CO_2 footprint report 2014

UNIVERSITY OF TWENTE.

Name Client:	University of Twente
Address:	Drienerlolaan 5
City:	Enschede
Performed by:	Zienergie BV
Address:	Dokter Stolteweg 2
City:	Zwolle
Phone:	038 – 85 313 95
E-mail:	info@zienergie.nl
Date of report:	September 4th 2015
Consultant:	Janjoris van Diepen
E-mail:	j.vandiepen@zienergie.nl

Content

Versions	Date	Performed by	Approved by
1.3	04-09-2015	Janjoris van Diepen - Zienergie	John Susebeek – University of Twente

1. Introduction

1.1 About this rapport

This report contains the CO_2 emission inventory (footprint) of the University of Twente (UT) over the year 2014. The CO_2 footprint provides insight in the greenhouse gas emissions caused by activities of the University of Twente. This CO_2 footprint is reported for the year 2014. University of Twente has not reported the CO_2 footprint before. 2014 is the base year.

This report is prepared according to the Greenhouse Gas Protocol (GHG) and the ISO 14064-1. The Greenhouse Gas (GHG) Protocol, developed by World Resources Institute (WRI) and World Business Council on Sustainable Development (WBCSD), sets the global standard for how to measure, manage, and report greenhouse gas emissions.

In appendix 1 you will find a reference table for ISO 14064-1 and the GHG Protocol.

This report is performed under the responsibility of Mariëlle Winkler, Manager Health Safety & Environment and John Susebeek, Energy Coordinator of the Facility Service Center of the University of Twente.

1.2 About the University of Twente

The University of Twente is a young and enterprising university that prepares young people for the future. The UT accomplishes this through innovative, attractive and future-focused education and through fulfilling a global function in technological and social research.

Sustainability in the broad sense is of increasing importance in society. Universities in general and the university of Twente in particular, because of its unique multidisciplinary research, contribute to solutions for social problems. This is also a concern in universities own operations. The UT is trying to improve sustainability of its organization as much as possible in conjunction with its own scientists and students, but also in close cooperation with various parties in the region.

An important part of this process is transparency about sustainability performance of the UT. In this context University of Twente publishes its CO_2 footprint according to the international protocols.

The University of Twente (UT) intents to reduce carbon emission caused by heating and electricity use by 20% by the year 2020 (compared to 2005).

1.3 Verification

The CO_2 footprint report 2014 is prepared by an independent expert. The CO_2 footprint report is not verified by a certified body.

2. CO_2 footprint design

2.1 Scopes of the CO_2 footprint

The CO_2 footprint maps the different kind of sources of greenhouse gas emissions. To draft a CO_2 footprint, all emissions need to be converted into CO_2 equivalents.

To help delineate direct and indirect emission sources, improve transparency, and provide utility for different types of organizations and different types of climate policies and business goals, three “scopes” (scope 1, scope 2, and scope 3) are defined for GHG accounting and reporting purposes (see diagram 1). Scope 1 represents direct GHG emissions and occur from sources that are owned or controlled by the reporting organization. Scope 2 accounts for GHG emissions from the generation of purchased electricity consumed by the company. Purchased electricity is defined as electricity that is purchased or otherwise brought into the organizational boundary of the company. Scope 2 emissions physically occur at the facility where electricity is generated. Scopes 1 and 2 are defined in this standard to ensure that two or more companies will not account for emissions in the same scope. This makes the scopes amenable for use in GHG programs where double counting matters. Scope 3 represents emissions from both suppliers (upstream activities) and consumers, including all use and end of life emissions (downstream activities). Scope 3 emissions are a consequence of the activities of the company, but occur from sources not owned or controlled by the company.

Scope 1: Direct emissions
For example: combustion of gas or combustion of fuel in company cars.

Scope 2: Indirect emissions purchased power
For example: purchase of electricity or district heating.

Scope 3: Other indirect emissions
For example: purchase of materials, business travel.

