Grexel Systems Ltd Greenhouse Gas Emissions Inventory 2014

GREXEL SYSTEMS LTD

GREENHOUSE GAS EMISSIONS INVENTORY 2014

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Contents

Introduction

Grexel Systems Ltd. (Grexel®) is a Finnish company providing core business infrastructure solutions and services for green commodity markets and environmental banking. Founded in 2001, Grexel has over 50 years of cumulative experience with the energy certificate markets and central certificate registries. Grexel is currently providing certificate registry services and support to ten European countries, covering registries for energy disclosure and support purposes. The company also has a strong position in regulatory and market engineering, helping the relevant authorities in different regions to best design their green energy markets.

As an environmentally aware company, Grexel is committed to tackling climate change by providing an example in green business solutions. As an integral part of this commitment, we have adopted a habit of reporting and offsetting all emissions caused by our business activities across our value chain.

This document sets out to disclose the GHG emissions inventory of Grexel Systems Ltd. For the third consecutive year we have reported the emissions as well as compensated them using emission reduction units.

Our calculations are based on GHG Protocol standards. For our energy consumption we have adopted the recently updated Scope 2 Guidance - The Corporate Standard. For our value chain emissions calculation, we have similarly adopted Scope 3 Guidance - The Corporate Value Chain. These documents have proven extremely useful in forming a consistent and well-structured basis for our emissions inventory. Our calculations also contain different emission factors for purchased commodities and services. These have been selected according to relevance to our business functions. Source references for emission factors are attached to relevant places in the calculations.

Year 2014 brought a few changes that are also relevant for this report. Firstly, Grexel moved to a new office building during March and April 2014. Although very comfortable, the old office started to lack the needed extra space. Luckily, a more suitable venue was shortly found close by. We were also glad to be able to continue using fully renewable electricity in our new office space.

The second change that affected the inventory was the updated Scope 2 Guidance, released by the GHG Protocol in early 2015. The new guidance requires companies to report their consumption using both market- and location-based methods. Previously, Grexel has reported its emissions using the market-based method, since it reflects our choices better. However, we welcome the change in requirements, since now the report also reflects a comparison calculation with the surrounding averages.

Scope 1 - Direct GHG emissions

As a certification service provider, Grexel® does not own or govern any production devices or other facilities directly emitting GHG emissions. Thus, the Scope 1 emissions for Grexel are considered as zero.

Scope 2 - Indirect GHG emissions

As mentioned in the introduction above, for year 2014, we are reporting our Scope 2 emissions using both market- and location-based methods.

For electricity, we used contractual information for the market-based inventory, and Finnish, Indian and Estonian grid averages for location-based inventory. For district heating and cooling, we used identical figures in both location and market-based calculations, because the attributes for contractual and physical consumption are the same.

For both methods, we have tried to account for all emissions originating from our business functions. Included are emissions from our office and emissions from remotely done work in India.

By considering the consumption of these two locations, we can safely state that all relevant indirect emissions inflicted by Grexel are taken into account. Consumed electricity or heat used by remote workers is not considered.

Since Grexel's office moved to a new building during March and April 2014, we have used building-specific readings to allocate the correct emission amounts to the relevant buildings. The periods used were: 2014-01-01 - 2014-03-31 for the old office building, and 2014-04-01 - 2014-12-31 for the new office building. For electricity, district heating, and district cooling consumption monthly data was used. Grexel office metering was available on both sites regarding electricity consumption. However, the total building consumption had to be used for district heating and cooling and thus, a share of this sum figure was allocated to Grexel by comparing Grexel office space to total available spaces in both buildings[1].

In Scope 2 calculations, the following emission factors were used.

Table 1: Emission factors used for Scope 2 calculation

	gCO2/kWh
Electricity (market-based method) [1]	0,00
Electricity in Finland (location-based method) [1]	225,46
Electricity in India (where grid average is used) [2]	810,00
District Heating[2]	190,00
District Cooling[2]	50,00

[1] Grexel used 1,33 % of the available area in the old office building (Hermannin rantatie 8, 00580 Helsinki) and 1,40 % of the available area in the new office building (Lautatarhankatu 6, 00580 Helsinki)

[2] Emission factors received via email from DH and DC provider HelEn Oy

Market-based method

As stated in the Scope 2 Guidance, the market-based method reflects the GHG emissions associated with the choices a consumer makes regarding its electricity supplier or product.

