جامعة قطر
QATAR UNIVERSITY

Carbon footprint Report 2021

Environment and Sustainability Section

Facilities and General Services Department

Environment and Sustainability Section

REPORT CONTENT

We are honoured to reveal the revised copy of the QU Carbon Footprint Report for the year 2021. This report covers the period from 2016 – 2021 with 2016 being the baseline year.

Qatar University is still monitoring and studying the ways of improvements, thus, with reference to the 2020 report, some areas are still excluded from the calculation process and in the plan to be included in the nearest future.

WHO WE ARE?

The Environment and Sustainability Section comes directly under the Facilities and General Services Department - Administration and Financial Affairs. We are here to design and build practical solutions and to assure that our operations are performed in a sustainable way. Conserving our natural resources, planning to decrease our campus carbon footprint, managing wastes, promoting recycling, and increasing the community awareness are all under our scope.

We are also monitoring the project performance to ensure that all operational work are done in environmentally friendly way.

REACH US

We are here to hear from you,

Environment and Sustainability Section: ess@qu.edu.qa

Prepared by: Mays Abdalla – Environmental and Sustainability Specialist   *Mays Abdalla*

Reviewed by: Madawi Al-Shafi – Environment and Sustainability Section Head

MESSAGE FROM THE DIRECTOR

"The State shall preserve the environment and its natural balance in order to achieve comprehensive and sustainable development for all generations."
Permanent Constitution

Following what stated in our state constitution and the fourth pillar in Qatar's vision toward 2030 – Environmental Development -, we at Qatar University affirm our endeavour toward achieving the required balance between the development needs and protecting the environment, and this could not be done without the cooperation of all sectors in campus.
The sustainability model of Qatar University represents an opportunity to embody a more sustainable society by working on the application of various relevant research and academic outputs. This will enable the University to provide Qatari society with the nation's largest and oldest national businesses, which will equip qualified personnel to lead sustainable development through their future positions in various sectors of institutions and society.
With the global warming and climate change issues arising every day, it is very important to understand the environment around us and predict our contribution as Qatar University towards global climate change.
Thus, the Environment and Sustainability Section at Qatar University are calculating the QU carbon footprint on annual basis, and summarized all the measurements done in this report, which will enable us setting targets, and building strategies and programs.
Together for a green and sustainable campus,

Eng. Mai Hamad Fetais
Director of Facilities and General Services Department ,
Qatar University

ACKNOWLEDGMENT

In the very outset, we would like to express our gratitude to all people who put their efforts in this project directly or indirectly; including all professional engineers, administrative people, operators, and student trainees or part-time student employees provided by the university.

Our special thanks goes to Eng. Mai Hamad Fetais the Director of Facilities and General Services Department for her endless support and professional assistance given through this journey.

We also would like to thank the Institutional Research and Analytic Department represented by Ms. Fatima Shaaban Ali for providing us with the institutional data-population part, and the Finance Department represented by Ms. Mariam A-Shaabi for providing us with the budget data spent in all three sectors (operational, research, and energy budget).

Thanks to the Civil, Electrical, Mechanical, Agricultural, and Transportation teams from the Facilities and General Services Department for their professional and skilful help in calculating the core data required in this work.

Our sincere thanks goes to Ms. Madawi Al-Shafi, the Environment and Sustainability Section Head, for her continuous and dedicated support to accomplish this work.

We believe that without your efforts, this work would not have been possible.

Carbon Footprint Calculation Team,
Environment and Sustainability Section – FGSD,
Qatar University

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Glossary

The following terms and abbreviations may be used in this report shall mean:

QU:	Qatar University, State of Qatar
KAHRAMAA:	Ministry of Electricity & Water, Doha, State of Qatar
GHGs:	Greenhouse Gases
GHG Protocol	A global standard for measuring, managing, and reporting greenhouse gas emissions.
WRI:	World Resources Institute
WBCSD:	World Business Council for Sustainable Development
Gha	Global Hectares
SIMAP	Sustainability Indicator Management and Analysis Platform
U.S	United States
MTCDE	Metric tons of carbon dioxide equivalent

01 INTRODUCTION

1.1. Qatar and the Climate Challenge

Qatar, the world's leading exporter of liquefied natural gas has the second globally ecological footprint of around 14.4 gha/person as per the Global Footprint Network, 2016. The ecological footprint per capita in Qatar shows a dramatic increase from 7.7 gha in 1980 to 14.4 gha in 2016 (as showed below) which indicates how the increase of population and the urbanization affects the environment negatively.

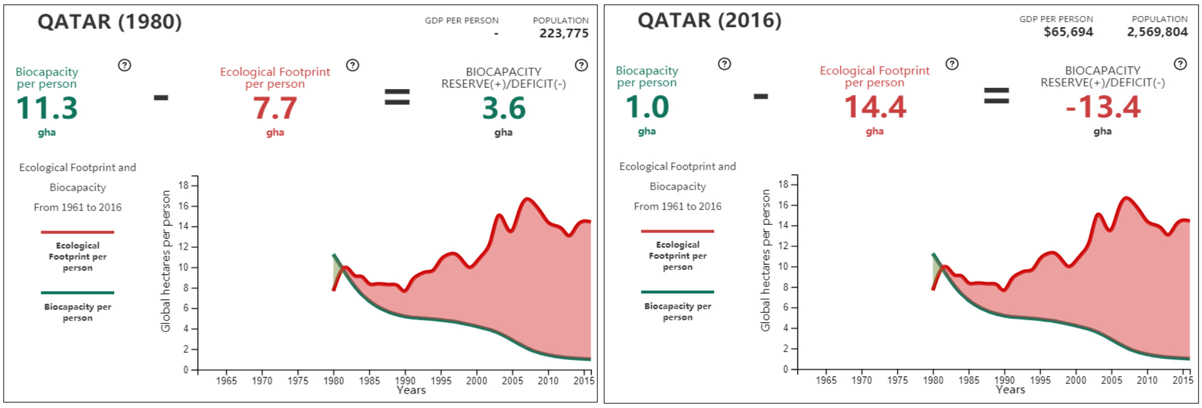

Figure 1: Qatar ecological footprint in 1980 and 2016

Today, the country is suffering from a very high temperature in summer that can reach 50ºC or above, which classified it to be one of the hottest lands in the world. The excessive use of resources, the lack of knowledge and sometimes the lack of social responsibility towards the environment drives people to adopt unsustainable practices. Therefore, if people are going to adopt the same behaviour without giving the attention to environment, we will need 1.75 of our planet size to afford our daily needs. It is important to understand that it is not only expectation and scientific calculations; we can see nowadays how climate change is affecting the world around us. Many countries experienced major floods and massive forest fires during the last couple of years, and some shores started to sink due to the increase of sea level.

