HELMHOLTZ

MDC MAX-DELBRÜCK-CENTRUM FÜR MOLEKULARE MEDIZIN IN DER HELMHOLTZ-GEMEINSCHAFT

GREENHOUSE GAS BALANCE OF THE MDC FOR THE YEARS 2019/2020 - PERSPECTIVES FOR A CLIMATE STRATEGY

Version:	1.0
Date:	10.01.2022
Created by:	Michael Hinz
Status:	DRAFT
Confidentiality Level:	PUBLIC

Introduction

The MDC has set itself the goal of making a meaningful contribution to climate protection and making its work as greenhouse gas neutral as possible by 2038[1].
One of the first steps on the way to a climate-neutral research center is to record and balance the greenhouse gas emissions caused by MDC. The Greenhouse Gas (GHG) Protocol (Fig.1), which contains the most commonly used standards for greenhouse gas accounting worldwide, serves as a guide.

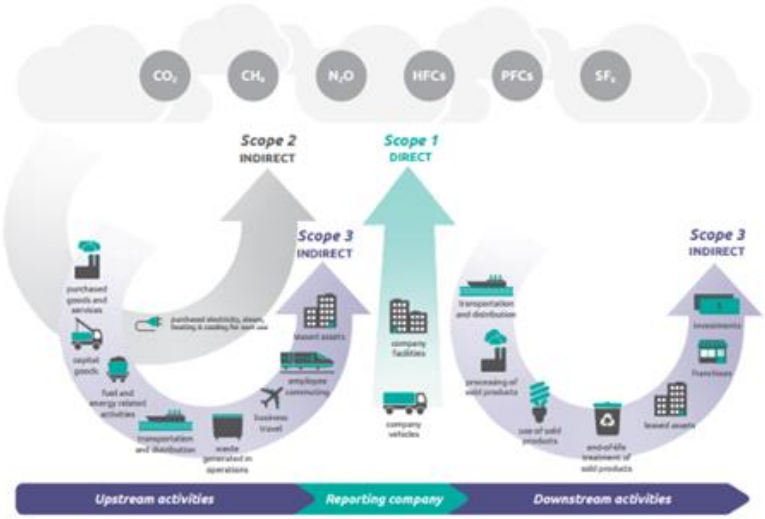

Fig. 1: Greenhouse Gas Protocol (graphical abstract)[2]

The GHG Protocol distinguishes between three scopes:

- Scope 1: Direct emissions (e.g. combustion of natural gas).
- Scope 2: Indirect emissions from externally generated energy sources (e.g. electricity, district heating)
- Scope 3: All other emissions caused directly or indirectly

Scope 3 is divided into a total of 14 categories. The categories relevant to the MDC were determined through a materiality analysis[3]:

- Purchased goods and services
- Capital goods (major equipment and buildings)
- Fuel and energy-related emissions (upstream chain emissions) [4]
- Transportation and distribution[5]
- Waste
- Business travel
- Commuting of employees

[1] https://www.mdc-berlin.de/media/40792
[2] https://ghgprotocol.org/blog/you-too-can-master-value-chain-emissions
[3] Criteria: e.g. share of total emissions, the potential to influence, interest and expectations of stakeholders
[4] Emissions resulting from the production, processing, transport, storage and distribution of energy sources
[5] Currently no data available

Consumption data from the above-mentioned areas (including electricity, natural gas, purchased goods and business trips) were provided by the relevant administrative departments (Biological Safety, Purchasing and Logistics, Finance, People and Corporate Culture, TFM-B and TFM-E) and by CBB. Based on these data, the associated GHG emissions were calculated using specific emission factors (for Scope1, Scope 2 and Scope 3.3) or estimated approximately using common extrapolation methods (for all other Scope 3 categories) (see Appendix).

Accounting

GHG emissions for 2019 and 2020 were determined based on consumption data from the Buch and Mitte sites (see above). In 2019, the MDC generated a total of 28.115 tons of GHG emissions. Each employee therefore generated an average of 16.6 tons at the workplace. By comparison, Germany emitted an average of 9.7 metric tons of CO2 equivalents per capita in 2019, and the European Union emitted 8.1 metric tons. In 2020, MDC was able to significantly reduce its GHG emissions compared to 2019, to 19.704 tons (Fig. 2), or 11,1 tons per employee.