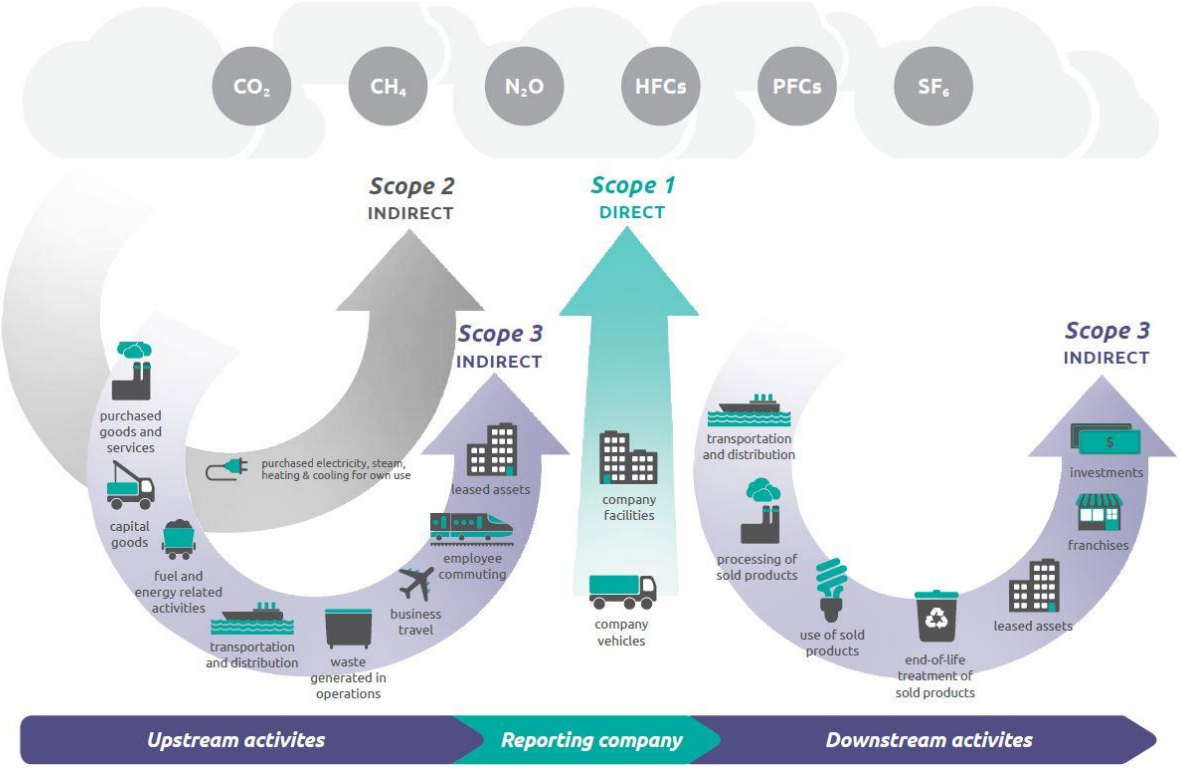

Diagram 1: Scopediagram GHG

According to ISO 14064 and the GHG Protocol, organizations shall separately account for and report on scopes 1 and 2 at a minimum. In this CO_2 footprint, all scope 1 and 2 emission are reported. No sources of CO_2 emissions are excluded. Also some scope 3 emissions are reported.

2.2 Organizational boundary

This CO_2 footprint reports the CO_2 emissions of the University of Twente over 2014.

The Executive Board is the highest executive council of the University of Twente and is charged with the administration and management of the University.

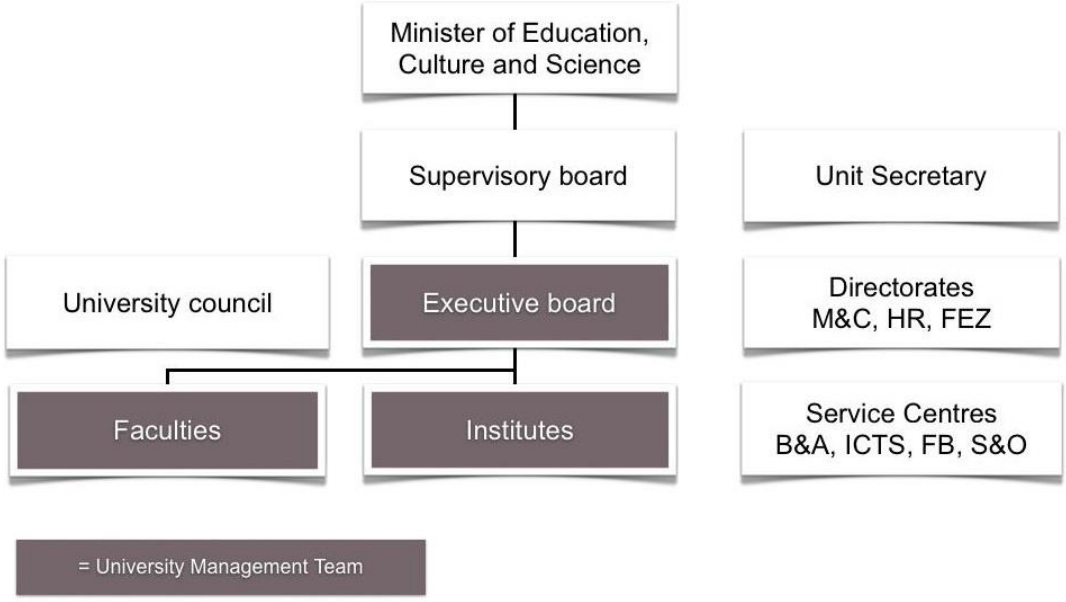

Diagram 1: Organization structure University of Twente

To determine the organizational boundary, the 'operational control' approach is used. Under the control approach, a company accounts for 100 percent of the GHG emissions from operations over which it has control. It does not account for GHG emissions from operations in which it owns an interest but has no control.

In appendix 2 is a list of the entities which are controlled by the University of Twente and are included in the boundary of this CO_2 footprint report. For example, student housing on the campus, owned by Acasa, is not included in the organizational boundary.