Thus, and in order to save the environment, the fourth pillar in Qatar National Vison 2030 came to affirm our country endeavour toward preserving the environment and it is clearly stated by ***her highness Shaikha Mozah bint Nasser Al-Misnid***:

"We need to care for our natural environment for it was entrusted to us by God to use with responsibility and respect for the benefit of human kind. If we nurture our environment, it will nurture us."

1.2. What is Carbon Footprint?

Carbon footprint is the amount of greenhouse gases released to the atmosphere from every daily activity by individual, organization, or country such as transportation, powering, cooking, and other activities. It is measured in tons of carbon dioxide equivalent gases (CO_{2eq}) including methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6) as per Kyoto protocol. The emission sources are classified into two categories, direct and indirect sources, based on how the organization's activities are contributing in emitting GHGs. For clarity, the fleet owned by QU is burning fuel and emitting emissions to the atmosphere so they are classified as direct source of GHGs, while the consequences of using the purchased electricity in campus, which was generated earlier by KAHRAMAA, are considered as an indirect source of emissions.

1.3. Why do we need to calculate the carbon footprint?

Since Qatar's economy depends mostly on fossil fuels, which is the main producer of carbon dioxide, it is threaten by severe environmental problems such as air pollution, biodiversity loss, desertification, coastal floods, and etc. Qatar is also ranked as one of the most carbon dioxide emitters in the region and there is a high need to look after the decisions and adopt new methods to save the environment around us. There is also a need to raise awareness campaigns and help our community to save the environment, thus, universities and schools are the best places to introduce new habits that will affect not only the institution but the whole community.

Therefore, measuring the carbon footprint helps in estimating the organization/institution contribution to global climate change. It gives a clear idea about the situation, and helps in making decision, putting plans, and implementing new techniques to reduce the emissions.

1.4. Qatar University at a Glance

Qatar University is the first governmental university in Qatar located on the northern outskirt of the capital Doha. The university was incepted by the end of seventies, in 1977, with the first four colleges: Education, Humanities & Social Sciences, Sharia & Law & Islamic Studies, and Science. As of today, Qatar University hosts ten colleges with 47 Bachelors, 29 Masters, 20 Ph.D. programs, nine Diplomas, and a Doctor of Pharmacy, with a total building area of more than 500,000 m^2. The cultural diversity QU have enriches its educational experience and encourages both students and staff to improve their communication skills with people from different regions in the world. The university hostel located inside the campus with an area of almost 106,910 m^2, and it hosts mostly the international students with some local students who are living in a bit far areas at Qatar, and an accommodation for staff. Moreover, the university opened an early childhood centre to help working parents focus on their work, boost their productivity, and promote a healthy work-life balance.

In terms of sports, the university host a quite big area for sport facilities that is almost 28,000 m^2, and two activity centres in both male and female campuses where they can take their breaks between the lectures. It also have a standalone sport activity building in the female campus with an average area of 6255 m^2.

Today, the university population go over 20,000 students with more than 2000 faculty and staff members.

02 DESIGN AND DEVELOPMENT

2.1. Greenhouse Gas Protocol:

Several entities started to develop protocols to help in collecting and measuring the carbon footprint, however, at Qatar University we are following the GHG protocol developed by the World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD) WRI/WBCSD.

2.2. QU Carbon Footprint Calculation Tool

The Sustainability Indicator Management and Analysis Platform (SIMAP) that is designed by the University of New Hampshire, U.S was used in calculating the QU carbon footprint. This tool helps in measuring, calculating, tracking, and reporting the campus carbon footprint. The institution provides the users with a workbook excel sheet in which all the data can be entered into it and then imported to the platform. The thing that makes this platform most effective is that users can customize either the energy emission factors or the fuel mix percentage in order for the system to measure the emissions. Thus, it is an effective tool for institutions who lives outside the U.S and wants to measure their carbon footprint.

2.3. Inventory Design:

In order to build a carbon footprint inventory, there is a need to have a consistent methodology that can be used not only in the start-up stage, but also for the coming years to be reasonable for comparing with the future values. Thus, figure (2) shows the main six elements that need to accomplish this project, and the main and most important element to start with is the organizational boundaries that will be discussed further in the next section.

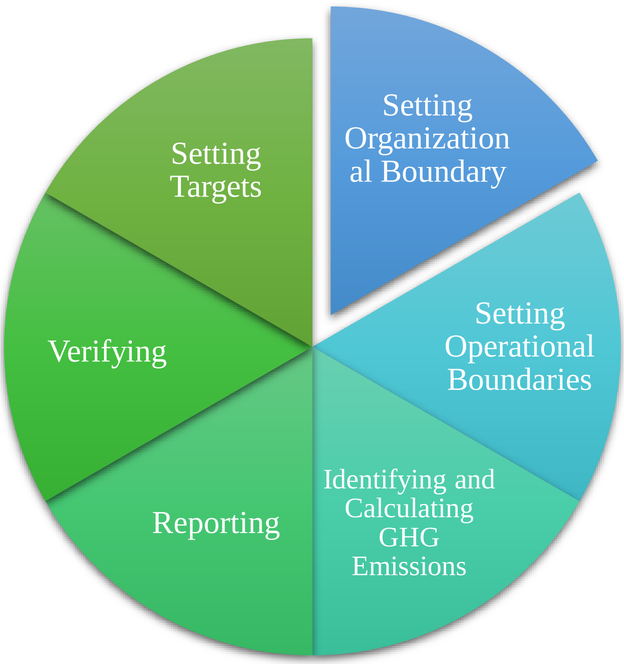

Figure 2: GHG Inventory design

2.3.1. Boundary Settings:

The hierarchy below was designed to help in defining the QU campus boundaries.