For our home office in Helsinki, the electricity used is completely renewable. The attributes are disclosed by the supplier[3] using Guarantees of Origin and the overall technology-based distribution is 99% hydro power and 1% wind power. Using the market-based method, our emissions from electricity consumption are zero.

Table 2: Grexel home office and employee electricity consumption and resulting emissions (market-based method)

Market-based method	kWh	tCO2
Electricity consumption 2014-01-01 - 2014-03-31	1 980,0	0,00
Electricity consumption 2014-04-01 - 2014-12-31	5 503,8	0,00
Total	7 483,8	0,00

In addition to electricity, Grexel's previous home office also consumed district heating and cooling. For the new office, only district heating is available. The monthly consumption rates for 2014 were metered for the entire building. In order to compensate our share of the overall consumption, we used the rate of Grexel office area to building area for allocating the correct amount to our business (1,33 % of the available area in the old office building and 1,40 % of the available area in the new office building).

Table 3: Grexel home office district heating consumption and resulting emissions (market-based method)

	kWh	tCO2
Overall district heating consumption 2014-01-01 - 2014-12-31	1 222 800,0	232,33
Grexel's district heating consumption 2014-01-01 - 2014-12-31	16 853,7	3,20

Table 4: Grexel home office district cooling consumption and resulting emissions (market-based method)

	kWh	tCO2
Overall district cooling consumption 2014-01-01 - 2014-03-31	91 500,0	4,58
Grexel's district cooling consumption 2014-01-01 - 2014-03-31	1 218,6	0,06

Grexel also employs a development team in India. As this team is part of a bigger corporation functioning in a larger office complex, we have estimated the consumed electricity for our functions by comparing our team size to overall amount of listed employees. The Indian office complex uses grid electricity for the most of the time. However, electricity from the company-owned wind turbine is also used. In market-based calculation, we have distinguished the electricity from the wind turbine from the electricity from the grid, assuming the wind energy to be emission-free.

Table 5: Grexel remote development team electricity consumption and resulting emissions (market-based method)

Number of dedicated employees	9
Number of employees	850
Complete electricity consumption (MWh)	2935,56

[3] http://www.nordicgreen.fi

Production from own wind turbine (MWh)	1275,29
Consumption producing emissions (MWh)	1660,28
Consumption allocated to Grexel (MWh)	17,58
Emissions (tCO2)	14,24

The following table summarizes Grexel's Scope 2 emissions when using the market-based method.

Table 6: Grexel's Scope 2 emissions (market-based method)

	tCO2
Grexel home office electricity consumption	0,00
Grexel home office district heating consumption	3,20
Grexel home office district cooling consumption	0,06
Grexel remote development team electricity consumption	14,24
Total	17,50

Location-based method

The location-based Scope 2 calculation method emphasizes the connection between collective consumer demand for electricity and the emissions resulting from local electricity production. When calculating our location-based Scope 2 inventory, we have used identical consumption data as in market-based calculation, but with location-based average emission factors instead of any contractual instruments.

Without contractual instruments, our home office electricity consumption would result in following emission rates.

Table 7: Grexel home office and employee electricity consumption and resulting emissions (location-based method)

Location-based method	kWh	tCO2
Electricity consumption 2014-01-01 - 2014-03-31	1 980,0	0,45
Electricity consumption 2014-04-01 - 2014-12-31	5 503,8	1,24
Total	7 483,8	1,69

The emission figures for district heating and cooling would be the same as with the market-based method.

Table 8: Grexel home office district heating consumption and resulting emissions (location-based method)

	kWh	tCO2
Overall district heating consumption 2014-01-01 - 2014-12-31	1 222 800,0	232,33
Grexel's district heating consumption 2014-01-01 - 2014-12-31	16 853,7	3,20

Table 9: Grexel home office district cooling consumption and resulting emissions (location-based method)

	kWh	tCO2
Overall district cooling consumption 2014-01-01 - 2014-03-31	91 500,0	4,58
Grexel's district cooling consumption 2014-01-01 - 2014-03-31	1 218,6	0,06

For the electricity consumed by the development team in India, in location-based method, the grid average is used for all consumed electricity.