System boundaries:	Campus Buch, Campus Mitte	
Year	2019	2020
Employees	1691	1711
GHG-emission total (t)	**28082**	**19043**
THG-emission per employee (t)	**16,6**	**11,1**

Fig. 2: GHG emissions at the MDC

The largest emitters of GHG emissions

Looking at the distribution of GHG emissions among the individual scopes, it is noticeable that Scope 3 clearly accounts for the largest share in both years (Fig. 3).

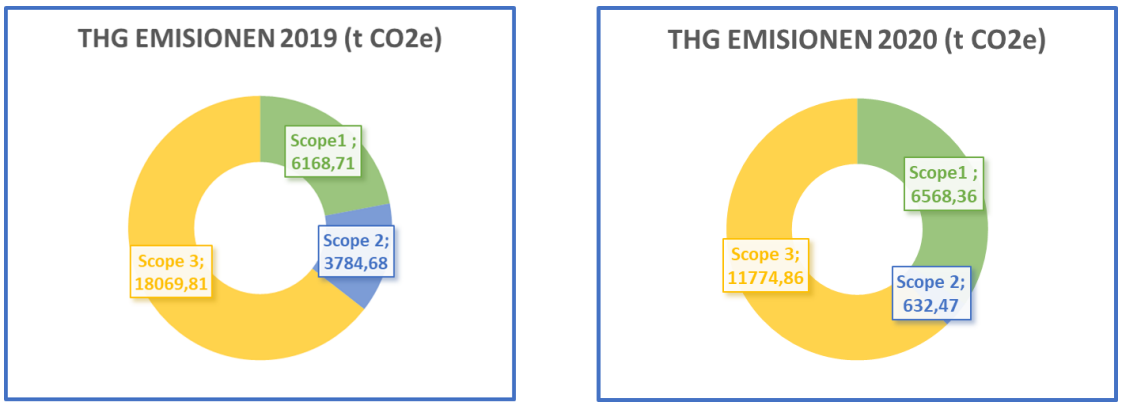

Fig. 3: Distribution of GHG emissions across the individual scopes of the GHG Protocol

An examination of the various categories within the three scopes shows that most emissions are caused by the procurement of goods and services (3.1) and by the procurement of capital goods (3.2) (Fig. 4).

Other significant sources of emissions are the combustion of natural gas (1.1; 3.3), the consumption of electricity (2.1; 3.3) and district heating (2.2; 3.3), as well as business travel (3.6) and daily commuting (3.7) (Fig. 4).