2.3 Operational boundary

Within the organization boundary of the University of Twente, the following GHG scope 1 emissions have been identified:

- Combustion of gas for heating
- Combustion of fuel in company cars
- Refrigerants in air conditioning

The following GHG scope 2 emissions have been identified:

- Electricity use
- District heating use

No scope 1 or 2 emissions are excluded.

In this CO_2 footprint also the following scope 3 emissions are reported:

- Business Travel
- Water use
- Paper use
- Waste disposed

3. CO_2 footprint

Table 1 and Diagram 3 en 4 show the CO_2 emissions over 2014 for the University of Twente.

Scope	Emission type	CO_2 Emission (ton CO_2-eq/yr)	%
1	Gas combustion	1.513	7,0%
1	Fuel combustion UT vehicles	177	0,8%
1	Air-condition refrigerants	0	0,0%
Total scope 1		1.689	
2	District heating	1.183	5,5%
2	Electricity	13.695	63,5%
Total scope 2		14.878	
3	Business travel	4.712	21,8%
3	Paper & cardboard	88	0,4%
3	Waste	58	0,3%
3	Water	142	0,7%
Total scope 3		5.000	
Total		**21.567**	**100%**

Table 1: CO_2 emission University of Twente 2014

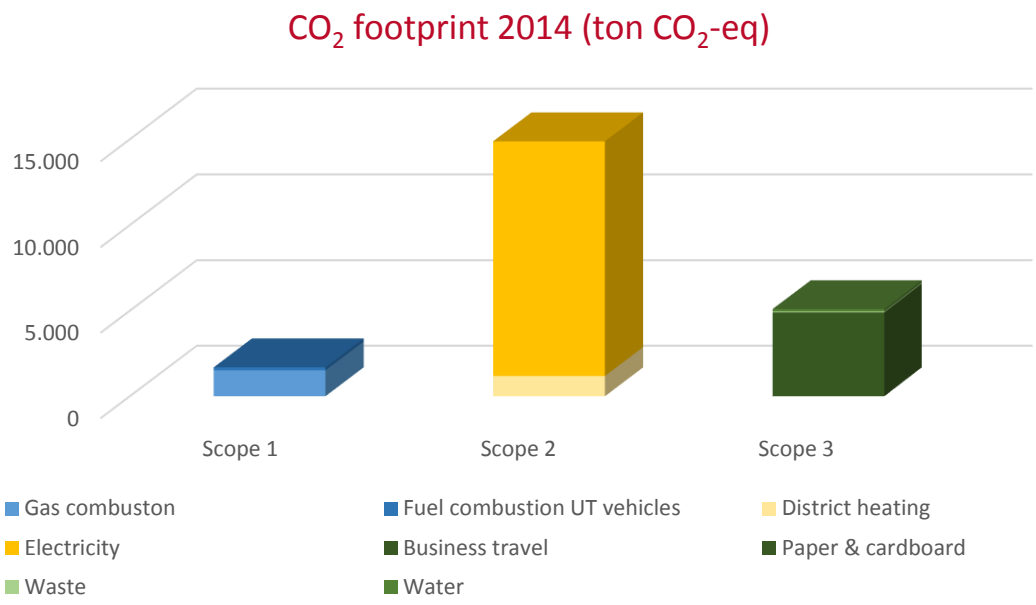

Diagram 3: CO_2 emissions University of Twente 2014 per GHG scope

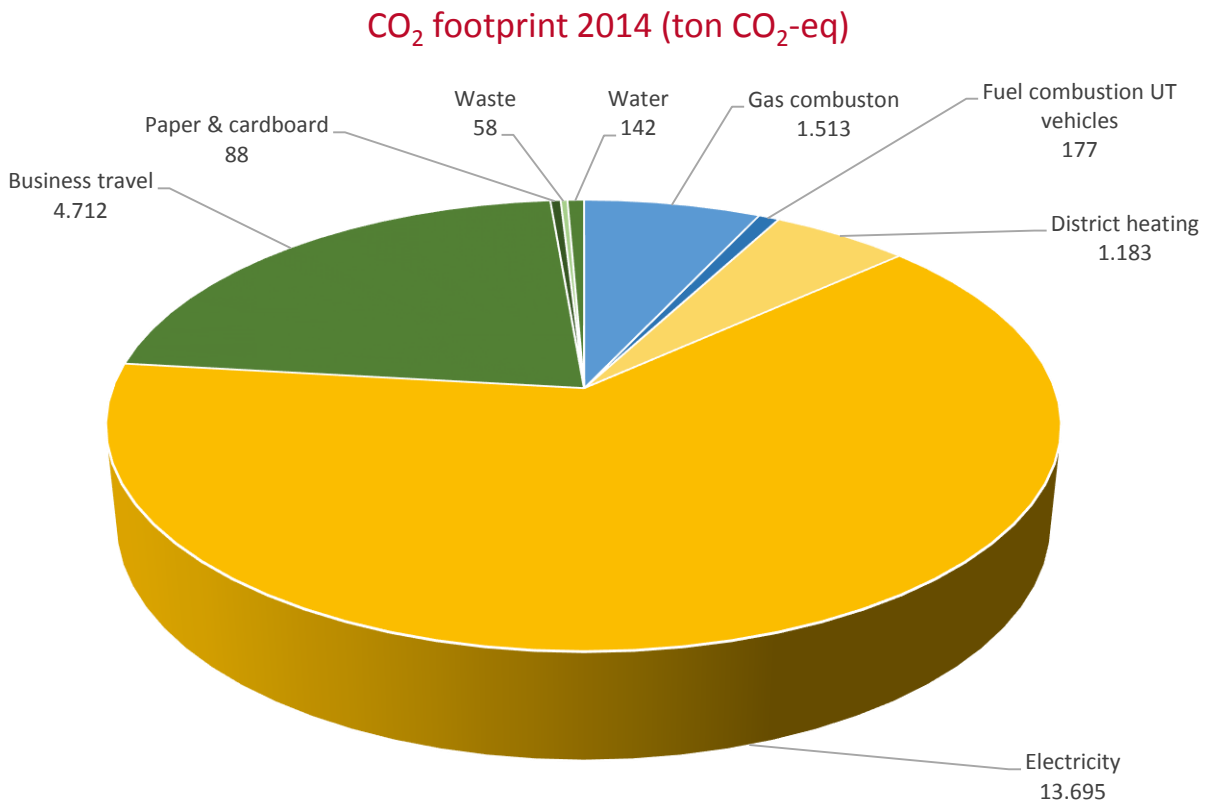

Diagram 4: CO_2 emissions University of Twente 2014

3.1 Analysis of the CO_2 footprint

The total CO_2 emissions for University of Twente in 2014 is 16.568 ton CO_2-eq for scope 1 and 2 emissions. Electricity use is by far the biggest contributor to the total footprint as you can see in diagram 3 and 4.

The identified scope 3 emissions are responsible for 4.768 ton CO_2-eq. Emission type 'Business Travel' is the second biggest contributor of the identified emission streams to the total footprint.

3.1.1 Scope 1: direct GHG emissions

The emission caused by gas combustion for heating is 1513 ton CO_2-eq and the biggest contributor of scope 1 emissions.

Emission type			Emission factor		CO_2 emission	
Gas combustion	802.914	m^3	1,88	kg CO_2/m^3	1.512.690	kg CO_2

