yearly. The figures for 2020 were lower than 110 tons due to the first 6 months of green electricity.
[2] Note: commuting in 2018 was not split up into private car and public transport. 2020 was an anomaly due to COVID. Further investigation of these figures needed.

Figure 3 Carbon emissions kg Source: Environmentaldata 20210428 v6.0

6 Progress on reduction goals

6.1 Reduction goals

Effective from September 2020 Arup has set global carbon reduction goals as part of the Net Zero Carbon Strategy. As part of aligning these goals with the CO2 performance ladder goals we will tackle these as joint efforts. There is some alignment required as to the exact definition of the various scope elements. These will be clarified in the course of 2021.

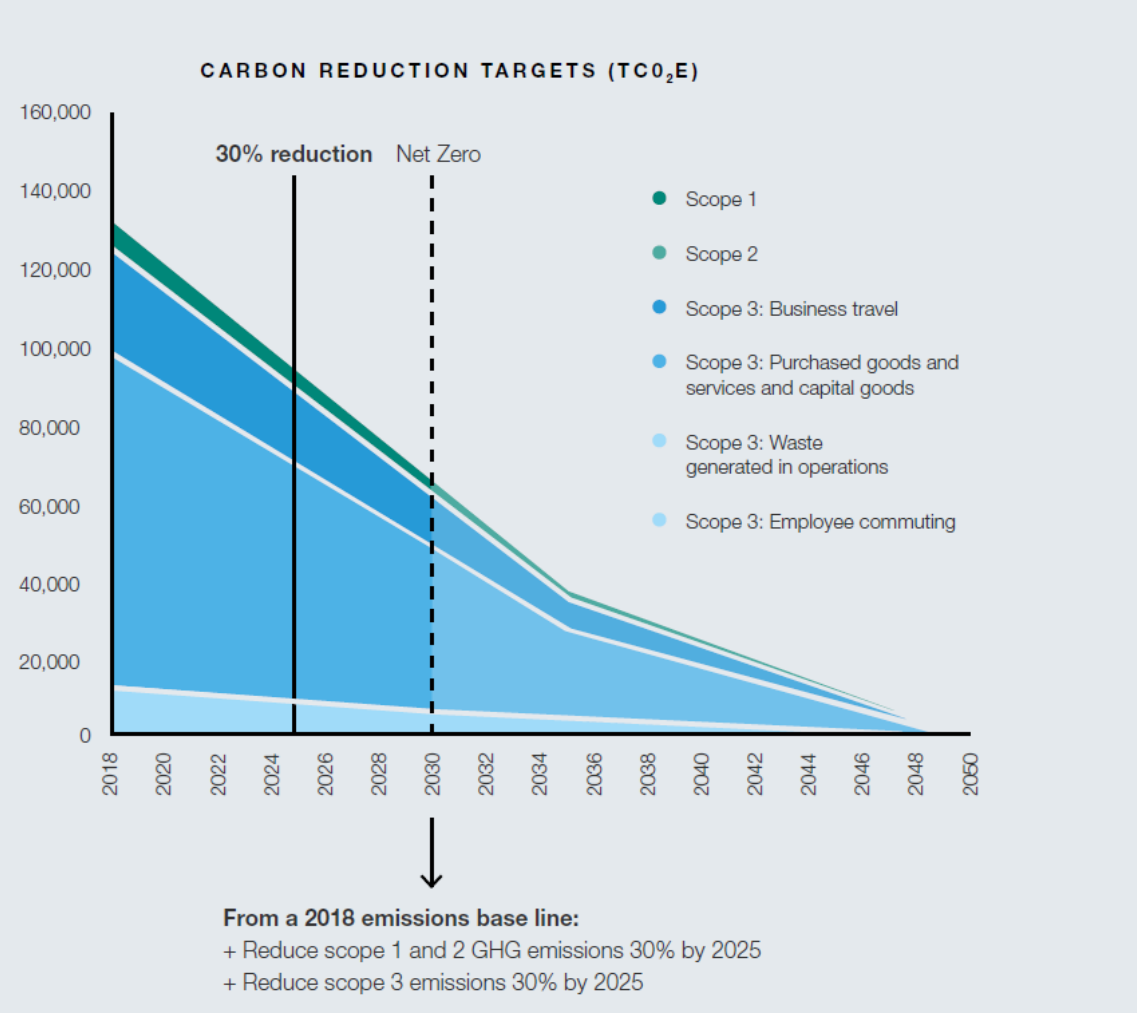


Figure 4 Net Zero Carbon Strategy goals Arup

GHG inventory				2018=100	
	2018	2020	2021*	2020	2021*
Scope 1					
Lease cars	82.080	27.982	20.226	-66%	-75%
Scope 2	554.201	291.520	271.459	-47%	-51%
Electricity	30.874	92.366	51.947	199%	68%
Heating	113.728	115.272	109.269	1%	-4%
Business travel private car	42.966	27.243	19.042	-37%	-56%
Business travel public transport	3.984	1.270	539	-214%	-271%
Business travel airplane	362.649	55.369	90.662	-85%	-75%
Scope 3	308.863	29.918	65.307	-90%	-79%
Commuting private car	308.863	25.352	62.966	-92%	-80%
Commuting public transport	-	4.567	2.341		
Paper consumption	-	-	-		
Total	945.144	349.421	356.993	-63%	-62%

Figure 5 GHG Inventory

6.2 Previous results

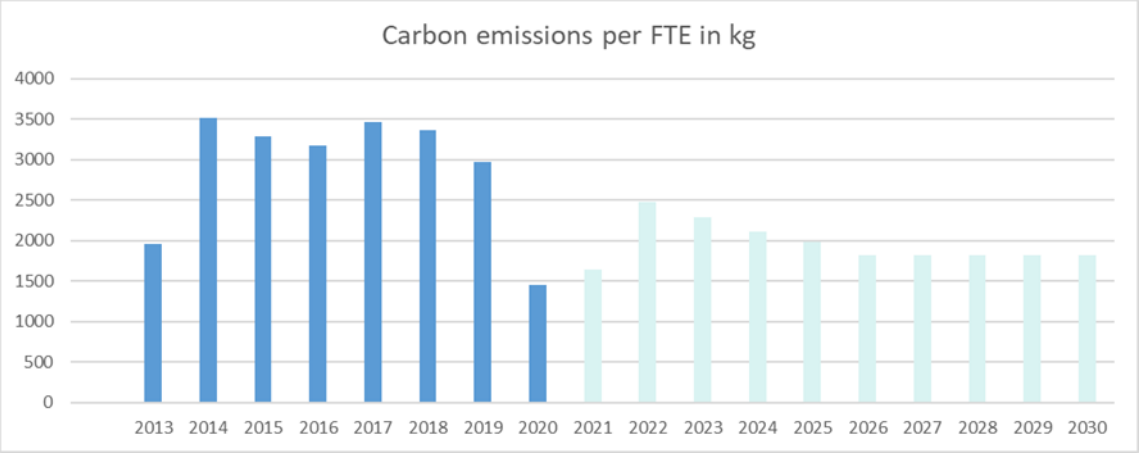


Figure 6 Total carbon emissions per FTE 2013-2030

[source Analysis 2020 tab Environmentaldata 20210428 v6.0]

The results for 2013-2020 show a decline in carbon emissions with the lowest emissions in 2020. The year 2021 is projected to show a similar trend although lifting of COVID restriction expected in autumn 2021 will lead to travel increases. The years beyond 2020 are forecast based on existing lease contracts and realistic reduction targets.

6.3 Likelihood of success

Achieved carbon reduction in 2020 have shown the viability of reducing carbon emissions whilst maintaining a healthy company. Although the present way of working can’t be sustained without adverse effects for a long time, remote working and flexible working hours are now being investigated as an option.

7 New proposals

The following actions are proposed to comply with the requirements of the CO2-prestatieladder and to achieve the Arup wide carbon reduction goals.