Table 10: Grexel Indian development team electricity consumption and resulting emissions (location-based method)

Number of dedicated employees	9
Number of employees	850
Complete electricity consumption (MWh)	2935,56
Consumption producing emissions (MWh)	2935,56
Consumption allocated to Grexel (MWh)	31,08
Emissions (tCO2)	25,18

The following table summarizes Grexel's Scope 2 emissions when using location-based method.

Table 11: Grexel's Scope 2 emissions (location-based method)

	tCO2
Grexel home office electricity consumption	1,69
Grexel home office district heating consumption	3,20
Grexel home office district cooling consumption	0,06
Grexel remote development team electricity consumption	25,18
Total	30,13

Scope 2 assessment

When comparing different Scope 2 methods, it is clear that for Grexel the market-based method produces far more positive results than the location-based equivalent. The biggest change appears in remote development team's electricity consumption. Also, when using the location-based method, Grexel home office produces a relatively small amount of emissions for the inventory.

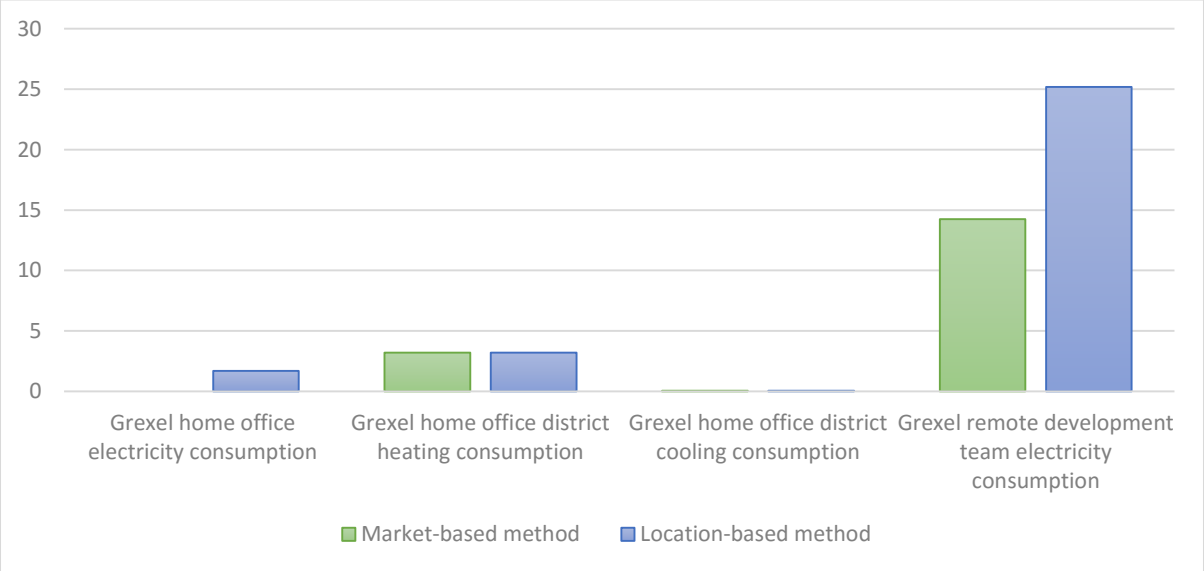


Figure 1: Grexel Scope 2 market- and location-based emission inventories in comparison

For Grexel home office, the comparison shows that by using available market instruments, it is possible to maintain our business on a more sustainable level. For the remote development team, the

results underline the importance and effect of local investments to renewable energy production. When comparing the situation of using the Indian grid average to the alternative of also taking account own renewable on-site production, it can easily be argued that such local investments have significant effect on mitigating the overall emission levels.

Scope 3 - Corporate value chain

In order to account for indirect emissions from our business value chain, the GHG Protocol's Scope 3 Corporate value chain standard was used. The standard introduces multiple categories designed to help companies gather and quantify their value chain emissions, both up and downstream. There are 15 different usable categories. For Grexel, we have identified three categories that are the most applicable to our business functions.

Category 1 Purchased goods and services
Category 6 Business travel
Category 7 Employee commuting

Category 1 includes all upstream emissions from manufacturing of purchased products and services during the reporting year. Grexel has decided to allocate the emissions resulting from purchased goods to all product lifespan years equally. In practice this means that Grexel will offset one fifth of emissions for five distinct years from product with a lifespan of five years.