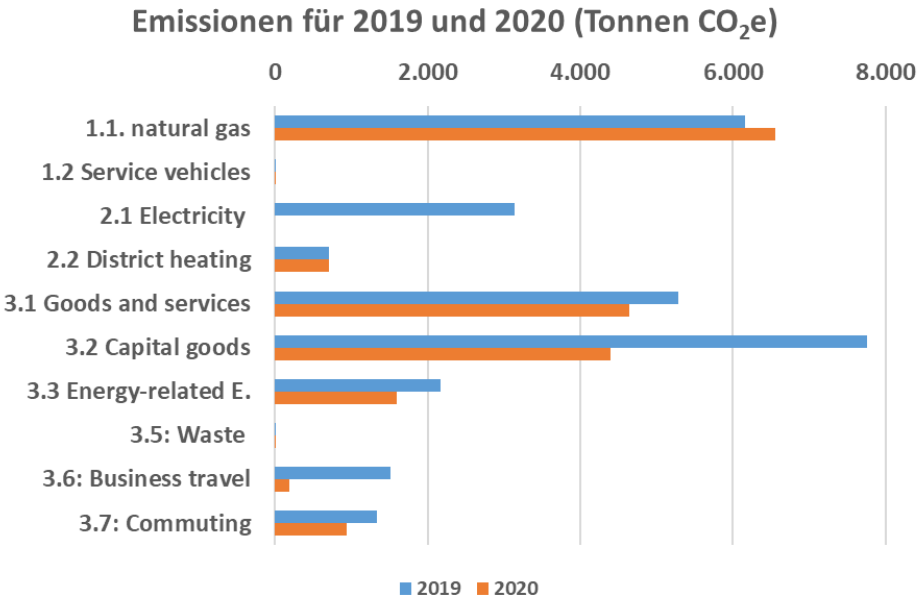

Fig. 4: Relevant emission sources in comparison 2019/2020

In the following, the relevant categories in Scope 3 were considered in detail in order to make clear which processes or consumptions generate the most emissions. The largest emitters (> 500 metric tons C02e) within these categories are listed below (Fig. 5):

	2019	2020
3.1 Goods and services		
Life Science Products	2004	1936
Div. services	1024	929
Laboratory Plastics	861	793
3.2 Capital goods		
IT equipment	1239	756
Large laboratory equipment	4501	1575
New buildings	1600	1246
3.6 Business trips		
Flights	1297	156,1
3.7 Commuting		
Car/Motorcycle	902	689
Total	**13429**	**8080**

Fig. 5: The largest emitters of GHG emissions in Scope 3 (values in metric tons of $C0_2e$)

Major sources of emissions, including the procurement of laboratory equipment, life science products and services, are directly linked to the scientific work of the MDC. However, the mobility behavior of

employees, in particular business air travel and commuting by car, also contribute significantly to the GHG emissions caused at the MDC. The high value for laboratory equipment in 2019 is striking, possibly due to the new opening of the BIMSB.

Causes for the reduction of GHG emissions in 2020.

As mentioned above, MDC was able to significantly reduce its GHG emissions in 2020 compared to 2019 (Fig. 2). There are three main reasons for this:

- Conversion of electricity supply to green power: - 3700 tons of CO2e.
- Reduction in procurement of computers and large laboratory equipment: - 3300 tons CO2e
- Pandemic-related reduction in business travel: - 1300 tons CO2e

Conclusion / Outlook

The present balance sheet makes it clear in which areas relevant GHG emissions are generated at the MDC. The present data serves first of all to increase the employees' awareness of sustainable actions. The balancing of GHG emissions will be continued in the future and, if possible, further improved. The medium-term goal is to establish more precise calculation methods, especially for Scope 3, in order to verify the effectiveness of future climate protection measures. The GHG balance for 2021 is expected to be completed in June 2022.
As mentioned in the introduction, the accounting of GHG emissions forms a necessary basis for the development of a future MDC climate strategy, which will be developed together with colleagues from science and administration in the newly formed Sustainability Commission. Possible perspectives for an MDC limit strategy can already be formulated. In Scope 1, the combustion of natural gas in the combined heat, power and cooling plant of the MDC energy center is a significant source of emissions. Here, it remains to be seen whether natural gas can be reasonably replaced by another energy source (e.g., biogas, hydrogen) in the medium term. In Scope 3, it becomes clear that in the categories that are essentially linked to the scientific work at the MDC (including the procurement of laboratory equipment, life science products and services), a significant reduction in GHG emissions is only possible if there is sustainable further development of biomedical equipment and products. Here, it remains to be seen how the technical framework for biomedical research will develop in the coming years. In many other areas, however, a significant reduction in GHG emissions is already possible. In discussions with various colleagues from science and the relevant administrative departments (especially Purchasing and Logistics, TFM-B and TFM-E), numerous measures were discussed that would contribute to the reduction of GHG emissions:

- Electric steam generation in the animal house (remove natural gas as an energy source)
- Increased use of photovoltaic systems
- Reduce air exchange rates in the laboratories
- Reduce business travel; take more trains, fly less
- Promote cycling, e-mobility and public transport
- Reduce plastic goods

- Increase use of recyclable products
- Use space more efficiently / reduce new buildings as much as possible
- Improve life cycle of equipment / use equipment more efficiently

An MDC climate strategy should initially focus on measures that can be implemented in the short and medium term. Within the framework of a roadmap, ambitious but also realistic targets for the year 2030 should first be formulated here. Based on the emissions of 2019, a reduction of greenhouse gas emissions caused by the MDC by about 50-60% by 2030 seems to be possible. Further target marks for the long-term objective of making the work at the MDC greenhouse gas neutral, if possible, by 2038 should be set at a later date, depending on the technological possibilities available in the future.