1. Go back to green electricity through our landlord AroundTown. Main energy can supply Dutch windpower for an extra of 2,50 €/MWh. Our current electricity use is estimated at 275 MWh yearly. This will cost us around € 750 yearly. Our landlord made the condition that all tenants should be switching to green electricity at the same time. The proposal is to pay for the switch for the full building for 1 year and in the meantime convince all tenants to switch. This would mean paying € 1500 yearly extra once and € 750 yearly after that.
2. Resume creation of yearly Sustainable Development report, showcasing our best national and international projects for internal and external use.
3. Improve CO2 impact of our projects by using the DuboCalc tool on at least two projects
4. Develop sustainability dashboard for project in PowerBI, currently being developed for inclusion in a bid for RWS (Balgzandbrug).

8 Recommendations

Reporting on CO2 performance ladder targets and Arup Net Zero Carbon targets to be aligned and to be published half yearly in March for the preceding calendar year and in September for the preceding first half of the calendar year.

9 Decisions

This memo will be discussed in the management meeting on 25 May 2021.

The decisions below have been made and will be implemented.

9.1 Management plan

Feedback from MT.

9.2 Reduction targets, measures and initiatives

1. Reduction target for 2021 and 2022: reduce airtravel by 30%
2. Reduction target for 2021 and 2022: reduce commuting with 20% by partially continuing home working one day a week.
3. Reduce carbon from electricity in Amsterdam to zero before end of June by changing supplier. First year additional service cost € 2000, after that € 1000 (based on all tenants accepting green electricity).
4. Reduce carbon from electricity in Groningen to zero before end of September by changing supplier.
5. Involve Business Units in developing participation plans, list out possibilities and provide options to BU leaders.

9.3 Improvements

The following improvements will be implemented;

1 Develop PowerBI dashboard sustainability into a useable tool for monitoring sustainability; SD manager

10 Conclusions

Due to the exceptional COVID19 conditions we are ahead of reaching our goals, but that has only partially been through our own actions. We need to use the time given to prepare for further reductions.

10.1 Efficiency within organization

Data collection and monitoring to be improved. First step was to improve the data collection sheets.

Reisbalans needs to improve reporting and clear lines of communication with Reisbalans have to be established.

10.2 Probability of reaching reduction targets

The probability of reaching the reduction targets is high in the present circumstances. In the longer run it will depend on the monitoring and reporting of data to all concerned. Air travel is the main focus, since commuting is actively promoted by public transport.

Arup

CO2 Performance ladder

GHG Inventory 2020

ISSUE | 25 may 2021

Job number

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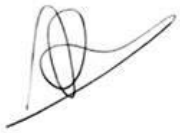
Document Verification

ARUP

Job title		CO2 Performance ladder			**Job number**
Document title		GHG Inventory 2020			**File reference**
Document ref					
Revision	**Date**	**Filename**	CO2-portfolio_GHG Inventory_FY 2020.DRAFT.docx		
Draft	22 feb 2021	**Filename**	CO2-portfolio_GHG Inventory_FY 2020.DRAFT.docx		
		Description	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	**Filename**	CO2-portfolio_GHG Inventory_FY 2020.DRAFT.docx		
		Description	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	**Filename**	CO2-portfolio_GHG Inventory_FY 2020.ISSUE.docx		
		Description	Checked		
			Prepared by	Checked by	Approved by
		Name	Paul van Horn	Martin Koster	Tudor Salusbury
		Signature			
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Contents

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_2 -performance ladder as a tool to map and reduce our CO_2-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_2 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 calender year 2020 to 2030, effectively changing the reporting period from Arup Financial year to standard calender 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 CO2 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	**349.421**

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	Arup b.v. rents 2 floors. Energy and central heating suppliers not chosen by Arup b.v. Energy/ climate is controlled centrally for the whole building, not falling under control of Arup b.v. Furniture, lighting and all operational devices such as computers and printers are property of Arup b.v.
Groningen (temporary site office for P500)	Equity share	Energy and gas 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.

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.

	Description report content 9.3 NEN-EN-ISO 14064-1:2019	**Report section/remark**
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 CO2, CH4, N2O, NF3, SF6 and other appropriate GHG groups (HFCs, PFCs, etc.) in tonnes of CO2e;	Direct CO2 emissions quantified, other emissions not relevant. 3.1
g)	a description of how biogenic CO2 emissions and removals are treated in the GHG inventory and the relevant biogenic CO2 emissions and removals quantified separately in tonnes of CO2e;	Not applicable
h)	if quantified, direct GHG removals, in tonnes of CO2e;	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 CO2e;	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;	https://co2emissiefactoren.nl/lijst-emissiefactoren/ 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_2-emissions scopes

The inventory reports its CO_2-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_2 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.
Scope 1		
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
Scope 2		
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]	**As per January 1st, 2019** 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]	**As per January 1st, 2019** 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
Upstream Scope 3		
Commuting travel [km] %	**As per January 1st, 2020** 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 (≤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 2nd 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 31st 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	**As per January 1st, 2020** 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]	• 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] • Record electricity on two dates on both floors to make own estimate of use.
Business travel by public transport [km]	• Review Reisbalans report as this seems to be underreported now.
Paper [kg]	• Review historical data • Improve way of capturing use, now too inaccurate. Very limited impact as kg of paper equals kg emission.

3 Carbon Footprint 2020 and forecast 2021

3.1 Distribution emissions 2018-2019-2020 [kg]

					% contribution to total emissions per year		
Scope 1	2018	2019	2020		2018	2019	2020
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				
Per FTE	**3.364**	**2.973**	**1.457**				

[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.

Arup bv

CO2 Performance Ladder

Energy Management Plan 2021-2030

ISSUE | 25 May 2021

REDACTED

Opdracht nummer n.v.t.

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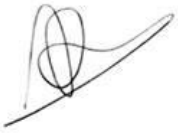
Document Verificatie

ARUP

Opdracht titel		CO2 Performance Ladder			**Opdracht nummer** n.v.t.
Document titel		Energy Management Plan 2021-2030			**Dossier referentie**
Document ref					
Versie	**Datum**	**Dossiernaam**	CO2-portfolio_EnergyManagementplan_2021-2030_DRAFT.docx		
Draft 1	22 feb 2021	**Omschrijving**	First draft		
			Voorbereid door	Gecontroleerd door	Goedgekeurd door
		Naam	Paul van Horn	Martin Koster	Tudor Salusbury
		Handtekening			
Draft 2	10 May 2021	**Dossiernaam**	CO2-portfolio_EnergyManagementplan_2021-2030_DRAFT2.docx		
		Omschrijving	Reworked following remarks from Internal audit		
			Voorbereid door	Gecontroleerd door	Goedgekeurd door
		Naam	Paul van Horn	Martin Koster	Tudor Salusbury
		Handtekening			
ISSUE	25 May 2021	**Dossiernaam**	CO2-portfolio_EnergyManagementplan_2021-2030_ISSUE.docx		
		Omschrijving	Checked		
			Voorbereid door	Gecontroleerd door	Goedgekeurd door
		Naam	Paul van Horn	Martin Koster	Tudor Salusbury
		Handtekening			
		Dossiernaam			
		Omschrijving			
			Voorbereid door	Gecontroleerd door	Goedgekeurd door

		Naam			
		Handtekening			
Uitgifte Document Verificatie met Document					✓

Inhoud

1 Introduction

At Arup we aim to contribute towards a more sustainable future. Arup in the Netherlands have adopted the CO_2 -performance ladder as a tool to map and reduce CO_2-emissions. The aims of the CO2 performance ladder are in line with the Arup global Net Zero Carbon Strategy released in 2020.

This Energy Management Plan combines our global company aims and strategies to reduce CO_2-emissions and the local CO2 performance ladder aims. Reduction targets and measures are set-up for emissions of scopes 1, 2 and 3 on the basis of the insight gained through the documents: GHG-inventory report, analysis of downstream scope 3 emissions and the chain analysis.