Category 6 includes Grexel-related business travel in means of transportation not owned or operated by Grexel.

Category 7 includes transportation of employees between their homes and their worksites during the reporting year.

Category 1 - Purchased goods and services

For 2014, category 1 underwent a significant update while Grexel moved its home office to a new location. Big part of the furniture was renewed along with some technical procurements.

Differently than previous years' inventories, this report presents all new Grexel procurements without dividing them according to their remaining lifespan. This was seen as a necessary clarification allowing for a more fluent and transparent presentation of our emissions. In the underlying inventory from previous years, the products still have specific remaining lifespans according to the year of procurement.

For the past three years, Grexel has used the climate calculator (http://www.ilmastolaskuri.fi/en) provided by WWF to calculate our Scope 3 Category 1 emissions. The tool has proven extremely useful, since it contains all the needed emission factors needed in the calculation. However, during the time of 2014 calculations, the climate calculator has updated its emission factors along with the general website update. Although perfectly logical, the procedure of updating the emission factors also resulted in some deviance from last year's calculations.

Emissions from Grexel's office appliances and furniture are presented in the following tables.

Table 12: Grexel office appliances and resulting emissions

	Amount	Emission factor (tCO2)	Product lifespan (years)	Emissions per year (tCO2)
Mobile phone	5	0,06	5	0,060
Laptop	3	0,16	5	0,096

Desktop computer	9	0,20	5	0,360
LCD monitor	16	0,33	5	1,056
MFP	2	0,41	5	0,164
Server	7	0,20	5	0,280
LED TV	2	0,21	5	0,084
			Total	2,10

Table 13: Grexel office furniture and resulting emissions

	Amount	Emission factor (tCO2)	Product lifespan (years)	Emissions per year (tCO2)
Office table	1	0,22	5	0,044
Office desk (electrical)	9	0,25	5	0,450
Office chair	9	0,03	5	0,054
Saddle chair	1	0,02	5	0,004
Other chair	7	0,01	5	0,014
Storage unit (low)	10	0,05	5	0,100
Storage unit (high)	2	0,07	5	0,028
Partition	10	0,05	5	0,100
			Total	0,79

Table 14: Grexel office paper consumption (estimate) and resulting emissions

	Amount	Emissions (tCO2)
Office paper sheets	2000	0,01

In consistence with previous years, Grexel's emissions inventory also includes the office appliances and furniture used by our remote development team in India. Each employee is estimated to have a standard set of office appliances and furniture in use. Calculation logic is the same as used with Grexel home office procurements.

Table 15: Grexel remote development team office procurements and resulting emissions

	Amount	Emission factor (tCO2)	Product lifespan (years)	Emissions per year (tCO2)
Office desk	1	0,22	5	0,044
Office chair	1	0,03	5	0,006
Storage unit (low)	1	0,05	5	0,010
Partition	2	0,05	5	0,020
Desktop computer	1	0,20	5	0,040
LCD monitor	1	0,33	5	0,066
			Total per person	0,19
			Dedicated employees	9
			Total	1,67

Additionally, Grexel uses dedicated servers from an offshore provider in the UK. To meet our demand, seven servers and one network appliance have been dedicated to Grexel's use. The service provider uses 100% renewable electricity to power their hardware, and thus no CO2 emissions are allocated to servers' electricity consumption.

The following table summarizes Scope 3 Category 1 emissions.

Table 16: Grexel Scope 3 Category 1 emissions

Grexel home office	2,90
Indian development team	1,67
Total	4,58

Category 6 - Business travel

The Scope 3 standard recommends companies to include their business related travel by means of transport not owned by the company into GHG emissions inventory Scope 3 Category 6. We have added business trips longer than 100 km for which travel arrangements are made by Grexel. In addition, we have continued to include Grexel-related business travel done by other than Grexel employees.

To avoid double compensation, flights that are already compensated by other parties are excluded.

Included flights were categorized according to their haul length. The assumed distances and according emissions were adopted from 2012 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting[4].

Table 17: Used flight categories and emission factors

Category	DEFRA category	Assumed distance (km)	Emissions factor (kg/km)	Emissions (kgCO2)
Short haul	Domestic	463	0,20	93,17
Medium haul	Short-haul international	1108	0,11	127,26
Long haul	Long-haul international	6482	0,13	851,93

In order to estimate the flight distances (from departure location to destination location) of reported flights, we used a web-based calculation tool[5].The below table contains the overview of Grexel flights for year 2014. For security reasons the complete listing of allocated flights has been removed, and only the category-based sum volumes have been presented.