Table 2: CO_2 emission gas combustion 2014

In appendix 3 there is a list of gas used by all UT buildings included in the organizational boundary.

The emissions caused by own vehicles is 177 ton CO_2-eq. In table 3 are shown the different kind of vehicles used and their CO_2 emissions.

Type of vehicle	Distance		Emission factor		CO_2 emission	
Passenger car gasoline (950-1300 gram)	373.786	Km	0,224	kg CO_2/km	83.728	kg CO_2
Passenger car diesel (>1450 gram)	165.600	Km	0,241	kg CO_2/km	39.910	kg CO_2
MPV(Multi-Purpose Van) with gasoline	76.000	Km	0,312	kg CO_2/km	23.712	kg CO_2
MPV(Multi-Purpose Van) with diesel	88.000	Km	0,298	kg CO_2/km	26.224	kg CO_2
Cargo 3.5-10 ton	6.600	Km	0,481	kg CO_2/km	3.175	kg CO_2

Table 3: CO_2 emission fuel combustion own vehicles 2014

No refrigerants were filled up in the air-conditioning systems in 2014.

3.1.2 Scope 2: indirect GHG emissions (purchased energy)

The identified scope 2 emissions are electricity use and the use of district heating.

Emission type			Emission factor		CO_2 emission	
District heating	59.158	GJ	20	kg CO_2/GJ	1.183.157	kg CO_2
Electricity	26.035.970	kWh	0,526	kg CO_2/kWh	13.694.920	kg CO_2

Table 4: CO_2 emission purchased energy 2014

In appendix 3 there is a list of electricity use and district heating per UT building.

3.1.3 Scope 3: indirect GHG emissions (other)

The biggest scope 3 emission is Business Travel. Most of the emissions of business travel is caused by air travel.

Emission type			Emission factor		CO_2 emission	
Train - high speed train	260.046	km	0,039	kg CO_2/km	10.142	kg CO_2
Train - type unknown	27.257	km	0,026	kg CO_2/km	709	kg CO_2
Air travel - short distance	1.186.752	km	0,297	kg CO_2/km	352.465	kg CO_2
Air travel - medium distance	4.213.942	km	0,2	kg CO_2/km	842.788	kg CO_2
Air travel - long distance	21.927.559	km	0,147	kg CO_2/km	3.223.351	kg CO_2

Table 5: CO_2 emission business travel 2014

Other reported scope 3 emissions are emissions caused by water use, paper use and emissions caused by waste disposal.