Due to the abnormal business conditions in 2020 and the uncertainty of business conditions in 2021, this plan will have an intermediate status. For most of 2020 the Arup offices have been closed except for business-critical reasons. In the Netherlands this has meant a very limited office presence of staff. Reception services continued during this period and regular lighting and heating in the office was provided.

The plan is set for the period from 2021 to 2030, with an update by the end of 2021. The present assumption is that in the second half of 2021, business as usual will slowly start to resume. In the rest of the plan we will discuss the post-COVID measures we aim to take in order to achieve our carbon reduction goals. The present COVID-induced carbon reduction is assumed to be temporary. The plan is written according to the ISO 50001 standard, as to comply to the CO_2-ladder certification.

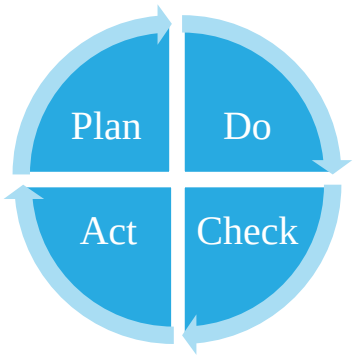
The energy management planning is intended to be a process of continuous improvement, on the basis of a Plan, Do, Check and Act system:

Plan: Set energy management targets and measures

Do: Implement the CO_2 strategy.

Check: Measure and monitor performance

Act: Analyse the variances, recommend improvements



1.1 Organizational boundaries

The CO_2-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 temporary 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 CO_2 emissions below 500 tons a year classifies as a small company. The size classification determines the specific set of CO_2-ladder certification requirements.

1.2 Responsibilities

The energy management team and organizational framework is introduced in the tables below. The team is also responsible for the yearly document maintenance.

Role	Name	Tasks
Sustainable Development Director (SDD)	Tudor Salusbury	Sets priorities and goals for the next 3 years Reviews governance policies Discusses with management team for approval of plans and implementation policies Audits if new projects meet the goals set by European board Yearly evaluates the goals
Sustainable Development Manager (SDM)	Paul van Horn, supported by Martin Koster, AMSFacilities, AMSFinance and junior PM.	Researches future scenarios Coordinates if goals meet CO2-prestatieladder Manages implementation of plans Checks governance with sustainability objectives Measures and monitors the effect of plans Analyses measurements Assists PM's of projects won with CO2-prestatieladder Reports to SDD

The responsible collaborators for project specific targets are:

Role	Name	
Project Director (PD)	-	Includes EC review the sustainability objectives Monitors progress on the sustainability objectives
Project Manager (PM)	-	Implementation sustainability objectives projects Measures and monitors CO2-footprint on project Measures and monitors the project objectives Analyses non-conformances and advises PD Update of sector- initiatives relevant for project

Additional collaborators within the office are:

Role	Name	Tasks
Quality control	Martin Koster	Organisation audits
Human Resources	Esther de Vreugd	Mobility plan, input for Environmental reporting
Marketing / Com.	Hester Duijndam	Communication strategy
Facility manager	Diede van Graas/Robin Langelaar	Facility management
Finance	Mathijs Lammertse	Input for Environmental reporting

2 Reduction plan own organization

In this section, the reduction strategy is outlined for emission categories associated with the operational activities of our own organization (scope 1 + scope 2 + upstream scope 3). The main areas of influence are defined in GHG-inventory report.

2.1 Evaluation reduction targets

2.1.1 Scope 1

Scope 1 reduction is linked to the reduction of number of lease vehicles and the electrification of the lease fleet. These measures were put in place in early 2019 with an evaluation of these measures set for early 2021.

First item to note is the reduction in lease companies from 6 to 3, this will make it easier to produce reliable information.

Second trend is the one towards electrification of the vehicle fleet, from 0 in 2015 to 12 in 2020. Note that the amount of lease vehicles spikes in 2020 due to some temporary contracts (< 3 months) for the Groningen office. These were included in the totals. For 2021 the number of non-electrical lease contracts is 3.

KG CO2 emissions			
Scope 1	2018	2019	2020
Business travel			
Lease cars gasoline	49106	41538	11500
Lease cars diesel	31866	9110	3696
Lease cars hybrid	-	-	-
Lease cars fully electric	1108	1640	12787
Total carbon lease cars	**82.080**	**52.289**	**27.982**
Total Scope 1	**82.080**	**52.289**	**27.982**

[Source: Business Travel tab in Environmental20210428 v6.0 xl sheet]

2.1.2 Scope 2

Electricity buildings Amsterdam and Groningen:

With the sale of the Arup office building in Amsterdam the electricity supplier has changed as well. From 100% wind energy between September 2017 and July 2020, Arup is since July 2020 using grey electricity (average mix of fuels of electricity on the Dutch market).

Scope 2		2018	2019	2020
Electricity				
AMS Building	**Electricity - grey**			80066
AMS Building	**Electricity -wind**	0	0	0
Total carbon AMS building Electricity		-	-	**80.066**
GRO Building	**Electricity**	30874	23112	12300
Total carbon GRO building Electricity		**30.874**	**23.112**	**12.300**

[Source: Carbon per FTE tab in Environmental20210428 v6.0 xl sheet]

The Groningen office is currently using grey electricity.

Heating buildings Amsterdam and Groningen

The Amsterdam building is heated by the AEB waste incinerator providing the whole western harbour area.

The Groningen building is heated by using natural gas. The exact amount for our own office is not known, the costs are included in the service-costs. The quoted figures seem overstated given the size of the office. Will be investigated.

There is not much gain to be had in reduction of heating, only in reduction in the amount of space leased. This will affect the heating requirements directly. An assessment of space requirements is presently undertaken for the Amsterdam office.

Heating		2018	2019	2020
AMS Building	**Heating**	8061	10511	10281
GRO Building	**Heating**	105667	79398	104990
Total carbon Heating AMS and GRO		**113.728**	**89.909**	**115.272**

[Source: Carbon per FTE tab in Environmental20210428 v6.0 xl sheet]

Business travel with private car

The numbers on the use of a private car for business travel (not commuting) vary over the years and are assumed to be mainly influenced by the P500 project in Groningen. Staff from Groningen regularly visited Amsterdam and vice versa. The spike in 2019 could also be an error due to a new accounting system for the private mileage.

Business travel with private car	2081	2019	2020
Total carbon business travel with private car	**42.966**	**117.891**	**27.243**

Source: Carbon per FTE tab in Environmental20210428 v6.0 xl sheet]

Business travel with public transport

The mobility plan that was put in effect on 1st January 2019 aims to have business travel done as much as possible by public transport of by using electric lease vehicles.

The public transport numbers are strongly influenced by the energy sources of the public transport companies. Between 2018 and 2020 more and more public transport companies have started using green electricity or hydrogen, pushing down the emissions factors.

The blacked out sections in the table below show the total numbers derived from earlier calculations. The modal split has only been possible since 2019.

Business travel with public transport		2018	2019	2020
Public transport	**Bus**	[redacted]	1105	356
Public transport	**Metro**	[redacted]	584	188
Public transport	**Tram**	[redacted]	2	2
Public transport	**Intercity train**	[redacted]	2249	724
Public transport	**International train**	[redacted]	456	0
Total carbon business travel with public transport		**3.984**	**4.395**	**1.270**

Source: Carbon per FTE tab in Environmental20210428 v6.0 xl sheet]

Business travel airplane

The main source of carbon emissions in the past has been business travel by airplane. From 28% of total emissions in 2014 to an all-time high of 42% in 2019 and an all-time low of 16% in 2020. These percentages partially hide a wide range of absolute emissions, from 215.426 kg in 2014, through a peak of 362.648 kg in 2018 to an all-time low of 55.369 kg in 2020. For the internal Arup net zero strategy the year 2018 is used as a reference.

Business travel airplane	2018	2019	2020
distance <700 km	101908	79194	15825
2500< distance >700	115130	104602	16839
distance >2500 km	145611	102978	22705
Total carbon business travel by airplane	**362.649**	**286.773**	**55.369**

Source: Analysis 2020 tab in Environmental20210428 v6.0 xl sheet]

Airplane travel is done for project reasons or for internal Arup reasons, mostly training and meetings. The mobility policy encourages a transfer to train for international travel on short distances. The recorded travel so far has been 41 trips recorded in 2019 and 25 in 2020. Unfortunately the destinations were not tracked.