Table 18: Overview of Grexel business related flights and resulting emissions

Category	Quantity	Assumed distance (km)	Emissions factor (kg/km)	Emissions (kgCO2)
Short haul	12	463	0,20	1118,09
Medium haul	38	1108	0,11	4836,07
Long haul	2	6482	0,13	1703,86

[4] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69554/pb13773-ghg-conversion-factors-2012.pdf
[5] http://www.travelmath.com/

Total	7658,01

Category 7 - Employee commuting

Scope 3 Category 7 covers the emissions from employee commuting. For this, information about employee commuting for Grexel home office employees in Finland and dedicated workers in the development center in India was gathered. For Grexel home office, the following distances per means of transportation were gathered. All gathered data was changed to a format of average distance per working day.

Table 19: Grexel employee commuting as average distance traveled per working day per means of transportation

Employee	Walking	Bike	Metro	Tram	Train	Bus	Car	Scooter
1	4,0							
2	1,7		9,4			16,1		
3		6,9	13,8				2,3	
4	1,0			7,0				
5	1,2				6,0	2,4		6,0
6	1,0							
7	3,4							
8					7,5			

	Walking	Bike	Metro	Tram	Train	Bus	Car	Scooter
km in 2014	3198,0	1794,0	6032,0	1820,0	3510,0	4810,0	598,0	1560,0

	Walking	Bike	Metro	Tram	Train	Bus	Car	Scooter
gCO2/km	0,0	0,0	0,0	0,0	0,0	58,0	98,0	34,0

	Walking	Bike	Metro	Tram	Train	Bus	Car	Scooter
kgCO2	0,0	0,0	0,0	0,0	0,0	279,0	58,6	53,0
							Total	390,6

The city of Helsinki uses 100% renewable energy for electric public transportation (metro, tram, and train). For emission factors relevant to combustion-based means of transportation (bus, car, and scooter) a calculation system for traffic exhaust emissions in Finland[6] was used.

Similarly to previous years, it was assumed that employees working in the Indian development center commute by bus. A yearly estimation of combined commuting kilometers was multiplied by an emissions factor of a typical bus. It should be noted however that the emission factor was updated this year to a more suiting figure, better representing an average bus. Also, the average distance travelled in one year was calculated using Indian working days[7].

[6] http://lipasto.vtt.fi/indexe.htm
[7] http://www.workingdays.in/

Table 20: Remote development team estimated commuting distance and resulting emissions

Number of dedicated employees	9,0
Average distance travelled one-way (km)	17,0
Average distance travelled in one year (km)	8228,0
Emissions factor (gCO2/km)[8]	89,0
Emissions due offshore employee commuting in 2013 (kgCO2)	732,3

The following table summarizes Scope 3 Category 7 emissions.

Table 21: Grexel Scope 3 Category 7 emissions

Grexel home office	0,39
Remote development team	0,73
Total	1,12

Scope 3 assessment

The overall emissions per category in Scope 3 are presented in the below table and figure.

Table 22: Grexel Scope 3 emissions

Category	tCO2
Category 1 - Purchased goods and services	4,58
Category 6 - Business travel	7,66
Category 7 - Employee commuting	1,12
Scope 3	13,36