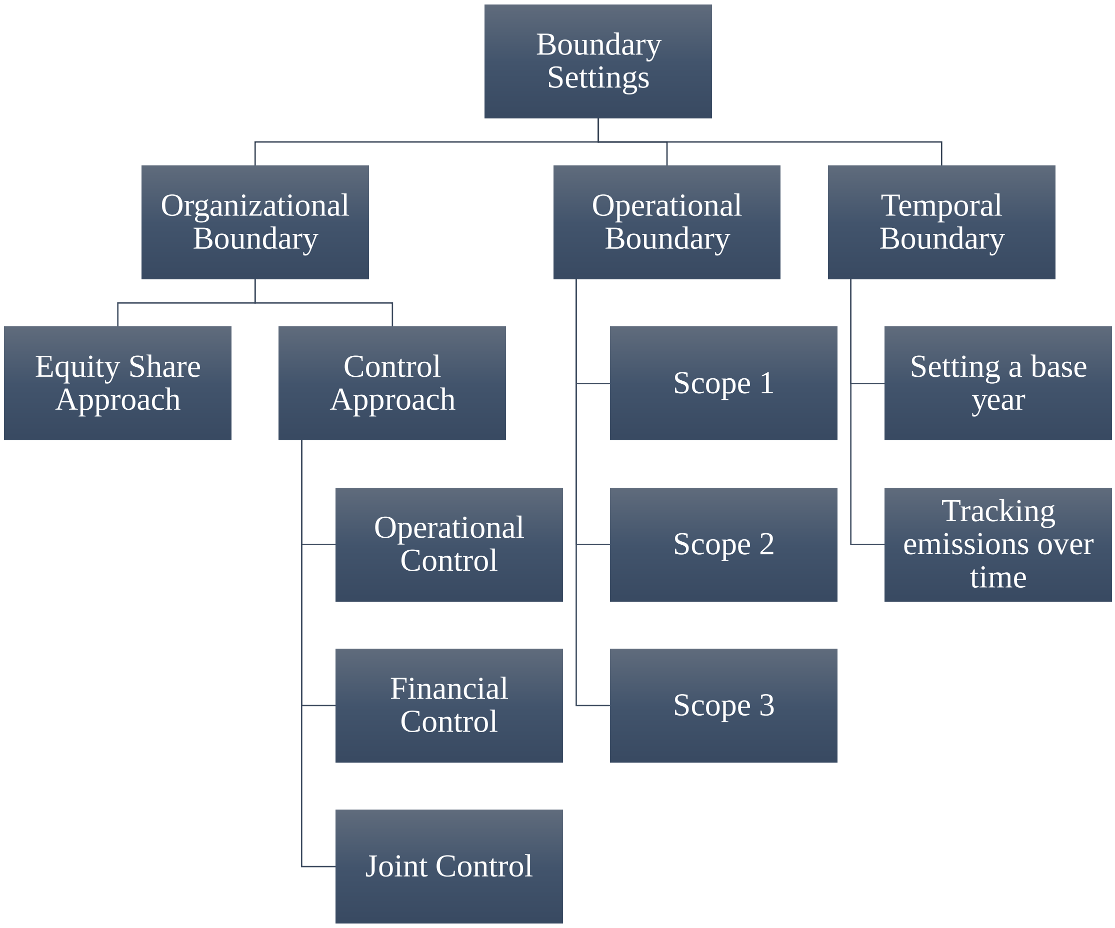

Figure 3: GHG Boundary setting hierarchy

A) Organizational Boundary:

Since Qatar University is a governmental institution, and accounts for almost hundred percent of the GHG emissions arise from its operations, having a full authority to implement its operational policies, thus, the control approach with an operational control was selected to be the organizational boundary. It is important to highlight that in local governmental organizations, the GHG protocol highlighted that in most case whether selecting operational or financial boundary, the results should not be affected.

B) Operational Boundary:

After setting the organizational boundary, the next step is to determine the operational boundary specifically through the three scopes, described below, in order to avoid the double counting of GHGs.

Carbon Footprint Scopes

In this protocol, the emissions fall into three main scopes based on their sources as described below:

Scope 1 – Core direct emissions: Emissions from activities owned by the organization or under its control. E.g. direct transportation, on-campus stationary sources, refrigerants, etc.

Scope 2 – Core indirect emissions: Emissions from activities that are neither owned nor operated by the organization but are directly connected to an on-campus energy consumption. E.g. purchased electricity, purchased steam, or purchased chilled water.

Scope 3 – Non-core indirect emissions: Other emissions attributed to the organization and are neither owned nor operated by the organization but are either directly financed by the organization or linked to it. E.g. directly financed outsource transportation, waste generated in operation, business and study travels, commuting, etc.

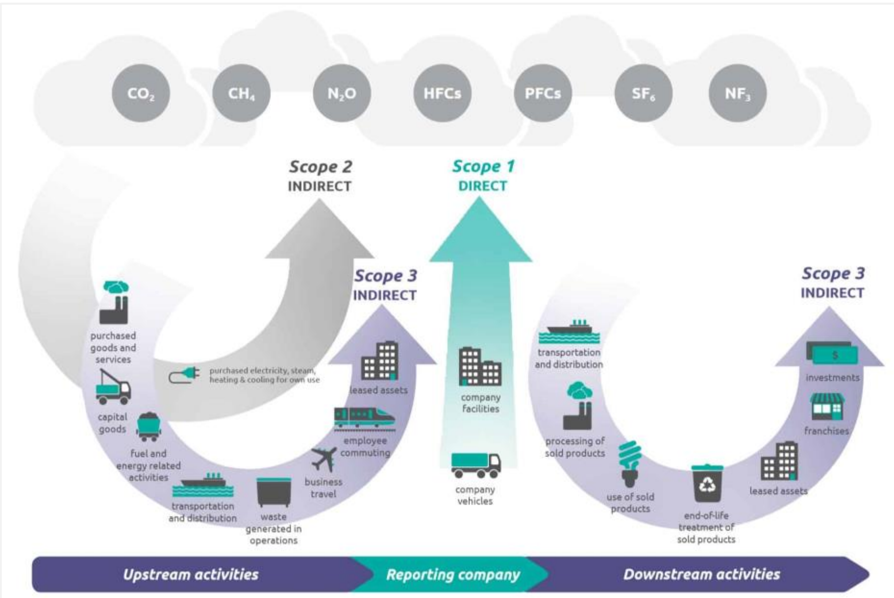

Figure 4: Infographic representation of the three scopes in calculating carbon footprint (1).