2.1.3 Scope 3

Commuting private car	2018	2019	2020
Fuel and weight unknown		88798	25352
Total carbon commuting private car	**308.863**	**88.798**	**25.352**

Source: Carbon per FTE tab in Environmental20210428 v6.0 xl sheet]

Commuting public transport	2018	2019	2020
Bus		3978	1281
Metro		2103	677
Tram		0	0
Train		8098	2608
Total carbon commuting public transport		**14.178**	**4.567**

Source: Carbon per FTE tab in Environmental20210428 v6.0 xl sheet]

The scope 3 figures are almost all related to commuting. The amount of commuting has been difficult to establish because in earlier years before 2019 there was no distinction between private car and public transport. The advent of Reisbalans (an app showing the modal split) now allows for more accuracy.

For 2020 the amount of commuting was limited due to the COVID19 restrictions.

Looking back at the carbon emissions per FTE in kg we can discern a gradual reduction in the years between 2014-2019 and a dramatic drop in 2020. In the next chapter we will outline the steps we will take to continue this path of reduced emissions.

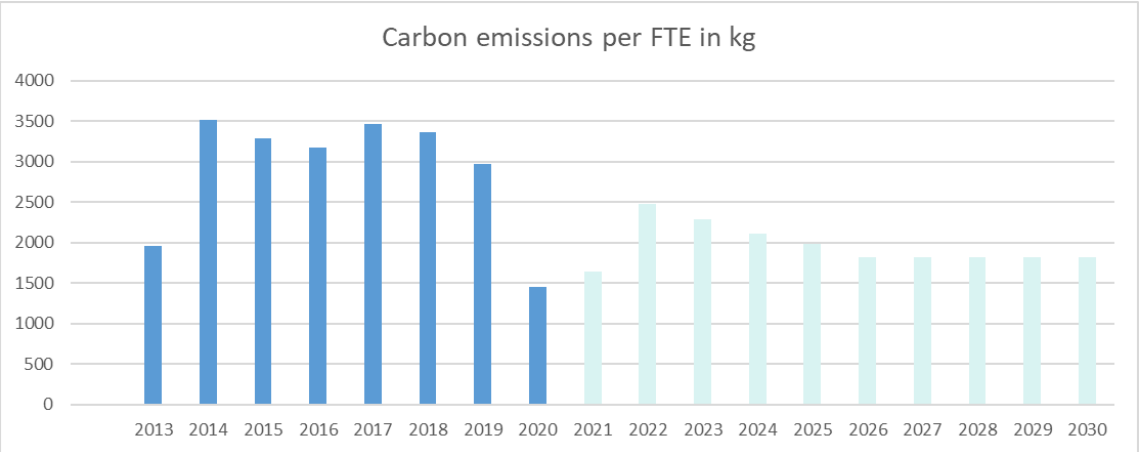


Figure 1 Yearly carbon emissions per FTE in kg

[source Analysis 2020 tab Environmentaldata 20210428 v6.0]

2.2 Reduction strategy

Table 31. GHG inventory				2018=100	
	2018	2020	2021*	2020	2021*
Lease cars	82.080	27.982	20.226	-66%	-75%
Scope 2	554.201	291.520	271.459	-47%	-51%
Electricity	30.874	92.366	51.947	199%	68%
Heating	113.728	115.272	109.269	1%	-4%
Business travel private car	42.966	27.243	19.042	-37%	-56%
Business travel public transport	3.984	1.270	539	-214%	-271%
Business travel airplane	362.649	55.369	90.662	-85%	-75%
Scope 3	308.863	29.918	65.307	-90%	-79%
Commuting private car	308.863	25.352	62.966	-92%	-80%
Commuting public transport	-	4.567	2.341		
Paper consumption	-	-	-		
Total	945.144	349.421	356.993	-63%	-62%

[source: Analysis 2020 tab in worksheet Environmentaldata 20210428 v6.0]

[* predicted based on assumptions listed in Assumptions 2020 tab in worksheet Environmentaldata 20210428 v6.0]

With the present COVID crisis gradually subsiding, we expect the regular business cycles to resume by end of September 2021. This means that from then on the regular travel patterns will re-emerge.

The COVID crisis has shown that remote working is more realistic and feasible than previously imagined. With everyone now having at their disposal a suitable desk and chair along with an extra computer screen, the conditions are set to make use of the home-working possibilities.

2.2.1 Scope 1 reduction

The target for the coming years is a full electrification of the lease vehicles and a reduction in lease vehicles. This is reflected in the targets, with a total of 12 fully electric lease vehicles being used for forecasting. The current lease contracts for non-electrical vehicles will expire in the coming years, with the last one in 2023. The target for 2024 is the target for a fully electric lease vehicle fleet. After 2024 the only way to reduce carbon is to ensure 100% renewable energy for charging and/or reduction of number of lease vehicles.

2.2.2 Scope 2 reduction

Electricity Amsterdam and Groningen

Scope 2		2020	2021
Electricity			
AMS Building	**Electricity - grey**	80066	84682

AMS Building	**Electricity -wind**	0	0
Total carbon AMS building Electricity		**80.066**	**84.682**
GRO Building	**Electricity**	12300	19211
Total carbon GRO building Electricity		**12.300**	**19.211**

Discussions are underway to revert the Amsterdam electricity supply back to Dutch wind power 100% green electricity by 1st July 2020. In that case the predicted 84682 kg emissions would be halved.

Switching the Groningen office to green electricity could reduce carbon emissions by 20 tons yearly. Discussion with the landlord in Groningen are also underway.

Target date for switch is June/July 2021.

Heating		2020	2021
AMS Building	**Heating**	10281	10281
GRO Building	**Heating**	104990	98988
Total carbon Heating AMS and GRO		**115.272**	**109.269**

Heating of the Amsterdam office is done through district heating from the waste incinerator AEB. This system can't be changed.

In 2021 we will discuss the issue of reverting to other possible uses (green gas) with the landlord of the Groningen office. The current figures for heating of the Groningen office seem inflated. This will be investigated.

Business travel with private car	2020	2021
Total carbon business travel with private car	**27.243**	**19.042**

The mobility policy favours business travel by electric lease car or public transport. This category is expected to stay at low levels in the coming years.

Business travel with public transport		2020	2021
Public transport	**Bus**	356	83
Public transport	**Metro**	188	0
Public transport	**Tram**	2	0
Public transport	**Intercity train**	724	0
Public transport	**International train**	0	456
Total carbon business travel with public transport		**1.270**	**539**

With effect from 2021 all public transport companies use 100% green electricity in their operations. This means travel on public transport in WtW analysis means zero emissions. This is reflected in the falling numbers over the years. Only bus travel will be producing a limited amount of carbon emissions from 2021 onwards.

Business travel airplane	2020	2021
distance <700 km	15825	25477
2500< distance >700	16839	28782
distance >2500 km	22705	36403
Total carbon business travel by airplane	**55.369**	**90.662**

The mobility policy favours trains for short distance international travel and this is already showing in the growing number of international train trips. In 2020 and 2021 this development was temporarily interrupted.

In coming years air travel will be dealt with as a direct cost to the projects. Projects will be charged an additional $US40 per ton of calculated emission. These amounts will be used to buy verified carbon offsetting certificates. The effect of this will be closely monitored.

Training will be increasingly held on-line. To that effect Arup University has made great strides in transforming training resource material to on-line variants.

The target emissions from airtravel will be 70% of 2018 in 2022, reducing with 10% year on year until 2026 when the emissions will be 30% of the 2018 figures.