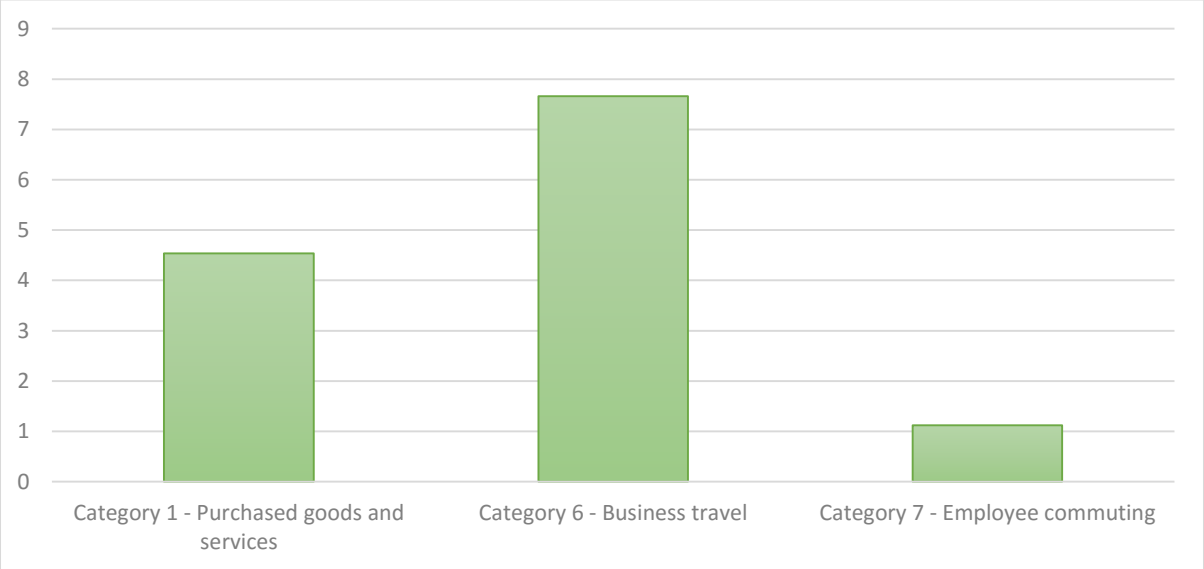


Figure 2: Grexel Scope 3 emissions

In Scope 3, Grexel's emissions mainly originate from our purchased goods and business travel. As mentioned in the Category 1 calculations, a lifespan concept is used for purchased goods and services.

[8] http://www.carbonindependent.org/sources_bus.html

In addition to making the inventory more stable, this feature also enables the company to lower its Category 1 emissions when a procurement is used longer than its lifespan estimates.

The dominating Category 6 - Business travel is typical to our kind of company which has nearly all of its clients abroad and is in close collaboration with international organizations. In addition, our work force is somewhat scattered resulting in more business-related travels.

Inventory overview and comparison

In 2014, Grexel induced 30,82 tCO2 emissions. As Grexel does not produce energy nor does it directly control any production units, the emissions are divided between scopes 2 and 3.

Table 23: Grexel GHG emissions overview for 2014

	tCO2
Scope 1 - Direct GHG emissions	0,00
Scope 2 - Indirect GHG emissions	17,50
Market-based method	17,50
(Location-based method)	30,13
Scope 3 - Corporate value chain	13,36
Category 1 - Purchased goods and services	4,58
Category 6 - Business travel	7,66
Category 7 - Employee commuting	1,12
Total	30,86

In Scope 2, we see the market-based method as the more informative and relevant option to report our indirect GHG emissions. This is mostly due to the fact that we actively support climate change mitigation by greening our operations with various market-based instruments. Also we see little possibilities to affect the surrounding environment's attributes when it comes to induced emissions. This point is further emphasized when considering the multitude of operating locations for our business activities.

In Scope 3, we continue to account for all the categories that have relevance to our business. Although the Scope has undergone a significant update regarding used calculation constants, it is still a solid presentation of our value chain's emissions.