Emission type			Emission factor		CO_2 emission	
Paper & cardboard	151.079	kg	0,584	kg CO_2/kg paper	88.253	kg CO_2
Water use	94.943	m^3	1,5	kg CO_2/m^3 water	142.415	kg CO_2
Waste disposal	268.177	kg	0,216	kg CO_2/kg waste	57.926	kg CO_2

Table 6: CO_2 emission paper use, water use and waste disposal 2014

3.1.4 Solar Power

The University has placed PV panels in 2013 on the roof on the Horst building. The production in 2014 was 28.315 kWh. This electricity was delivered to the own net and is discounted for in the total electricity use (see appendix 4 with energy use per building).

3.1.5 Combustion of biomass

No biomass is combusted within the organization boundary.

3.1.6 GHGs emissions separately

Table 7 shows the emissions per GHG type.

GHG emission	ton	ton CO_2-eq
CO_2	21.567	21.567
CH4	0	0
N20	0	0
HFC	0	0
PFC	0	0
SF6	0	0

Table 7: GHG emissions 2014

3.2 Quantification methodology

The sources and quantification methods are represented in Table 8. To calculate the CO_2 emissions for scope 1 and 2 emissions, the CO_2 emission factors published on www.CO2emissiefactoren.nl are used. Emission factors on this website are regularly updated and are supported by Dutch Government and relevant NGO's. For some scope 3 emissions which are not available on www.CO2emissiefactoren.nl, other sources are used (as listed in the table below).

Emission type	Source	Quantification method
Gas combustion	Monthly bill energy provider (by building)	Gas volume in m^3 converted to CO_2 equivalents.
Electricity	Monthly bill energy provider (by building)	Quantity of electricity use in kWh converted to CO_2 equivalents.
District Heating	Monthly bill energy provider (by building)	Quantity of GJ delivered converted to CO_2 equivalents. District heating is produced by a waste incineration plant so this emission factor is used.[1]
Fuel combustion of University Vehicles	Yearly kilometer registration facility department	Quantity of kilometers is converted to CO_2 equivalents (based on fuel type).
Business Travel - Car	Declaration of travelled kilometers by employees	Quantity of kilometers is converted to CO_2 equivalents (based on train average car, fuel unknown)
Business Travel - Train	Kilometer report of Travel Agent	Quantity of kilometers is converted to CO_2 equivalents (based on type of train)
Business Travel - Flights	Kilometer report of Travel Agent	Quantity of kilometers is converted to CO_2 equivalents (based on flight segment distance)
Water use	Monthly bill water provider	Water volume in m^3 is converted to CO_2 equivalents. The CO_2 emissions caused by energy use for pumping, sewage and treatment of drinking water based on a study of carbon footprint of water use.[2]
Waste disposal	Kilograms of waste by facility department	CO_2 emissions by incineration of waste. CO_2 emissions are calculated using data from the national incineration plants from 2003.[3]
Paper & cardboard	Kilograms of paper waste by facility department	CO_2 emissions of production of paper in The Netherlands based on energy use of paper production in The Netherlands[4], total volume op paper production[5].

Table 8: Quantification methodology

[1] As the emission factor for district heating by a waste incinaration plant (AVI) was not available on www.CO2emissiefactoren.nl, instead the emission factor from 'CO_2 Prestatieladder handboek 2.2' is used. This is the latest available emission factor and is also used by the district heating supplier Essent.

[2] Van Sleen, P. (2011) Carbon footprint: A pilot study for Spiegel and Zuidhorst, BTG, Enschede, the Netherlands

[3] Bartelings, H. (2003) Municipal solid waste management problems: an applied general equilibrium analysis, PhD thesis, Wageningen University, the Netherlands

[4] CBS (2012b) Energy balance sheet; supply, transformation and consumption, Central Statistics Netherlands, The Hauge, The Netherlands

[5] EUROSTAT (2012) Total paper and paperboard production, EUROSTAT, Brussels, Belgium

3.3 Influence of measure inaccuracies and uncertainties

An organization should complete and document an uncertainty assessment for GHG emissions and removals, including the uncertainty associated with emission and removal factors.

3.3.1 Scope 1 and 2

Electricity use, gas volume and district heating quantities are based on the data from the Facility Service Center. Data is collected by reading the meters each month from each facility. These values are checked with the monthly energy bills of the Energy Service Provider. Invoices of suppliers have a very high level of data quality. So inaccuracies and uncertainties will be minimal.

District heating is produced by a waste incineration plant. CO_2 emissions may vary depending on input for the incineration plant. Also, CO_2 emissions of the plant have to be allocated to waste disposal, electricity production and heat production. This could lead to a significant uncertainty for the emission factor used for district heating by a waste incineration plant. Nevertheless, this is the best available emission factor for district heating by a waste incineration plant.

The emission type vehicles is based on yearly kilometer registration. The date (day and month) the registration is done, differs year to year. Also, for some vehicles there is no registration from 2013 so it is not possible to make a good estimate of the kilometers driven over 2014. If no data of 2013 were available, the kilometers registered in 2014, is assumed to be the total amount of kilometers in 2014 (worst case). As this emission type is only responsible for less than 1,2% of the total scope 1 and 2 footprint, this inaccuracy is not of great significance on the total footprint. Nonetheless, measures are taken to improve data collection for this emission type.