2.2.3 Scope 3 reduction

Commuting private car	2020	2021
Fuel and weight unknown	25352	62966
Diesel	0	0
Hybrid	0	0
Fully electric	0	0
Total carbon commuting private car	**25.352**	**62.966**

Home-working in 2020 has shown that productivity doesn't necessarily suffer. This has made it more realistic to introduce regular home-working as a way to push down commuting, either by public transport or private car. The aim for 2022 is 20% less commuting per FTE than in 2018.

For the commuting by public transport there is little to be gained in limiting carbon emissions, since all means of public transport are now run on sustainable energy. All commuting miles with public transport are basically zero emission.

Another possible outcome could be the re-evaluation of office size. With a 20% less attendance in the office, there is scope for hotdesking and reducing the amount of office space. This will have a positive impact on the energy use per FTE. The effects are now being studied but are not expected to be the same 20%.

2.3 Targets set in Europe region net zero carbon strategy

Arup has set itself global goals in reducing carbon emissions and being a net zero carbon organisation by 2030, with an intermediate goal of 30% reduction by 2025. The Europe region has set out a detailed plan for reductions by 2025 and 2030. The relation between those reductions and the ones proposed for the CO2 prestatie ladder will be discussed below.

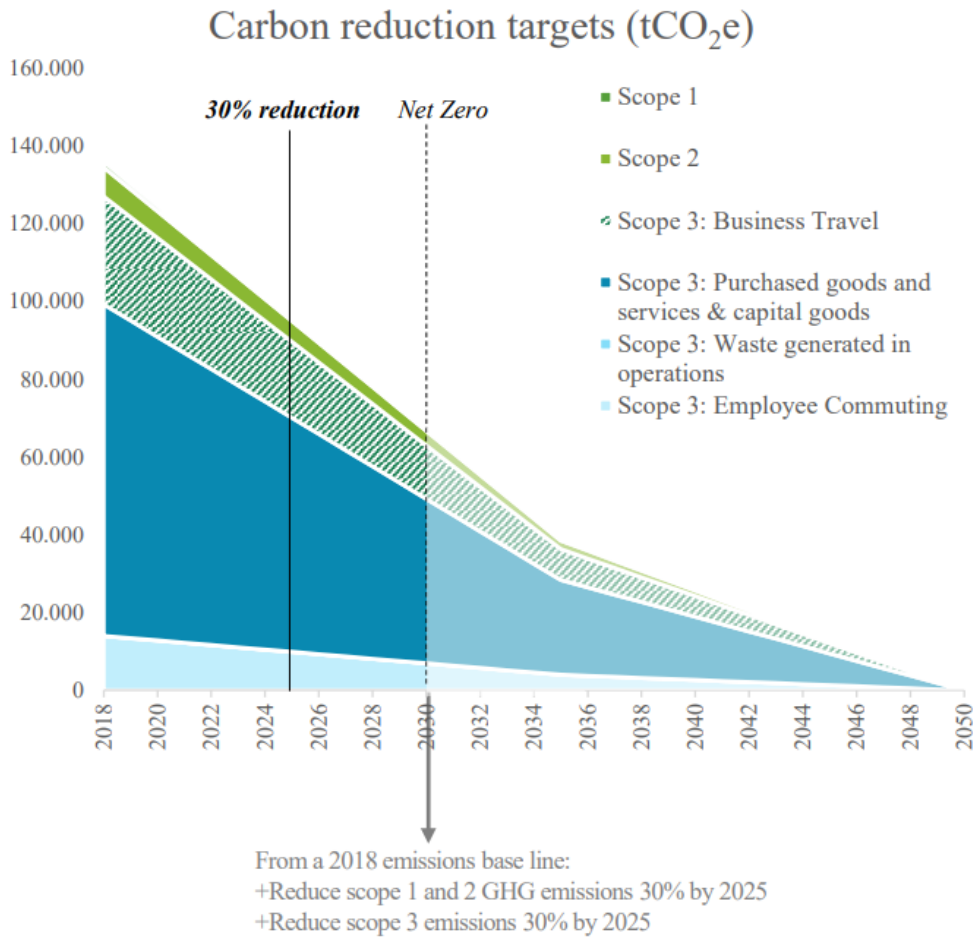


Figure 2 ER GHG reduction goals [source: Net Zero ER GHG Reduction Plan August 2020]

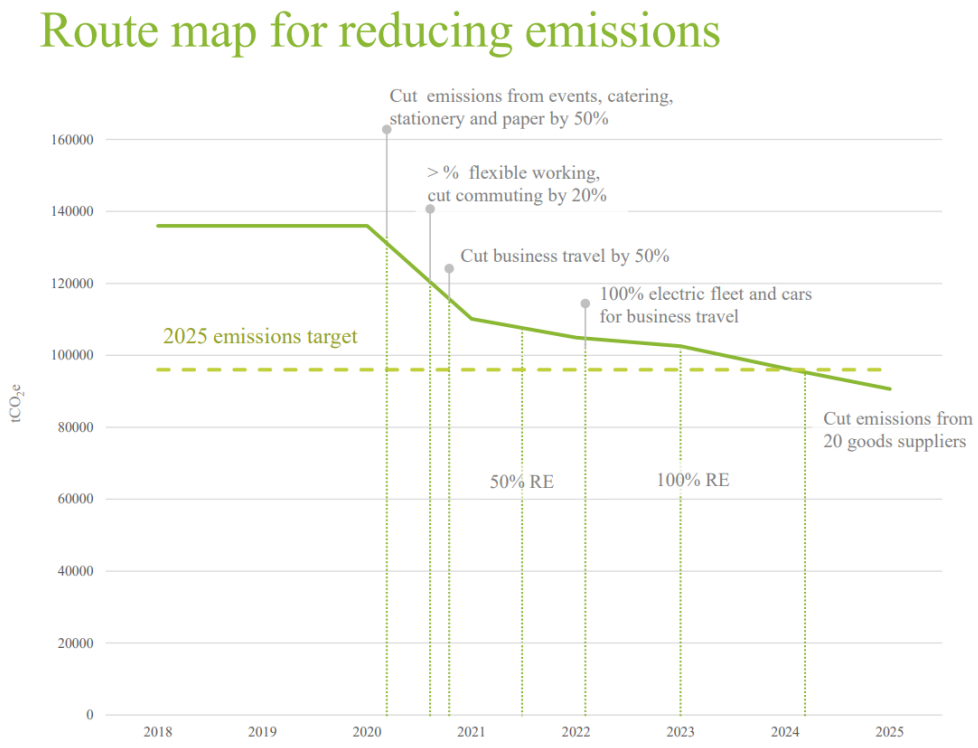


Figure 3 ER GHG reduction plan route map [source: Net Zero ER GHG Reduction Plan August 2020]

A few remarks: the ER plan uses different definitions of scope for their emissions calculations than the ones used for CO2 prestatieladder. The CO2 prestatieladder has business travel with lease cars in scope 1, business travel by private car, public transport and airtravel in scope 2, commuting in any form in scope 3. The CO2 prestatieladder excludes emissions from suppliers.