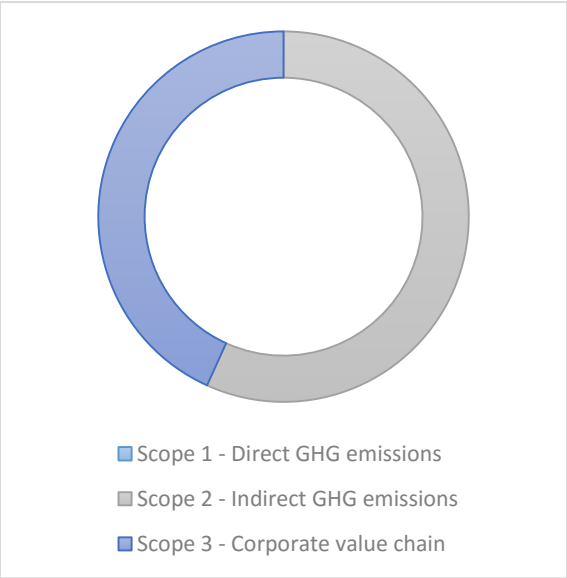


Figure 3: Grexel GHG emissions

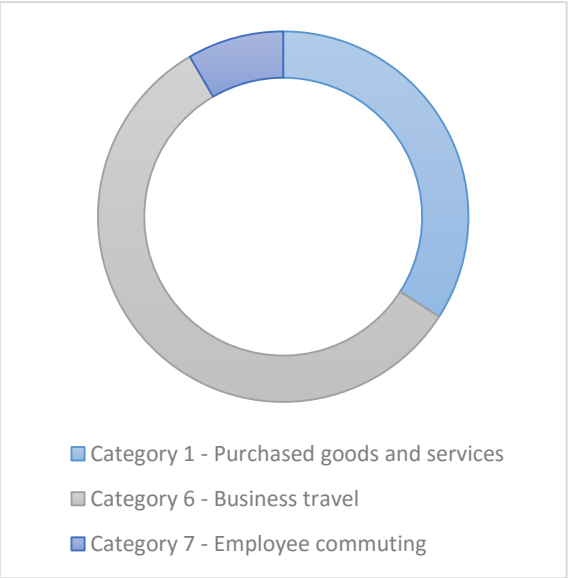


Figure 4: Grexel Scope 3 GHG emissions

Retrospect

Grexel has disclosed and offset all its emissions since 2012. The following table summarizes the evolution of Grexel-induced emissions during 2012 - 2014.

Table 24: Grexel GHG emissions overview 2012 - 2014

	2014	2013	2012
Scope 1 - Direct GHG emissions	0,00	0,00	0,00
Scope 2 - Indirect GHG emissions	17,50	17,39	16,95
Market-based method	17,50	17,39	16,95
(Location-based method)	30,13	-	-
Scope 3 - Corporate value chain	13,36	13,28	13,00
Category 1 - Purchased goods and services	4,58	7,98	7,61
Category 6 - Business travel	7,66	4,32	4,81
Category 7 - Employee commuting	1,12	0,98	0,59
Total	30,86	30,67	29,95

When comparing the main Scopes as defined by the GHG Protocol, no significant changes can be found. Scope 1 has been zero for the entire history of the inventory. Scopes 2 and 3 have remained somewhat constant.