Figure (4) illustrates how the scopes are contributing in the total GHGs emitted from an organization, where the upstream activities are the production-related activities (those generated as a result of extracting and importing fossil fuel), and the downstream activities are consumption-related activities (services and consuming goods related activities).

Scope 1 Core direct emissions

As described earlier, the core direct emissions are all kind of on-site sources of fuel/coal burning. It also includes chemical refrigerants, and agriculture sources arises from the N_4 emissions from animals (if available in campus) and N_2O emissions arises from fertilizers (2).

For example, the very basic diesel fuel combustion reaction below indicated how much carbon dioxide are released to the atmosphere as a result of burning 4 molecules of an average diesel compound:

$$4C_{12}H_{23} + 71\ O_2 \rightarrow 48\ CO_2 + 46\ H_2O$$

The same thing with refrigeration cycles in air conditioning which relies on chemical refrigerants for cooling, though, these compounds have a considerably high Global Warming Potential values. Thus, these compounds were added to the GHG emissions calculation by the Kyoto Protocol under the UNFCCC. It clarifies that, based on the type of equipment and amount of used refrigerants in an organization, the GHG can be estimated.

The table below is a real case study of a hotel where they examine the relevance of refrigerants as part of the overall GHG emissions.

Table 1: Example for the relevance of refrigerants as part of the overall GHG emissions

Refrigeration/ Air conditioning Equipment	Number of Units	Type of Refrigerant	GWP of Refrigerant	Refrigerant Charge (kilograms)	Annual Leakage Rate (%)	Operation Emissions (t of CO_2.e/yr)
Chiller I	1	R134a	1430	750	7%	75
Chiller II	1	R407C	1526	200	7%	21
Walk in chiller	7	R22/R404A	1700	13	7%	11
Walk in freezer	2	R22/R404A	1700	13	7%	3
Fridges/chillers	18	R134a	1430	1.5	7%	3
Fridge freezers	4	R22/R404A	1700	1.5	7%	1
Counter fridges	16	R22/R404A	1700	1.5	3%	1
Minibars in rooms	512	R600a	3	0.1	1%	0
Total						115

Scope 2 Core indirect emissions

This scope is for activities that are neither owned nor under the institution control, but it is directly connected to an on-site energy consumption. It includes emissions arise from purchased energy in the form of electricity, steam, and chilled water (2). Since in our case the purchased electricity is the only source of emissions in this scope, the emission factor was estimated using KAHRAMAA Annual Statistics Report 2018 and used to double check the calculations in this study, while the fuel mix was manually customized in the software to enable it to calculate the emissions of scope 2.

If we are assuming that a building in a campus is consuming 10,000 kWh of electricity in a month, that means around 4.30 MTons of CO_2 is emitted from electricity.

$$10{,}000 \text{ kWh } \times 0.000431 \text{ MTons} \frac{CO_2}{kWh} = 4.30 \text{ MTons } CO_2$$

0.000431 MTons CO_2/kWh – Estimated value using KAHRAMAA Statistics Report 2018

However, there is a need to calculate emission values of methane and nitrous oxide and calculate the equivalent carbon dioxide, but since their contribution is minimal and because of lake of information, we just calculate the carbon dioxide manually and compare it with the software values.

Scope 3 Non-core indirect emissions

This scope focus on activities that neither owned nor under the institutional control but connected to it in a way. Since this scope is optional, we decided to exclude it at this stage and to be included in the future.

The following table shows the selected activities that are contributing in releasing GHG emissions at Qatar University. (Activities used in calculating QU carbon footprint)

Table 2: QU GHG scopes and their relevance activities

Scopes	Scope 1	Scope 2	Scope 3
QU activities/emission sources	Transportation Refrigeration Agriculture	Purchased Electricity	Excluded

03 IDENTIFYING AND CALCULATING GHG EMISSIONS

3.1. Institutional Data

The first step in collecting and measuring GHGs is to collect the institutional data, which is divided into three categories, they are:

A) University population,

B) Budget, and

C) Area Size.

3.1.1. Population at Qatar University

The number of both full-time and part-time students in campus increased gradually from 2016 to 2021 as illustrated in the chart below, and is expected to keep increasing on lower rates in the coming years. On the other hand, the number of both admin and academic staff working at the university had a minor increase through the five years starting with almost 2500 employee in 2016 until it slightly exceeded 3000 in 2021.

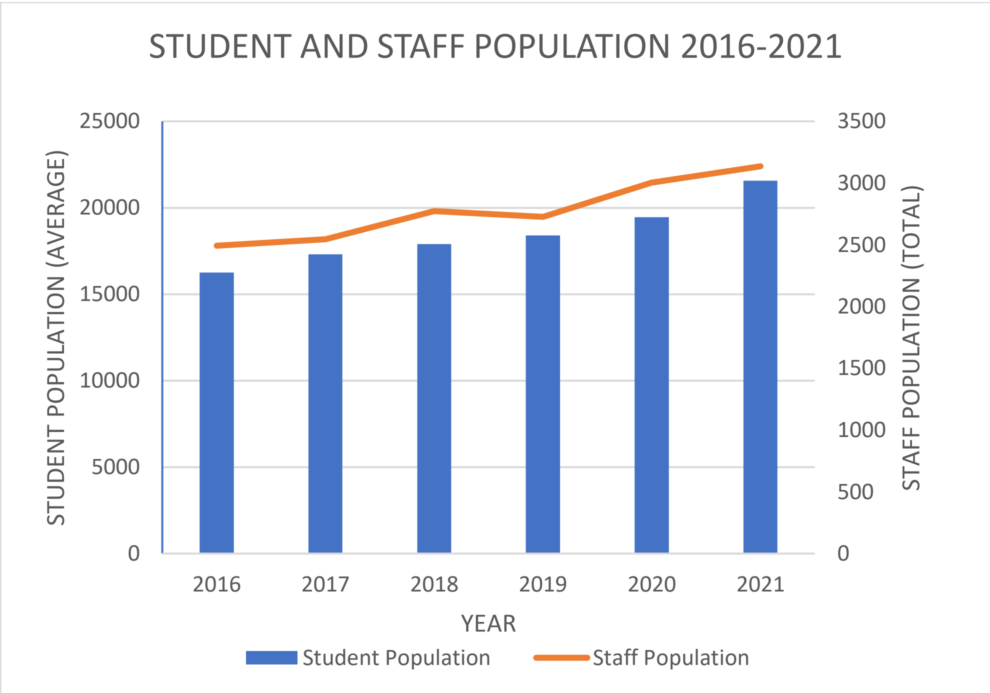

Figure 5: Student and employee statistics 2016-2021

All student-related statistics were obtained from the Office of Institutional Planning & Development by the end of the academic year, which usually start by August and last for September, while the calculation done in this report were based on the fascial year that start annually by January in which our institution rely on budgeting and reporting. We did put in our considerations the consistency, thus the number of students were taken for each semester in order to ease the conversion between the academic year and our fascial year, as illustrated in the table below.