ER GHG reduction plan				target	% reduction		
ER GHG reduction goals	2018	2020	2021	2025	2020	2021	% complete
Scope 1	82.080	27.982	20.226	57.456	66%	75%	251%
Scope 2	554.201	291.520	271.459	387.941	47%	51%	170%
Scope 3	308.863	29.918	65.307	216.204	90%	79%	263%
Total scope 1, 2,3	945.144	349.421	356.993	661.601	63%	62%	207%
ER GHG reduction plan route map							
Cut emissions from events, catering, stationary and paper 50%							
Cut commuting by 20%	308.863	29.918	65.307	247.090	90%	79%	394%
Cut business travel by 50%	409.599	83.882	110.243	204.800	80%	73%	146%
					% increase		
100% electric fleet and cars for business travel	22%	35%	75%	100%	13%	53%	75%
Cut emissions from 20 goods suppliers	-	-	-	-			

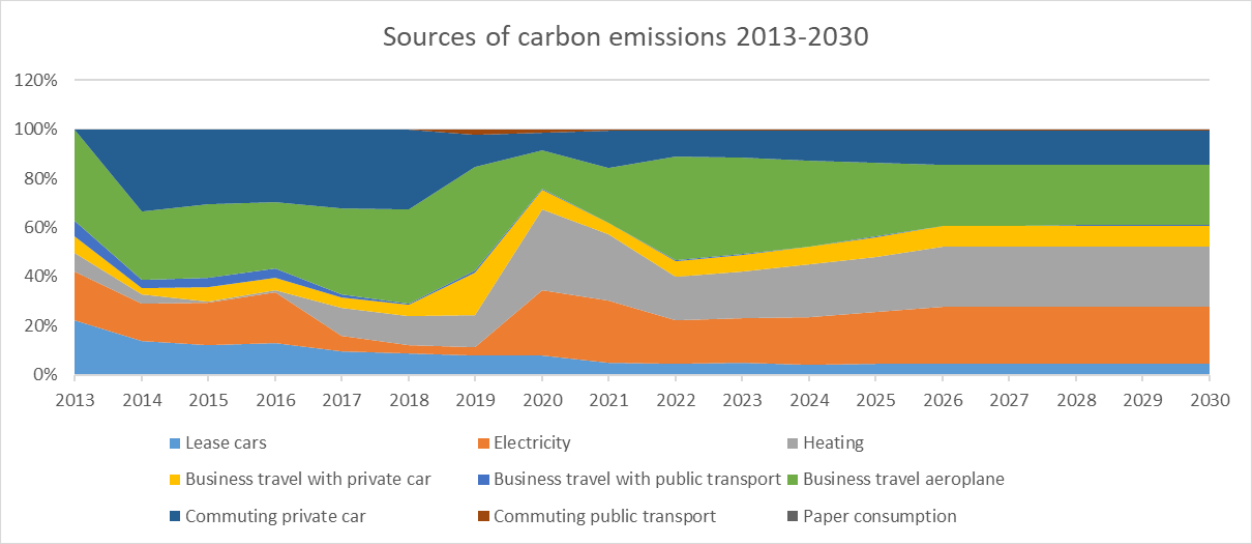
As can be seen the global targets for 2025 have already been attained.
Commuting emissions will be reduced further by using only public transport or electric lease vehicles. All public transport companies in the Netherlands have reverted to using 100% green electricity, effectively meaning that commuting by train, tram or metro will not generate carbon emissions in 2021.

With reduced presence in the office (20% reduction as a target), the amount of required office space is also under consideration. This will directly impact the **heating** and **electricity** requirements. Heating emissions are directly linked to amount of office space and can't be influenced in any other way (city heating in Amsterdam is the only supplier allowed).

The last major reduction will be the use of **airtravel** in projects and internally. The conversion of most Arup University material into online courses will have a discernible impact on the amount of airtravel for training.

The only reduction measure not in line with the CO2 performance ladder is the reduction of emissions from 20 goods suppliers. At present these emissions are not included in the scope for the CO2 performance ladder. Further investigation of the exact definition of these emissions and our influence on them will be done before the next report.

2.3.1 Prediction 2030 emissions based on historical averages



[actual and forecast distribution of sources of carbon emissions 2013-2030, based on 2020 figures. File: Environmentaldata 20210428 v6.0]

Looking ahead to 2030 based on the data now available (some needs to be corrected and other data is not in line with the historic trend) we can see that the main contributors to carbon emissions in the future will be electricity (orange), heating (grey), airtravel (green). This forecast will be updated yearly to make sure the correct sources are considered for action.

2.4 Reduction targets

In the past year 2020 air travel has literally dropped to zero due to Covid-induced travel restrictions. Commuter travel has dropped significantly from March 2020 onwards as office presence of staff became restricted and employees started to work from home.

As stated before, the current Covid travel restrictions make it very hard to set realistic targets. Generally speaking the first six months of 2021 will probably show the same restricted travel patterns as 2020. After that travel is projected to gradually pick up and be fully possible in 2022, most probably not reaching pre-2020 levels.

One of the main lessons from the Covid lockdown was the apparent effectiveness of remote working and online working. Whereas before this was never considered a viable option, it has now become a daily reality.

This will also affect travel patterns in the future as online conferencing and remote working will become more accepted. It is not realistic to think all work can be productively done online. The targets for reduction below take this into account.

Reduction targets for 2021 will be greatly affected by the low levels of travel and commuting in the first half of 2021. Realistically speaking any reduction target should only start in 2022.

For this reason we take the reduction target for 2022 to be the following:

1. Each FTE to work from home 1 day a week, effectively reducing commuting mileage by 20%. This will bring commuting emissions lower if public transport is used. From 2021 onwards all public transport (except busses) has zero emissions.
2. Air travel to Arup meetings and Arup internal conferences to be reduced by 20% in 2022 compared to 2018 due to availability of online alternatives. This reduction will be continued until a 70% reduction is reached compared to 2018. This will bring Arup bv close to net zero in 2025, assuming the compensation of flight with offsetting certificates.

Taking these two targets into account the 2022 reduction will be:

Scope	**Source of emission**	**CO_2-emission [kg CO_2-/FTE]*** **	**Reduction Ambition**	
		2018	2022	2022 target
Scope 1	Business travel: lease cars	292	60%	117
Scope 2	Business travel: private cars	153	Equal	158
	Air travel	1291	20%	1055
	Electricity	110	Equal	81*
	Heating	405	Equal	446**

	Business travel: public transport	14	70%	4
Scope 3	Commuting	1099	76%	271**
Total				
Scope 1,2 en 3		3.364	26 %	2.484

[Source Carbon per FTE tab Environmentaldata 20210428 v6.0]

** Assumes green power for Amsterdam office, if not the total for Amsterdam and Groningen will be 781 tons per year per FTE.*

*** Figures look distorted. Need to improve measurements.*

**** Targets per FTE differ slightly from overall targets due to changing number of FTE.*

2.5 Potential reduction measures

The following definitive set of reduction measures were implemented as part of the new mobility plan, effective as per January 1st, 2019. The assumed changes in work patterns as discussed above have also been included.

Category	Measure	Potential % total emissions	Progress	Responsible
Scope 1: Self assessment energy audit.	Use the toolkit of InfoMill http://www.infomil.nl/kantoren to identify possible office energy saving measures.	Estimated 1% of Scope 2. Done mainly to verify completeness of measures identified	● ● ●	SDM
Scope 1: Office energy use	Office energy audit by Main Energy, identifying potential areas of saving.	Estimated 1% of Scope 2. Done mainly to verify completeness of measures identified	●	SDM
Scope 2: Business travel – air 	1. Incentives setup in Net Zero Carbon plan. 2. Training move on-line.	▼ 20% in 2022 compared to 2018	● ●	SDM

	3. Incentives for train set up in new mobility plan 4. Provide alternative travel guideline: Our travel agency is instructed to provide travel by train as the first option for travelling within the EU (Germany, Belgium, UK or France). 5. For flights to/from these destinations, an additional supervisor approval will be needed.			
Scope 3: Commuting 	• Incentives in new mobility plan • Use of Reisbalans • OV business cards/ mobility cards • Free OV bike to and from train station • Aim for 1 day home-working • Reduction of number of lease vehicles from 12	▼ 20% reduction compared to 2018	● ●	SDD

Besides focussing on the main reduction measures of scope 1,2, and 3 to decrease the CO2 emissions of our operations, Arup as a company has put effort into increasing awareness amongst employees.

Category	**Measure**	**Potential %**	**Progress**	**Responsible**
Awareness 	Sustainable development Learning path	*Tbd*	● ●	SDM

3 Reduction for projects downstream scope 3

In this section, the reduction strategy is outlined for emission categories associated to our projects, downstream scope 3. The main areas of influence are defined in the downstream scope 3 analysis and the chain analyses.

3.1 Reduction strategy

Through our design and consultancy practice we stimulate sustainable decisions in the design process. To assist project managers in setting sustainability objectives a tool will be developed to give insight in the driver for sustainability and help them set and monitor objectives in projects. A focus on energy targets in projects is priority.