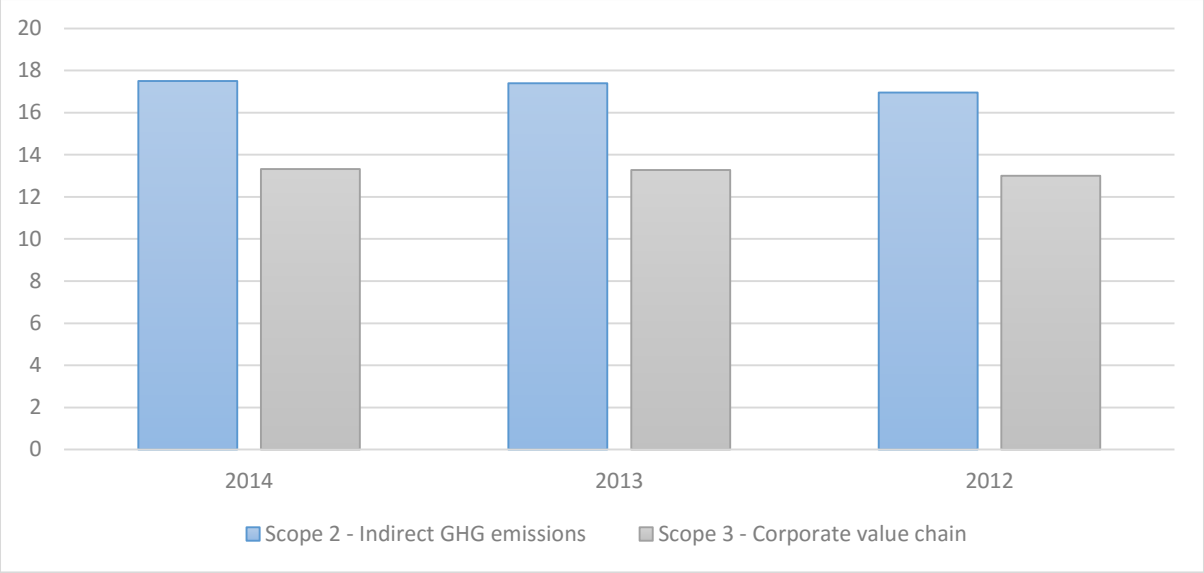
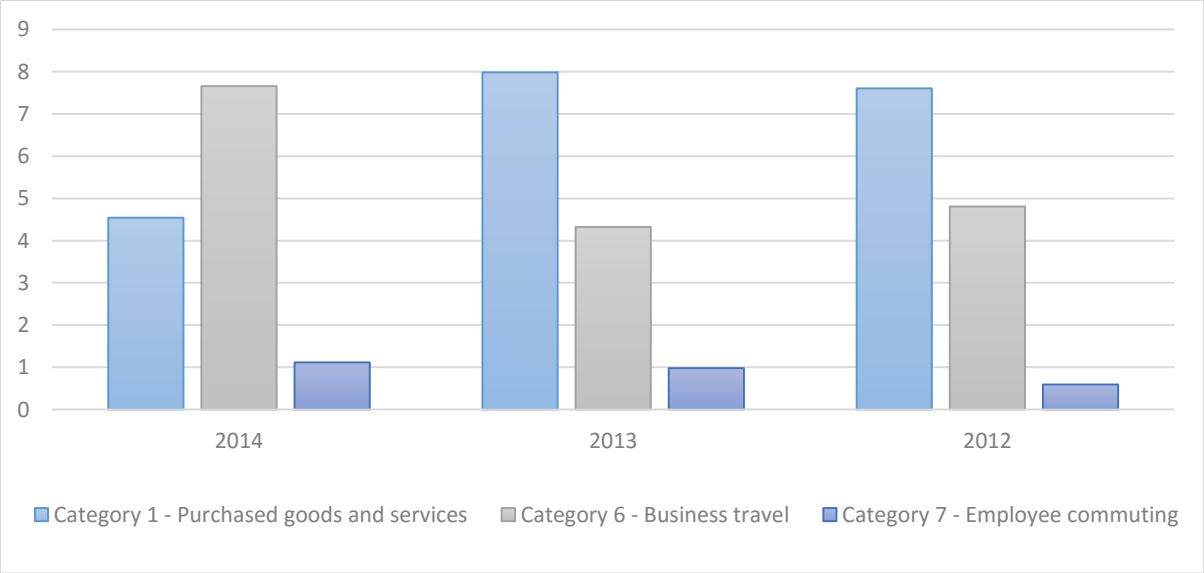


Figure 5: Grexel GHG emissions for Scopes 2 and 3 2012 - 2014

However, when comparing individual Scope 3 categories, larger changes from 2013 to 2014 can be seen. Namely, Category 1 has dropped by over 3 tCO2 although Grexel has moved to a new office and purchased new office appliances and furniture. Part of this change can be explained by the fact that during the move, we disposed some of our appliances and left some of the furniture for recycling. But probably the main cause for this sudden drop is the fact that WWF climate calculator tool provided updated emission factors for office appliances and furniture, which were quite much lower than for the previous years. The decline in Category 1 emissions is almost exactly "compensated" by the increase in Category 6 - Business travel, leaving the overall Scope 3 level practically unchanged.



Offsetting

In order to offset our business related emissions, we have used Certified Emission Reductions (CERs) that are eligible for European Union Emissions Trading System from Shaanxi Shenmu Hengdong waste gas based electricity generation project.

The certificates have originally been issued by the Clean Development Mechanism (CDM) Executive Board. The certificates have since been exported from the CDM registry to EU-ETS registry and from there to Grexel GECCO account for voluntary emission reduction purposes. The cancellation in GECCO was done by Enegia for the benefit of Grexel. This transaction also acts as a proof of concept for a new service provided by Grexel in our registry, making it possible for account holders to also offset their business related emissions using certificates exported from the CDM.

The cancellation statement for emission offsets can be found here.

More information about the source project in China can be found here.

References

[1] M. Brander, A. Sood, C. Wylie, A. Haughton and J. Lovell, "Technical Paper - Electricity-specific emission factors for grid electricity," Ecometrica, 2011.

[2] S. Bhawan and R. K. Puram, "CO2 Baseline Database for the Indian Power Sector - User Guide (Version 6.0)," Government of India, Ministry of Power, Central Electricity Authority, New Delhi, 2011.

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