Appendix

Sources for emission factors

Berechnung von Emissionsfaktoren		
		Kommentar
Scope 1		
Erdgasverbrennung BHKW	Senatsverwaltung für Umwelt .. Emmissionsfaktoren für brennstoffe	pdf Dokument
Erdgasverbrennung geerell	s.o..	DEFRA; Excel-Datei
Benzin	s.o	
Diesel	s.o.	
Scope2		
Strom market based	Vatenfall	PDF-Dokument
Strom location based	https://www.umweltbundesamt.de/themen/klima-energie/energieversorgung/strom-waermeversorgung-in-zahlen#Strommix	
Wärme marked based	Vatenfall	PDF-Dokument
Wärme location based	https://www.umweltbundesamt.de/sites/default/files/medien/publikation/long/3476.pdf	
Scope 3		
3.1: Güter und Dienstleistungen	DEFRA Indirect emissions from supply chain 2007-2011	Excel Datei
3.1 Wasserverbrauch	https://www.probas.umweltbundesamt.de/php/prozessdetails.php?id={611FF321-CDF7-456E-B8AE-A3016C1163B4}	
3.1 Abwasser	https://www.probas.umweltbundesamt.de/php/prozessdetails.php?id={4AA00B29-8EB5-4695-8CE9-FF98139D48F2}	
3.2: Kapitalgüter (Geräte)	DEFRA Indirect emissions from supply chain 2007-2011	Excel Datei
3.2 Kapitalgüter (Bau)	https://www.probas.umweltbundesamt.de/php/prozessdetails.php?id={4E639AF4-5C74-4E19-92DB-2C2362779C93}	ProBas Steine-ErdenBeton-DE-2020
	https://www.probas.umweltbundesamt.de/php/prozessdetails.php?id={E608C47E-D3ED-4B69-AD43-9D90E9A76CDA}	ProBas MetallStahl-Oxygen-DE-2020
	https://www.sciencedirect.com/science/article/abs/pii/S0360132309002649?via%3Dihub	Nach Yan et al. 2010 Verursacht die Herstellung der Baumaterialien etwa 85% der THG Emissionen, wobei Beton und Stahl in RC-Buildings etwa 95-98% ausmachen.
3.3: Brennstoff und Energiebezogene Energie: Vorketten Erdgas	http://iinas.org/gemis-download-121.html	GEMIS 4.95; Excel-Datei;Aufkommensmix für Erdgas in
3.3: Brennstoff und Energiebezogene Energie: Vorketten Strom	Vorkette von Grünstrom (Mix aus Solar, Wasser und Wind) in Deutschland: 21,7943954 g/kWh	GEMIS /Empfehlung DGCN
3.3: Brennstoff und Energiebezogene Energie: Vorketten Fernwärme	UBA Bestimmung spezifischer THG Efs für Fernwärme (Pdf; Seite 5)	
3.5: Abfall	https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2019	DEFRA; Excel datei
3.5. Entsorgung von Altgeräten		
3.6: Dienstreisen (Flug, Auto,Taxi, Unterkunft)	https://quantis-suite.com/Scope-3-Evaluator/	Berechnung über Preis
3.6. Dienstreisen (Bahn)	http://www.dieeinsparinfos.de/guenstige-mobilitaet/bahn/kosten/	Umrechnung 1 € = 5 km
	https://www.umweltbundesamt.de/themen/verkehr-laerm/emissionsdaten#verkehrsmittelvergleich_personenverkehr	converting factor for international rail
3.7: Pendeln der Arbeitnehmer	https://www.umweltbundesamt.de/themen/verkehr-laerm/emissionsdaten#verkehrsmittelvergleich_personenverkehr	bei PKW: Umrechnung auf 1 Person / PKW