The objectives are recorded in the Arup internet Project Plan (IPP)

Figure 4 UNSDGs (Source: United Nations)

Both in the CRM system and the IPP project plan system data on sustainability is captured but up to now without follow up action.

Starting in 2021 there is a Power BI dashboard capturing all projects that have environmental aspects. In the course of 2021 the actions that will spring from this dashboard will be defined and set in motion. The most obvious would be to have an environmental audit of the project to assess the potential for sustainability measures to be taken into account, carbon emissions reduction being one of them.

REDACTED

Further work will follow on outlining example projects and project-level interventions and suggestions to lower carbon emissions.

In 2021 work will begin on tracking the carbon emission performance of our suppliers. Initial work will be done in identifying the main suppliers and setting up a questionnaire on their carbon emissions, possibly offering to do a carbon analysis of their operations.

3.2 Reduction targets

In compliance with Arup European Objectives:
50% of projects with a fee > €150k are setting sustainability objectives.
Performance 2018: 34% achieved. Goal 2022: 50%

3.3 Reduction measures

Target	Category	Measure	Progress	Responsible
1 	Projects – Objectives	Sustainability objectives in projects > €150k fee are recorded in the IPP	● ○ ○	PM
2 	Projects – Objectives	Development of Sustainability objectives tool	● ○ ○	SDM
2 	Projects – design - Energy	Verify if projects comply with Dutch regulation in relation to the 'Energieprestatie' of a building. (EPC)	● ● ○	PM
3 	Projects – design - Materials	Verify if projects comply with Dutch regulation in relation to the 'Milieuprestatie' of a building. (MPG)	● ○ ○	PM
4 	Projects - Communication	Each year a selection of our projects will be presented in the 'How We Shape a Better World' report	● ○ ○	SDM

Arup

CO2-performance ladder

Participation plan

ISSUE | 25 May 2021

Opdracht nummer

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Document Verificatie

ARUP

Opdracht titel		CO2-performance ladder			**Opdracht nummer**
Document titel		Participation plan			**Dossier referentie**
Document ref					
Versie	**Datum**	**Dossiernaam**	CO2 Portfolio 2020_Participation plan Draft1.docx		
Draft 0.1	23 May 2021				
			Voorbereid door	Gecontroleerd door	Goedgekeurd door
		Naam	Paul van Horn	Martin Koster / Hester Duijndam	Tudor Salusbury
		Handtekening			
Issue	25 May 2021	**Dossiernaam**	CO2 Portfolio 2020_Participation plan ISSUE.docx		
		Omschrijving	Checked		
			Voorbereid door	Gecontroleerd door	Goedgekeurd door
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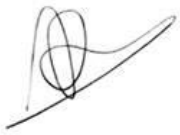
		Handtekening			
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		Omschrijving			
			Voorbereid door	Gecontroleerd door	Goedgekeurd door

		Naam			
		Handtekening			
			Uitgifte Document Verificatie met Document		✓

Inhoud

1 Introduction

As part of the overall Arup sustainability strategy Arup b.v. is committed to the active participation in initiatives in the field of sustainability in general and CO_2-reduction in particular. This entails performing in-house research and establishing partnerships with academic and industry partners.

The previous report was issued in 2019 with the intention to update it after the closure of the Arup financial year in March 2020. Things didn't quite work out that way. New working patterns had to be established to facilitate the social distancing required to combat COVID-19.

Webinars and podcasts proofed to be a popular way to divulge the Arup message on sustainability and participate in sector initiatives.

2 In-house research

2.1 Sustainable development Infra Amsterdam

In preparation of the RWS SBIR Circular viaducts call Arup prepared by hosting 3 internal workshops on circular economy in February 2020 based on three principles: re-use; biobased; modular. The outcomes of these workshops resulted in our focus on timber. These workshops were funded with internal Business Unit development funds.

2.2 SBIR Circular Viaducts RWS

Partnering with Heijmans, the Dutch contractor, we set out to develop a proposal for the first round of the SBIR call. Out of 32 entries there were 10 chosen to participate, one being our proposal Bridges of Laminated Timber (BoLT).

Work on the initial phase ran from March 2020 to August 2020. During this time we worked on a preliminary proposal and assessment of the best approach. Our submission [1] was awarded a place in Phase 1 of the project.

From October 2020 to March 2021 we worked on the development of the design of the timber bridge, the environmental impact and the business case. We submitted our report on 16th of March 2021.

Our promise to RWS was to release all documents related to the design as open source documents at the end of Phase 2. These documents will be part of our communication and participation plans for the CO2 performance ladder requirements. We will also release the environmental impact report.

At present we are anticipating the jury results and expect to hear on 23rd April whether our proposal will enter the second phase. This phase will last about 18 months.

2.3 Invest in Arup

In support of the SBIR CIVI internal Arup research funds were allocated to the Timber bridge initiative. This made it possible to involve the wider Arup community in the undertaking. These funds are also used to translate the original Dutch report to make it easier to distribute internationally.

3 Initiatives

Arup b.v. participates in a number of initiatives aiming to reduce CO2-emissions.

3.1 CB-23

The Circular Building initiative hosted by Bouwcampus has since 2019 been working on ways to measure circularity. From mid 2019 to mid 2020 Arup participated in the workgroup Measuring Circularity. This participation will be continued in the year to come.

3.2 Green business club Sloterdijken

Arup is a founding membership of a green business club Sloterdijken, aiming to help the local business deploy sustainable development initiatives.

3.3 Memberships

- Arup is a member of the Sustainability Committee TC1 of the Dutch Steel Association
- Arup is a Member of Madaster, the circularity initiative for building materials
- Arup is a Member of Circle economy, the circular building initiative. As part of this membership Arup twice hosted a webinar on timber building, showcasing the work on Haut.

3.4 Sector initiatives

- Participant of Leeromgeving ‘Circular viaducts & Bridges’
- Arup is a Knowledge Partner of the Ellen MacArthur Foundation. Whilst most of the effort is geared towards Arup global, there have been a number of calls for input from Arup in Amsterdam.
- Arup Amsterdam is participating in an internal network of Arup practices linked to European Infrastructure clients such as Transport Infrastructure Ireland; Vejdirektorat Denmark, Statens vegvesen Norway, Trafikverket Sweden in promoting sustainable infrastructure.
- Arup is participating in the RWS initiative Roadmap naar klimaatneutrale en circulaire kunstwerken in 2030.

- Arup is participating and contributing to the Bouwcampus series Materialen met Toekomst: Hout in de GWW. The aim of this series is to produce a manual for local and provincial authorities helping them to make informed choices on the use of timber.

4 Future plans

The future plans will mostly be geared towards involving a wider internal audience from Arup in the efforts to promote sustainable solutions.

Arup

CO2-prestatie ladder

Communication plan 2021

ISSUE | 25 May 2021

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Document Verificatie

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Opdracht titel		CO2-prestatie ladder			**Opdracht nummer**
Document titel		Communication plan 2021			**Dossier referentie**
Document ref					
Versie	**Datum**	**Dossiernaam**	CO2 portfolio_Communication plan_2021_Draft_0.1		
Draft	23-05-2021				
			Voorbereid door	Gecontroleerd door	Goedgekeurd door
		Naam	Paul van Horn	Martin Koster/Hester Duijndam	Tudor Salusbury
		Handtekening			
ISSUE	25 May 2021	**Dossiernaam**	CO2 portfolio_Communication plan_2021_ISSUE		
		Omschrijving	Checked		
			Voorbereid door	Gecontroleerd door	Goedgekeurd door
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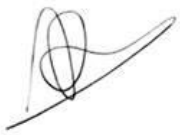
		Handtekening			
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Inhoud

1 Introduction

In this document Arup b.v. outlines its communication plan for the years 2021and 2022 within the framework of its sustainability strategy and the CO_2 -Performance ladder. This document is an update of the draft plan 2019-2020, never officially released due to COVID-19 related disruptions of work patterns.