Table 3: Detailed student population in campus from 2016-2021

Semester	Full-time Students	Part-time Students	Total
Semester	Full-time Students	Part-time Students	Total
Spring 16	14,599	1,761	16,360
Summer 16			6,422
Fall 16	16,133	1,773	17,906
Spring 17	15,459	2,099	17,558
Summer 17			6,611
Fall 17	17,060	2,092	19,152
Spring 18	16,085	2,378	18463
Summer 18			6685
Fall 2018	17,309	2,429	19,738
Spring 19	16,413	2,567	18,980
Summer 19			7,427
Fall 19	17,676	2,879	20,555
Spring 20	16,711	2,940	19,651
Summer 20			9,018
Fall 20	19,645	2,190	21,835
Spring 21	17,930	3,098	21,028
Summer 21	9,476		9,476
Fall 21	18,723	3,384	22,107

In contrast, the employees' statistic were obtained at the end of the calendar year from the Human Resources Department - Strategy and Development Office, and the detailed information are listed in the table below.

Table 4: Detailed employee population in campus from 2016-2021

Year	Academic Full Time	Admin Full time	Total New Hired	Total Employees
2016	1361	1132	165	2493
2017	1356	1189	177	2545
2018	1513	1260	131	2773
2019	1396	1331	121	2727

2020	1641	1363	171	3004
2021	1768	1368	241	3377

3.1.2. Budget

The total amount of expenditures in operation, research, and energy sectors were obtained from the Financial Planning and Control Section - Finance Department, and the use of it was limited only to the calculation of the QU Carbon Footprint and not for publishing.

3.1.3. Area Size

The calculated area was divided into two categories, Research and Building area size, based on the nature of work executed in the selected areas. The total area, type of location, calculation, and needed AutoCAD drawings were obtained from the Civil Team – Facilities and General Services Department. This step took more time because the function in some locations of the old campus buildings needed to be updated before measuring the areas. This was done by checking all laboratories in campus and measuring their areas using AutoCAD. The total building area data was already available with the AutoCAD team. The detailed information about the physical size are given in appendix.

Table 5: Calculated total building and research building areas for the years 2016-2021

Year	Category	Total Building Space (ft^2)	Total Research Building Space (ft^2)
2016	Physical Size	3,641,373.55	239391
2017		6,542,186.04	239391
2018		6,565,565.88	239391
2019		6,883,117.08	239391
2020		6,887,697.98	239,391

3.2. Scope 1– Data:

3.2.1 Refrigerants

The refrigerant data was obtained from the Mechanical Team – Facilities and General Services Department.

The main two refrigerants used at Qatar University for air conditioning and refrigerators are HFC-134a and HCFC-22, while other three types are being used in minimal amount, they are, R-404a, R-410a, and R-407c. The table below shows the amount used from each type per year.

Table 6: Detailed amount and type of refrigerants consumed 2016-2021

Year	Category	Type	Consumption Quantity (pound)
2016	Refrigerants & Chemicals	HFC-134a	297.00
		HCFC-22	400 (estimation)
2017		HFC-134a	327.00
		HCFC-22	400 (estimation)
2018		R-404a	9
		R-407c	64
		HFC-134a	207
		HCFC-22	653
2019		R-404a	2
		R-410a	11
		R-407c	7
		HFC-134a	450
		HCFC-22	414
2020		R-407c	26
		HFC-134a	31
		HCFC-22	282
2021		R-410a	2
		R-407c	7
		HFC-134a	44
		HCFC-22	194

3.2.2. Transportation

There are several types of vehicles used in our campus, including in-campus bus fleet used to travel the students between the buildings, in-campus special needs vehicles, home-campus bus fleet, and transportation cars to travel admin/academic staff from and to the campus in special occasions. However, the only type that is fully under the campus control is the in-campus bus fleet. Therefore, the amount of fuel measured in this report is for the in-campus bus fleet, and it was obtained from the Transportation Section at the Facilities and General Services Department as illustrated below.

Table 7: Detailed amount of fuel consumed in campus from 2016-2021

Year	Category	Consumption Quantity (gallons)
2016	University Fleet	23,009
2017		20,007
2018		21,320
2019		21,271
2020		11,844
2021		15297

3.3.3. Fertilization

In order to feed the landscape plants with the needed nutrients, two types of fertilizers are being used at Qatar University, they are Pasteurized Compost and Peat Moss (organic type) with 1.5% of nitrogen content, and Urea (synthetic type) with 46% of nitrogen content. The amount and nitrogen content of those fertilizers were obtained from the Civil and Landscape team – Facilities and General Services Department.

Table 8: Detailed amount of fertilizers from agriculture source consumed in campus landscapes from 2016-2021

Year	Category	Type	Consumption Quantity (gallons)
2016	Fertilizer	Synthetic	16,535.00
		Organic	672,630.00
2017		Synthetic	16,535.00
		Organic	140,999.00
2018		Synthetic	16,535.00
		Organic	132,277.00
2019		Synthetic	16,535.00
		Organic	195,660.00
2020		Synthetic	13,228.00
		Organic	26,455.00

2021		Synthetic	18,188
		Organic	32,463.07

3.3. Scope 2 – Data

3.3.1. Power Consumption

i. Data Source

The power consumption readings are collected through the buildings meters and then the consumption are being calculated. Since the electricity is supplied by KAHRAMAA, we are usually double check the readings with them to ensure that they are correct. All needed data related to power consumption are obtained from the Electrical Team – Facilities and General Services Department and the data for the years 2016-2021 are listed in the table below:

Table 9: Total amount of power consumption in campus from 2016-201

Year	Category	Scope	Consumption Quantity (kWh)
2016	Electricity, Steam, and Chilled Water	2	99,332,278
2017			103,441,292
2018			113,341,805
2019			110,677,819
2020			123,723,808
2021			161,851,210

ii. Methodology:

Since the used tool is not designed for the MENA region, we had to customize our fuel mix that was used by KAHRAMAA to generate electricity, which was found to be 100% natural gas (3). The fuel mix percentage was then added to the tool to generate the function and find the emissions released as a result of the electrical consumption in campus.