3.3.2 Scope 3

Business Travel is based on all the trips booked with the travel agency. Flights are broken down to segments as CO_2 emission depends on flight length. As CO_2 emission of flights depend on a lot of variables, like occupancy, age of the plane and routing, there is some inaccuracy on the calculated emission. However, the methodology used is the best practice available and frequently used in CO_2 emission calculation. The CO_2 emission factors (by flight segment) are used from www.CO2emissiefactoren.nl.

Train trips are split in two categories: high speed train or unknown. The unknown category could lead to an inaccuracy as regional trains have twice as much emissions as an intercity train and high speed trains have about 15% less emissions. As emissions caused by train are very low compared to the total business travel emission (0,2%), this is not of great significance. The CO_2 emission factor for train trips is used from www.CO2emissiefactoren.nl.

Water use in m^3 is based on the data of the facility department. The CO_2 emissions cause by energy use for pumping, sewage and purifying of drinking water is based on data from a study about carbon footprint of drinking water. As water is only responsible for 0,7% of the total footprint, inaccuracies will not have an significant impact on the total footprint.

Waste data is based on the registrations of the facility department. It is assumed that 100% of the waste is incinerated. Actually, part of the waste stream is recycled but no data about the volume is available. CO_2 emissions are calculated using data from the national incineration plants. Exact emission will depend on the type of waste and the specific incineration plant. As waste is only responsible for 0,3% of the total footprint, inaccuracies will not have an significant impact on the total footprint.

Emissions caused by paper use are based on energy use and volume of production of paper in The Netherlands. It is estimated that all facilities use gas as energy source. As paper is only responsible for 0,7% of the total footprint, inaccuracies will not have an significant impact on the total footprint

Appendix 1 Reference to ISO 14064 and GHG Protocol

Norm part ISO 14064 (paragraph 7.3.1)	GHG Protocol requirement	Reference in this report
a) description of the reporting organization		Paragraph 1.2
b) person responsible		Paragraph 1.1
c) reporting period covered	The reporting period covered.	Paragraph 1.1
d) documentation of organizational boundaries	An outline of the organizational boundaries chosen, including the chosen consolidation approach.	Paragraph 2.2
	An outline of the operational boundaries chosen.	Paragraph 2.3
e) direct GHG emissions, quantified separately for each GHG, in tonnes of CO_2-eq.	Total scope 1 and 2 emissions independent of any GHG trades such as sales, purchases, transfers, or banking of allowances. Emissions data separately for each scope.	Table 1
f) a description of how CO_2 emissions from the combustion of biomass are treated in the GHG inventory	Emissions data for direct CO_2 emissions from biologically sequestered carbon.	Paragraph 3.1
g) if quantified, GHG removals, quantified in tonnes of CO_2-eq;		n.v.t.
h) explanation for the exclusion of any GHG sources or sinks from the quantification	Any specific exclusions of sources, facilities, and / or operations	Paragraph 2.3
i) energy indirect GHG emissions associated with the generation of imported electricity, heat or steam, quantified separately in tonnes of CO_2e	Total scope 1 and 2 emissions independent of any GHG trades such as sales, purchases, transfers, or banking of allowances. Emissions data separately for each scope.	Table 1
j) the historical base year selected and the base-year GHG inventory	Year chosen as base year, and an emissions profile over time that is consistent with and clarifies the chosen policy for making base year emissions recalculations.	Paragraph 1.1
k) explanation of any change to the base year or other historical GHG data, and any recalculation of the base year or other historical GHG inventory	Appropriate context for any significant emissions changes that trigger base year emissions recalculation.	N.A.
l) reference to, or description of, quantification methodologies including reasons for their selection	Methodologies used to calculate or measure emissions, providing a reference or link to any calculation tools used	Paragraph 3.2
m) explanation of any change to quantification methodologies previously used;		N.A.
n) reference to, or documentation of, GHG emission or removal factors used ;		Paragraph 3.2
o) description of the impact of uncertainties on the accuracy of the GHG emissions and removals data;		Paragraph 3.3
p) a statement that the GHG report has been prepared in accordance with this part of ISO 14064;		Paragraph 1.1
q) a statement describing whether the GHG inventory, report or assertion has been verified, including the type of verification and level of assurance achieved.	Emissions data for all six GHGs separately (CO_2, CH4, N2O, HFCs, PFCs, SF6) in metric tonnes and in tonnes of CO_2 equivalent.	Paragraph 1.3 Paragraph 3.1.6