Arup uses both internal and external channels to communicate the implementation of the CO2-performance ladder. The earlier communication strategy based on quarterly CO_2-performance updates, half yearly awareness weeks and yearly CO2-target updates have been adjusted to reflect the new reality of working from home.

At the moment of writing this plan, working from home is the norm and no change is expected in this regard in the forseeable future. Updates on the CO2-performance using the screens in the office are now obsolete for now.

Yearly calendar:

	Internal				External	
Period	**CO_2-ladder**		**CO_2-awareness**			
	Topic	Method	Topic	Method	Topic	Method
Q1	Update CO_2-performance	Group meeting presentation at the end of Q1 (March)			Update CO2-performance for previous calender year	Arup site
Q2			Report Sustainability in projects		websites	SKAO
Q3	Update CO2-performance	Update in group meeting for half year results Q1+Q2.				Arup site
Q4			Sustainability day	External speaker		

Figure 1 Yearly communication calendar

2 Communication strategy

2.1 Target groups

	Target Group
Internal	• Employees • Project managers • Business units Leaders • Management team
External	• Arup Global and Arup companies • Clients: public and private sector • Sector / network associations and knowledge exchange platforms: • SKAO “Stichting Klimaatvriendelijk Aanbesteden en Ondernemen: • Project partners: architects and engineering firms • Students and potential employees

2.2 Content per Target Group

In the table below, we explain the content of communication for each target group:

Target group	Content of communication
General	• Reduction target and progress of Arup bv in meeting these targets
Internal	• Actual footprint, reduction goals and measures to be taken to reduce emissions • Measured progress in reducing emissions • Expected / measured environmental performance of projects using Power BI dashboard • Environmental audits on projects
Arup Global and Arup companies	• Progress of Arup Netherlands in complying with Arup Regional and Global sustainability strategy and plans. • Progress of Arup bv in meeting reduction goals
Clients, Sector and knowledge exchange platform	• Carbon footprint, reduction targets and measures (to be) taken. • Progress in meeting reduction targets • Our measures and visions about a collaborative progress towards more sustainable designs
SKAO	• Documents and links required according to certified level requirements of CO2-performance ladder • Valid certificates
Partners and clients	• Continuous reporting on design propositions, feasibility studies and decisions to increase the sustainability outcome of a project

3 Internal communication channels

Arup uses multiple channels to convey information on the CO_2-performance ladder to employees.

3.1 Group meetings

The prime channel for internal communication is the group meeting. These meetings are recorded and widely shared within Arup. Twice yearly [March and September] the results of the carbon emissions inventory will be shared in the group meeting.

3.2 Sustainable development in our projects-report

From 2021 onwards we yearly publish a summary of sustainable development aspects of our own projects. This will showcase our capabilities in the field of sustainability and improve our own understanding of sustainability in a project context.

The first sustainable development report is scheduled for June 2021.

3.3 Training

For all staff we organized on an enrollment basis a training DuboCalc in February 2021 to align ourselves with the standard tool of RWS for sustainability measurement.

All staff members can enroll through our internal training system Moodle in the Learning Path Global Sustainability Practitioner with 5 knowledge streams on sustainability

1. Climate change-
2. Health and wellbeing-
3. ESG responsible business-
4. Sustainable/regenerative design and tools-
5. Sustainability/Frameworks and Certification)

on three levels – Knowledgeable, Skillfull, Expert.

The Climate Change modules are obviously the most relevant, but parts of the Sustainability / Frameworks and Certification modules deal with embedded carbon and ways to calculate that while designing.

4 External communication

4.1 Website Arup Netherlands

Arup communicates its participation in the CO2-performance ladder system through the website of Arup Netherlands. One of the significant changes in the past year on the Arup Group policy on CO2 has been the adopted goal to be carbon neutral in 2030 and to achieve a 30% reduction in carbon footprint in five years. These goals are reported and measured on the European and global level within Arup.

4.2 SKAO

On the SKAO Arup b.v. shares the information according to the requirements of the audit checklist. The information stays available on the website for at least 2 years. Arup is listed on the website of SKAO as a level 5 certified company.

https://www.skao.nl/gecertificeerde-organisaties/Arup

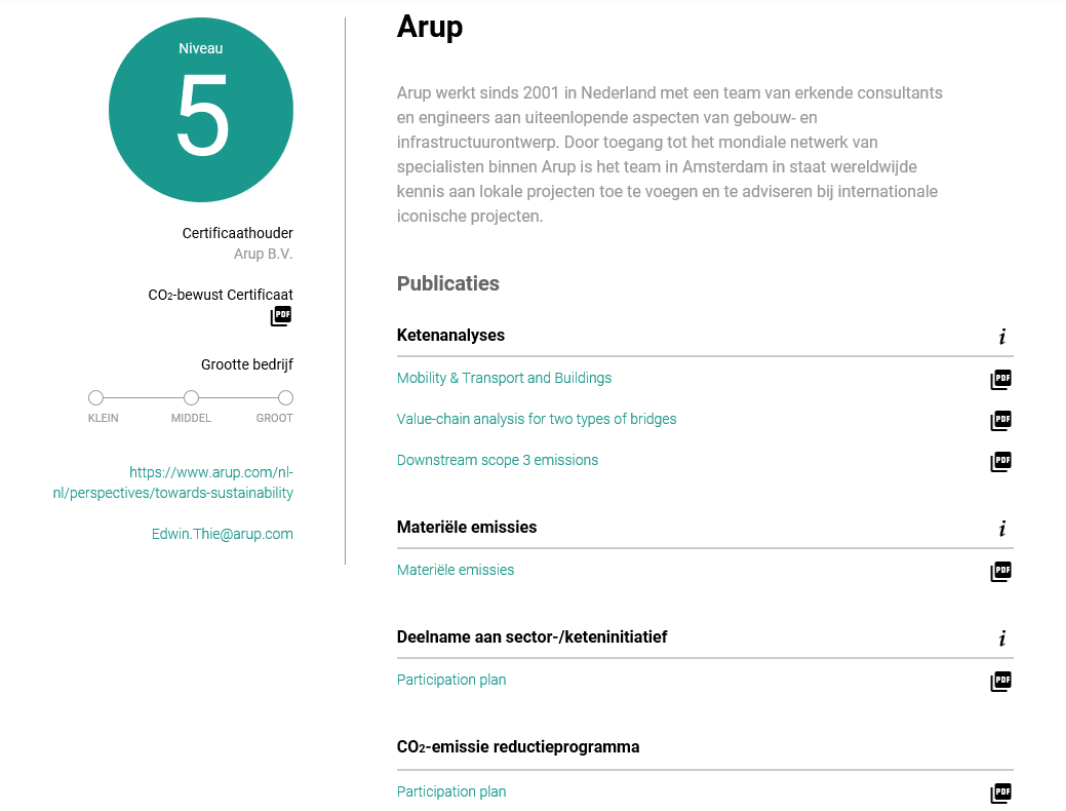

Figure 2 Arup information on the SKAO website (obtained on 31/05/2019)

4.3 Clients

As part of the client management with RWS we yearly discuss sustainability issues in our Leveranciersgesprek. Part of the Samenwerkingsovereenkomst 4 with Rijkswaterstaat is the stated intention to collaborate on sustainability. Arup has confirmed this intention.

Other communication channels

Various other means of communication during the year 2019-2020.
Podcast Waste to value: is circular economy more than just a fad? By Edwin Thie

Webinar Haut Bouwen aan een Houten toekomst 16 december 2020 as part of the Circle Economy https://www.youtube.com/watch?v=FUEBilTtHHo by Mathew Vola

https://teamv.nl/webinar-haut-with-arup-lingotto-jp-van-eesteren-and-team-v/

https://circulairebouweconomie.nl/events/webinar-je-maakt-het-met-haut/

https://www.houtnatuurlijkvannu.nl/meer-weten-over-hoogbouwen-met-hout-bekijk-dit-webinar-over-haut/

White paper houten toekomst https://www.circle-economy.com/resources/building-a-future-in-timber

SBIR-Team – BoLT communication on LinkedIn and Arup website