3.4. Scope 3

As mentioned earlier, scope 3 is excluded from the calculation and planned to be included in the coming years.

04 RESULTS

4.1. Total footprint results

As shown in Chapter 3, all required data were obtained and manually entered into the SIMAP tool. The emission factors and related equations were generated by SIMAP, whereas only the fuel mix was entered manually to generate its emission factor as discussed earlier in the previous chapter. The start of fascial year was selected to be January, and the accuracy of the data is moderate. The tool then was able to calculate the carbon footprint and show how each source and scope is contributing in the footprint as summarized in the table below.

Table 10: Total Greenhouse Gas Amounts per Source 2016-2021

Year	Direct Transportation GHG (MTCDE)	Refrigerants & Chemicals GHG (MTCDE)	Fertilizer & Animals GHG (MTCDE)	Purchased Electricity GHG (MTCDE)	T&D Losses GHG (MTCDE)	Net GHG MTCDE
2016	200	494	64	38,506	3122	42,387
2017	174	512	29	40,099	3251	44,064
2018	185	707	28	43,937	3,562	48,419
2019	185	614	32	42,904	3,479	47,214
2020	103	263	17	47,961	3,889	52,232
2021	131	188	23	62741	5060	68144

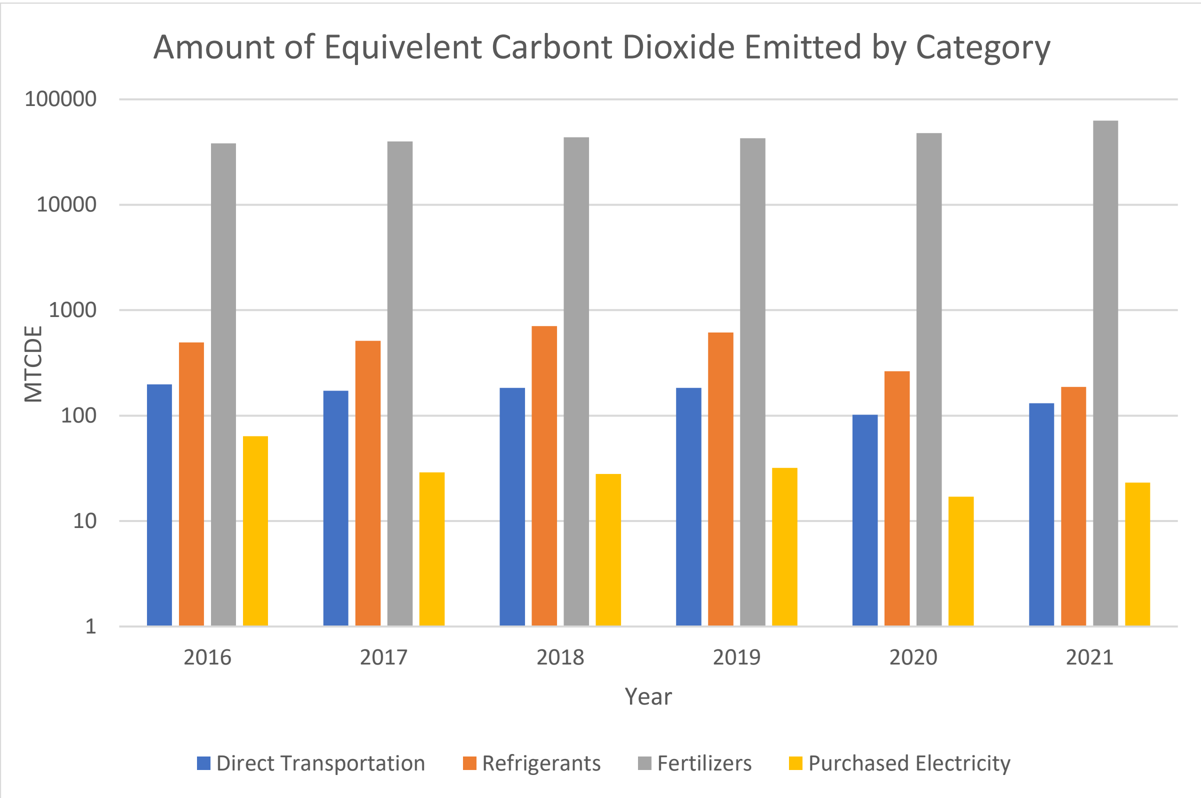

Figure 6: Graphic representation of the total carbon footprint results per category 2016-2021

As it is clearly seen from figure number 6 the purchased electricity owns the most contribution in the carbon footprint. It is almost contributing with average of 90% of the total carbon footprint for the five years 2016-2019. Around 7% of the total footprint goes to the transmission and distribution losses of the purchased electricity, which occurs because of the wires resistance and equipment efficiency. The least contribution goes for scope 1 (Direct transportation, Refrigerants, and Fertilizers), though, it might not be as low as it is now because our input in transportation is only for one type of fleet (in-campus bus fleet) as mentioned earlier in Chapter 3 that is the only type we have a control over it. Generally, the net metric tons of equivalent carbon dioxide shows an almost steady state range from 2016-2021 and this is mainly because we were monitoring without putting control measures to lower the emissions yet. The chart below shows how much each person in campus contributed in greenhouse gas emissions in the last five years. The total amount of greenhouse gas represented in equivalent carbon dioxide was divided by the summation of the average student number and total staff number.