Appendix 2 Entities Organization Boundary

Nr	Buildings on campus	Building ID	Use	CAT*	Part of EMS	Organization Boundary
2	Spiegel	SP	Lectures + offices	A	V	YES
3	Vleugel	VL	Offices	A	Spiegel	YES
4	Carillon	CN	Technical Room	B	V	YES
5	Garage	GA	Offices	B	V	YES
6	Paviljoen	PA	Offices	A	V	YES
7	Seinhuis	SH	Server space	A	V	YES
8	Hogedruklab	HD	Lab	B	V	YES
9	Citadel	CI	Offices + lectures	B	V	YES
10	Ravelijn	RA	Lectures +office	A	V	YES
11	Zilverling	ZI	Offices + ICT lab	A	V	YES
12	Waaier	WA	Lectures + horeca	A	V	YES
14	Teehuis	TH	Server space	A	V	YES
16	Nanolab	NL	Lab & offices	A	V	YES
17	The Gallery	GY		C		NO
18	Technohal	TH		C		NO
48	Bastille	BA	Offices	A	V	YES
63	Blokhutten	BL	Horeca	B	Boerderij Bosch	YES
32	BMC	BI	Offices	B	V	YES
62	Boerderij Bosch	BB	Horeca	B	V	YES
53	Box	BO		C		NO
29	Buitenhorst	BH	Offices	A	Horstcomplex	YES
15	Carré	CR	Lab & offices	A	V	YES
41	Cubicus	CU	Lectures + office	A	V	YES
44	Drienerburght	DR	Hotel	C		NO
40	Erve Holzik	ER	Offices	B	V	YES
42	Faculty Club	FC	Horeca	B	V	YES
13	Hal B	HB	Offices	B	Hallen	YES
46	High Tech Factory	HTF	Lab + office	C		NO
45	Hogekamp***	HO	Offices + lab	B	V	YES
21	Horstring	HR	Offices	A	Horstcomplex	YES
20	Horsttoren	HT	Offices + lectures	A	Horstcomplex	YES
75	ITC	ITC	Offices +lectures	A	Buiten campus	YES
75	ITC hotel	ITC	Lodging	B	Buiten campus	YES
30	Keet	KT	Offices	B	Windpark	YES
23	Kleinhorst	KH	Offices + lab	A	Horstcomplex	YES
61	Linde	LI		C		NO
65	Logica	LO		C		NO
27	Meander	ME	Lab	A	Horstcomplex	YES
59	Mondriaan	MO		C		NO
24	Noordhorst	NH	Offices + lectures	A	Horstcomplex	YES
26	Oosthorst	OH	Offices + labs	A	Horstcomplex	YES
56	Openluchttheater	OUT	Theater			YES

43	Schuur	SR	Kitchen	B	Boerderij Bosch	YES
51	Sky	SK		C		NO
58	Sleutel	SL		C		NO
49	Sportcentrum	SC	Sports	A	V	YES
63	Stall	ST	Horeca	B	V	YES
64	Tennispark	TP	Horeca	B	V	YES
39	Trial-Terrein	TT		B	**	YES
60	Vlinder	VI		C		NO
47	Vrijhof	VR	Horeca	A	V	YES
22	Westhorst	WH	Offices	A	Horstcomplex	YES
31	Windpark	WP	Offices	B	V	YES
28	Zuidhorst	ZH	Offices	A	Horstcomplex	YES
57	Zwembad	ZW	Swmming pool	A	V	YES
-	Chalet***		Offices	A	V	YES
-	Koelcirkel		Technical room	B	V	YES
-	Afvalstoffendepot			B	V	YES
-	Boortoren		Horeca	B	V	YES
-	Hoogspannings-verdeelstation		Technical room	B	V	YES
-	Kwekhoes		Horeca	B	V	YES
-	Openbare verlichting		Lighting	B	V	YES
-	KPN tussenstation		Technical room	B	V	YES
-	Rioolgemaal		Technical room	B	V	YES
-	Reinwaterkelder		Storage	B	V	YES
-	Sportvelden		Sports	B	V	YES
-	Summercampus		Lodging	B	Boerderij Bosch	YES
-	Evenementenveld		Events	B	V	YES

*

Category A = UT buildings for education

Category B = UT buildings for facilities

Category C = Buildings on campus controlled by third party

** Not registered as energy user

*** Not in use anymore

Appendix 3 Map of the university campus

PLATTEGROND UNIVERSITEIT TWENTE

Bastille (BA)	48	Erve Holzik (ER)	40	Kleinhorst** (KH)	23	Schuur (SR)	43
Blokhutten (BL)	63	Faculty Club (FC)	42	Linde (LI)	61	Seinhuis (SH)	7
BMC (BI)	32	The Gallery (GY)	17	Logica (LO)	65	Sky (SK)	51
Boerderij Bosch (BB)	62	Garage (GA)	5	Meander** (ME)	27	Sleutel (SL)	58
Box (BO)	53	Hal B (HB)	13	Mondriaan (MO)	59	Spiegel (SP)	2
BTC (BTC)	66	High Tech Factory (HTF)	46	Nanolab* (NL)	16	Sportcentrum (SC)	49
Buitenhorst** (BH)	29	Hogedruklab (HD)	8	Noordhorst** (NH)	24	Stall (ST)	63
Carillon (CN)	4	Hogekamp (HO)	45	O&O plein (OO)	0	Technohal (TH)	18
Carré* (CR)	15	Horstring** (HR)	21	Oosthorst** (OH)	26	Teehuis (TH)	14
Citadel (CI)	9	Horsttoren (HT)	20	Openluchttheater (OUT)	56	Tennispark (TP)	64
Cubicus (CU)	41	ITC (ITC)	75	Paviljoen (PA)	6	The Gallery (GY)	17
Drienerburght (DR)	44	Keet (KT)	30	Ravelijn (RA)	10	Therm (TM)	69
						Trial-terrein (TT)	39
						Vleugel (VL)	3
						Vlinder (VI)	60
						Vrijhof (VR)	47
						Waaier* (WA)	12
						Westhorst** (WH)	22
						Windpark (WP)	31
						Zilverling (ZI)	11
						Zuidhorst** (ZH)	28
						Zwembad (ZW)	57