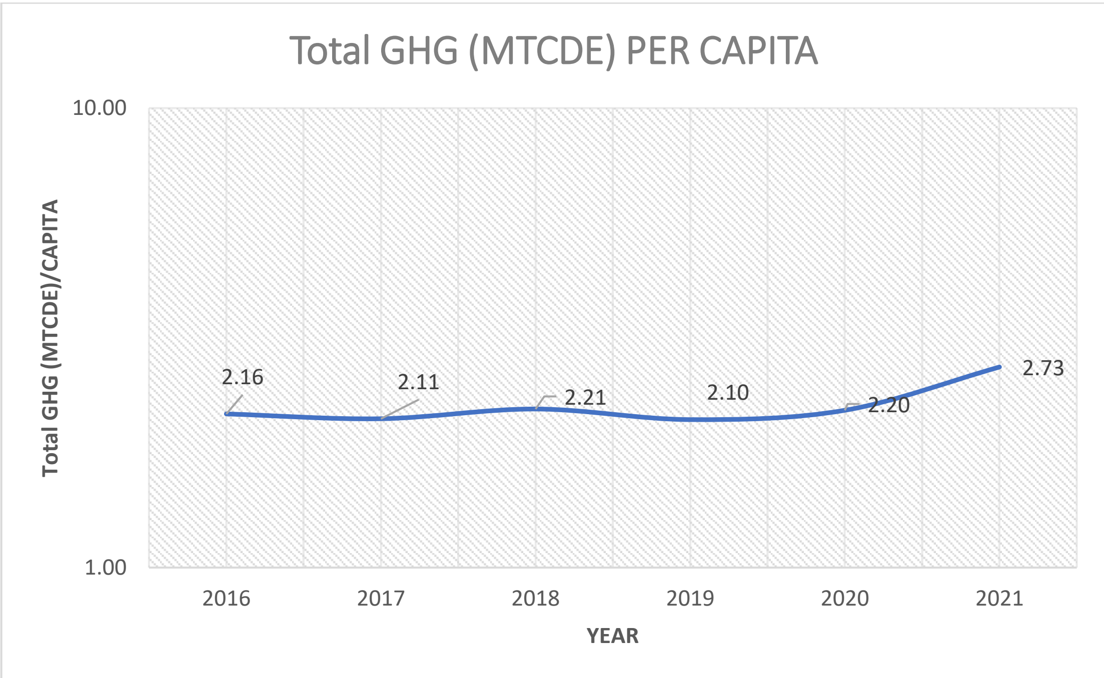

Figure 7: Total GHG emissions represented in equivalent carbon dioxide per capita

Since electricity contributes with the higher percentage in the emission of greenhouse gases, there is a need to figure out the main causes and start implementing some measures to reduce it, such as (but not limited to):

- Switching off/ increase the AC temperatures,

- Replacing old lighting fixtures with electrically efficient ones,
- Installing occupancy sensors whenever is applicable,
- Increasing awareness among campus society to reduce the electrical consumption,

Although these measures can have a big impact in reducing the consumption, though, we still have some machineries that could not be turned off for research purposes, and those can still have a huge impact.

05 REFERENCES

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06 APPENDIX

APPENDEX A:

Table 11: List of QU buildings 2016-2020 with Area (m2)

SN	Building Code	Name of the Building	Usage	Area (m2)	Year Build
1	B01	Higher Administration	Administrative Facility	4,700	1984
2	B04	College Of Education	Academic Facility	8,060	1984
3	B05	Main Men's Building	Academic Facility	7,623	1984
4	B06	Engineering Annex	Academic Facility	1,066	1984
5	B07	Engineering Workshop	Academic Facility/Workshop	2,941	1984
6	B08	Green House	Indoor agriculture	151	1984
7	BCR	Corridors A-J (Men's College Of Arts and Sciences)	Academic Facility	26,824	1984
8	C02 &C03	Faculty Office Building	Academic/Event Facility	9,963	1984
9	C04	Main Women's Building	Academic Facility	10,850	1984
10	C08	Business Operation Department (BOD)	Facility Operation	3,828	1984
11	C09	Central Service Unit (CSU # 1)	Utility Facility	2,156	1984
12	C10	Chemical Stores	Store Facility	100	1984
13	B02	Men's Activity Center	Indoor Sports / Recreational Facility	6,590	1986
14	B03	Information Technology Services	Administrative Facility	3,095	1986
15	C05	Women's Activity Centre	Indoor Sports / Recreational Facility	7,139	1986
16	D03	Women's Sports Facility	Indoor Sports	6,255	1986
17	A01	Arena Pavilion Complex	Sports Facility	25,500	1988
18	A02	Main Court Pavilion	Sports Facility	550	1988
19	A03	Tennis Court Pavilion	Sports Facility	550	1988
20	A04	Swimming Pool Pavilion	Sports Facility	1,500	1988
21	B09	CEng Research Center	Research	3,327	1990
22	B12	Mosque	Administrative Facility	1,362	1990
23	D01	Al-Bidaa Building	Academic Facility	2,762	1995
24	D02	Women's Car Park Arena	Parking	1,384	1997
25	C06	Medical Clinic	Health Facility	919	1998

26	B10	Qatar National Bank	Bank facility	929	1999
27	B11	Ibn Khaldoon Hall	Mass Events Facility	1,003	1999
28	C01	College of Arts & Science	Academic Facility	25,558	2000
29	I 01	General Service Section	Facility Operation		2000
30	A05	Administrative Affairs Building	Non Academics / Admn	3,955	2002
31	C11	College of Sharia and Islamic Studies	Academic Facility	3,954	2002
32	C12	Admission And Registration Building	Administrative Facility	3,395	2003
33	A06	Men's Foundation	Academic / Admn	3,750	2004
34	D05	Women's Foundation	Academic Facility	4,491	2007
35	F02	Guard House (Gate # 2)	Administrative Facility	133	2007
36	F03	CCTV Main Control Room	Administrative Facility	820	2007
37	C07	College of Engineering-Women's	Academic Facility	12,684	2009
38	D04	Women's Food Court	Food Court	7,503	2009
39	H09	Central Service Unit (CSU# 2)	Utility Facility	5,231	2010
40	H08	College of Business and Economics	Academic Facility	27,780	2011
41	B13	Library Building	Academic Facility	45,251	2012
42	H10	Research Complex Building	Academic Facility	19,455	2013
43	D08	Security Point	Administrative Facility	14	2014
44	F27	Entrance Gate	Administrative Facility	35	2014
45	F28	Entrance Gate	Administrative Facility	35	2014
46	H 11	Guard House	Administrative Facility	150	2014
47	H 11	Entrance Gate (Gate # 5)	Administrative Facility	35	2014
48	I 02	Central and Maintenance Store	Store Facility	5,800	2014
49	I 03	New Office Building	Administrative Facility	5,400	2014
50	I 04	Guard House (Gate # 3)	Administrative Facility	150	2014
51	I04	Entrance Gate	Administrative Facility	35	2014
52	I 05	Boat Yard building	Utility Facility	265	2014

53	I 12	Entrance Gate (Gate # 4) Service Gate	Administrative Facility	35	2014
54	I13	Security Point	Administrative Facility	17	2014
55	I14	Security Point	Administrative Facility	17	2014
56	H12	Male Class room Building	Academic Facilities	8,181	2015
57	D06	Female Class Room Building	Academic Facilities	13,022	2016
58	I 12	Security Point (Gate # 4)	Administrative Facility	17	2016
59	D07	Earlychildhood	Academic Facilities	5,002	2017
60	F05	Male Hostel	Students Hostel	41,233	2017
61	F06	Faculty Building	Staff Apartment	5,258	2017
62	F07	Faculty Building	Staff Apartment	5,258	2017
63	F08	Faculty Building	Staff Apartment	5,258	2017
64	F09	Faculty Building	Staff Apartment	5,258	2017
65	F10	Faculty Building	Staff Apartment	5,258	2017
66	F11	Faculty Building	Staff Apartment	5,258	2017
67	F12	Faculty Building	Staff Apartment	6,072	2017
68	F13	Faculty Building	Staff Apartment	6,072	2017
69	F14	Faculty Building	Staff Apartment	6,072	2017
70	F15	Faculty Building	Staff Apartment	6,072	2017
71	F16	Female Hostel	Students Hostel	41,233	2017
72	F17	Central Service Unit (CSU # 3)	Utility Facility	5,231	2017
73	F18	Housing Maintenance	Administrative Facility	503	2017
74	F19	Housing Club House	Sports Facility	3,380	2017
75	F20	Housing Administration	Administrative Facility	455	2017
76	F21 to 28	Security Point	Administrative Facility	136	2017
77	H13	Multistorey Car Park	Parking	94,562	2017
78	I 06	College of Pharmacy	Academic Facility	21,926	2017
79	F04	Security Services	Administrative Facility	433	2018
80	H14	Wind Modeling Research Center	Utility Facility	1,739	2018
81	A07	Sport's & Events Complex	Sports Facility	27,000	2019
82	B14	Security Point	Administrative Facility	6	2019
83	B15	Security Point	Administrative Facility	6	2019
84	H06	Annex Building	Academic Facility	2,484	2019

85	H16	Security Point	Administrative Facility	6	2019
86	C14	Security Point	Administrative Facility	30	
87	D09	Security Point	Administrative Facility	30	
88	D10	Security Point	Administrative Facility	14	
89	E01	Main Entrance Gate#1	Administrative Facility	250	
90	E01	Security Point	Administrative Facility	25	
91	F01	Entrance Gate-02 (Female)	Administrative Facility	60	
92	H17	Security Point	Administrative Facility	8	
93	H18	Security Point	Administrative Facility	8	

Table 12: Results extracted from SIMAP 2016-2020

Fiscal Year	Scope	Source	CO2 (kg)	CO2 (MTCDE)	CH4 (kg)	CH4 (MTCDE)	N2O (kg)	N2O (MTCDE)	GHG MTCDE
2016	1	Direct Transportation	197,600	197.6	11	0.3	7	1.84	200
	1	Refrigerants & Chemicals	0	0	0	0	0	0	494
	1	Fertilizer & Animals	0	0	0	0	243	64.3	64
	2	Purchased Electricity	38,378,761	38,378.76	3,822	107.01	76	20.24	38,506
	3	T&D Losses	3,111,791	3,111.79	310	8.68	6	1.64	3,122
	Total GHG (MTCDE)								42,387
2017	1	Direct Transportation	171,751	171.75	9	0.26	6	1.6	174
	1	Refrigerants & Chemicals	0	0	0	0	0	0	512
	1	Fertilizer & Animals	0	0	0	0	108	28.52	29
	2	Purchased Electricity	39,966,350	39,966.35	3,980	111.44	80	21.07	40,099
	3	T&D Losses	3,240,515	3,240.51	323	9.04	6	1.71	3,251
	Total GHG (MTCDE)								44,064
2018	1	Direct Transportation	183,057	183.06	10	0.28	6	1.7	185
	1	Refrigerants & Chemicals	0	0	0	0	0	0	707
	1	Fertilizer & Animals	0	0	0	0	105	27.94	28
	2	Purchased Electricity	43,791,586	43,791.59	4,361	122.11	87	23.09	43,937
	3	T&D Losses	3,550,669	3,550.67	354	9.9	7	1.87	3,562
	Total GHG (MTCDE)								48,419

2019	1	Direct Transportation	182,567	182.57	10	0.28	6	1.7	185
	1	Refrigerants & Chemicals	0	0	0	0	0	0	614
	1	Fertilizer & Animals	0	0	0	0	122	32.2	32
	2	Purchased Electricity	42,762,309	42,762.31	4,258	119.24	85	22.55	42,904
	3	T&D Losses	3,467,214	3,467.21	345	9.67	7	1.83	3,479
	Total GHG (MTCDE)								47,214
2020	1	Direct Transportation	101,657	101.66	5	0.15	4	0.94	103
	1	Refrigerants & Chemicals	0	0	0	0	0	0	263
	1	Fertilizer & Animals	0	0	0	0	64	17.01	17
	2	Purchased Electricity	47,802,854	47,802.85	4,760	133.29	95	25.21	47,961
	3	T&D Losses	3,875,907	3,875.91	386	10.81	8	2.04	3,889
	Total GHG (MTCDE)								52,232
2021	1	Direct Transportation	130,009	130.01	7	0.2	5	1.22	131
	1	Refrigerants & Chemicals	0	0	0	0	0	0	188
	1	Fertilizer & Animals	0	0	0	0	87	23.12	23
	2	Purchased Electricity	62,534,042	62,534.04	6,227	174.37	124	32.97	62,741
	3	T&D Losses	5,043,131	5,043.13	502	14.06	10	2.66	5,060
	Total GHG (MTCDE)								68,144