- P Parkeerplaats
- Slagboom
- Afgesloten weg
- IB *Ingang via **Hal B**
- IH **Ingang via **Horsttoren**
- I Beveiliging & Infocentrum
- S Studentenwoningen
- H BASTILLE Bushalte

Deze plattegrond is te downloaden via
www.utwente.nl/plattegrond
Voor een 3d-versie van deze plattegrond zie
maps.utwente.nl

UNIVERSITEIT TWENTE.

Appendix 4 CO_2 emissions energy use per building

ID	Building Name	Emission streams			CO_2 emissions (ton CO_2 eq)			
		Heat (GJ)	Electricity (kwh)	Natural gas (m3)	Heat	Electricity	Natural gas	Total
BA	Bastille	2.657	506.882	0	53	267	0	320
CR	Carré	13.774	3.419.570	170.154	275	1.799	321	2.395
CHA	Chalet	0	6.588	3.022	0	3	6	9
CU	Cubicus	3.487	368.981	0	70	194	0	264
HR	Horstcomplex	16.886	6.736.946	93.105	338	3.544	175	4.057
NL	Nanolab	3.017	4.559.900	48.576	60	2.399	92	2.550
PA	Paviljoen	0	35.515	9.759	0	19	18	37
RA	Ravelijn	1.731	539.029	0	35	284	0	318
SH	Seinhuis	0	693.001	2.211	0	365	4	369
SP	Spiegel	3.793	411.277	0	76	216	0	292
SC	Sportcentrum	3.070	596.175	15.807	61	314	30	405
TH	Teehuis	0	1.138.187	0	0	599	0	599
VR	Vrijhof	3.680	986.551	0	74	519	0	593
WA	Waaier	374	721.315	0	7	379	0	387
ZI	Zilverling	3.366	764.618	0	67	402	0	470
KOC	Koelcirkel	0	1.630.660	0	0	858	0	858
ASD	Afvalstoffendepot	0	7.932	2.804	0	4	5	9
BI	BMC	0	4.688	1.866	0	2	4	6
BB	Boerderij Bosch	0	12.475	2.910	0	7	5	12
BOT	Boortoren	0	8.892	2.209	0	5	4	9
CN	Carillon	0	3.735	0	0	2	0	2
CI	Citadel	0	197.970	22.968	0	104	43	147
ER	Erve Holzik - kantoren	0	25.883	8.320	0	14	16	29
ER	Erve Holzik - schuren	0	25.883	8.320	0	14	16	29
ER	Erve Holzik - woonhuis	0	25.883	8.320	0	14	16	29
FC	Faculty Club & Schuur	1.210	136.166	144	24	72	0	96
GA	Garage	0	23.824	13.580	0	13	26	38
HB?	Hallen	0	0	0	0	0	0	0
HD	Hogedruklab	2.109	173.482	0	42	91	0	133
HO	Hogekamp	4	9.742	0	0	5	0	5
HSV	Hoogspanningsverdeelstation	0	1.227	0	0	1	0	1
KWH	Kwekhoes	0	2.153	3.396	0	1	6	8
GY?	Langezijds (gebouw A)	0	154	0	0	0	0	0
OUT	Open Luchttheater	0	383	0	0	0	0	0
OPV	Openbare verlichting	0	166.664	0	0	88	0	88
PTT	PTT tussenstation	0	7.515	0	0	4	0	4
RIG	Rioolgemaal	0	194.972	0	0	103	0	103
RWK	Reinwaterkelder RWK	0	0	848	0	0	2	2
SPV	Sportvelden	0	43.932	0	0	23	0	23
ST	Stall	0	4.335	1.379	0	2	3	5
SUM	Summercampus	0	10.218	0	0	5	0	5
TP	Tennispaviljoen	0	31.271	4.710	0	16	9	25
WP	Windpark	0	9.397	1.049	0	5	2	7
ZW	Zwembad	0	83.618	34.576	0	44	65	109
EVE	Evenementenveld	0	2.779	0	0	1	0	1
ITC	ITC	0	1.101.786	140.992	580	266	0	845
ITCH	ITC Hotel	0	674.814	218.529	355	412	29	795
PVP	PV Panelen	0	-28.315	0	-15	0	0	-15
	TOTAL	**59.158**	**26.035.970**	**802.914**	**1.183**	**13.695**	**1.513**	**16.473**