An aerial photograph of a body of water with several traditional wooden boats. Each boat has one or two people on board, and some are carrying large bundles of green plants. The water is a calm, greenish-brown color. The boats are arranged in a loose pattern across the frame.

Wikimedia Foundation

Environmental Sustainability Metrics 2023

About These Metrics

Since 2019, the Wikimedia Foundation has been committed to conducting an annual greenhouse gas inventory, to assess the impacts of its data center sites, business travel program, and employees' day to day working environments (e.g., the San Francisco, USA office, commuting, and remote employees' estimated home energy use). Our inventory is developed according to the WRI/WBCSD [Greenhouse Gas Protocol](#) and includes our scope 1, scope 2, and all of our relevant scope 3 emissions, as defined below:

- **Scope 1:** Direct greenhouse gas emissions that occur from sources controlled or owned by the Wikimedia Foundation. This includes natural gas and refrigerant consumption at our San Francisco office.
- **Scope 2:** Indirect emissions associated with the purchase of electricity, steam, heat, or cooling. This includes electricity and steam used at the San Francisco office.
- **Scope 3:** Indirect emissions resulting from activities from assets not owned or controlled by the Wikimedia Foundation, but that we indirectly impact through our operations. Scope 3 emissions include all sources not within our scope 1 and 2 boundary. These include water usage and waste (landfill, recycling, compost) at the San Francisco office; electricity used by our data center vendors across the globe; WMF-sponsored staff and volunteer business travel; commuting; and as of 2022, energy related to [remote work](#).

Recent Improvements in Reporting

As part of our commitment to sustainability, we are continually looking for ways to better capture our environmental impact and to improve the accuracy of our reporting. Notable changes since 2019 include:

- Updating our data center emissions methodology in 2021 to reflect the emission factors of the grids where our data centers operate rather than the procurement decisions of our vendors (i.e., PPAs, RECs). This resulted in a 75% increase in data center-related emissions between 2020 and 2021. Please see our [2021 report](#) for more information.
- Expanding our scope 3 emissions in 2022 to include remote work impacts (e.g., remote employees' estimated home energy use and their commutes to alternative workspaces), which increased our emissions by 505 mtCO₂e in [that year](#).
- **Looking Ahead:** Our scope 3 emissions for calendar year 2024 will be expanded to include the travel emissions associated with our conference grants portfolio. Previously, we were only able to include travel emissions of the WMF staff who traveled to these events, but as the Foundation's Travel Team is taking a more active role in booking travel/accommodation for scholarship attendees, we will have access to a broader dataset in 2024.

2023 in Review

In 2023, our scope 1, 2, and 3 emissions totaled **3,946 mtCO₂e**. Year-over-year, our 1 and 2 emissions remained static, while our scope 3 emissions increased by approximately 1,000 mtCO₂, or 35%. This change was driven by increased travel to community convenings compared to 2022. In 2023, we saw the return of an in-person [Wikimania](#) and [Wikimedia Hackathon](#), events for which the Foundation sponsors scholar and staff travel. In 2023, Wikimania was held in the ESEAP region for the [first time in ten years](#), which significantly increased our air mileage. Staff travel to internal offsites and business meetings remained more or less the same year-over-year, as we continue to incorporate learnings from the pandemic and act more intentionally when deciding to meet in person. Our data center emissions, the second largest source of emissions next to business travel, increased slightly in 2023, in line with expected annual data center growth.

340M

Pageviews on climate change

In 2023, Wikipedia recorded [340M pageviews](#) on 35k+ climate change-related articles across all language wikis.

4.60

kgCO₂-eq/1M pageviews

In 2023, our data centers generated 4.6kg CO₂e for every million pageviews on Wikimedia projects (including Wikipedia), less than 1% of the [industry average](#).

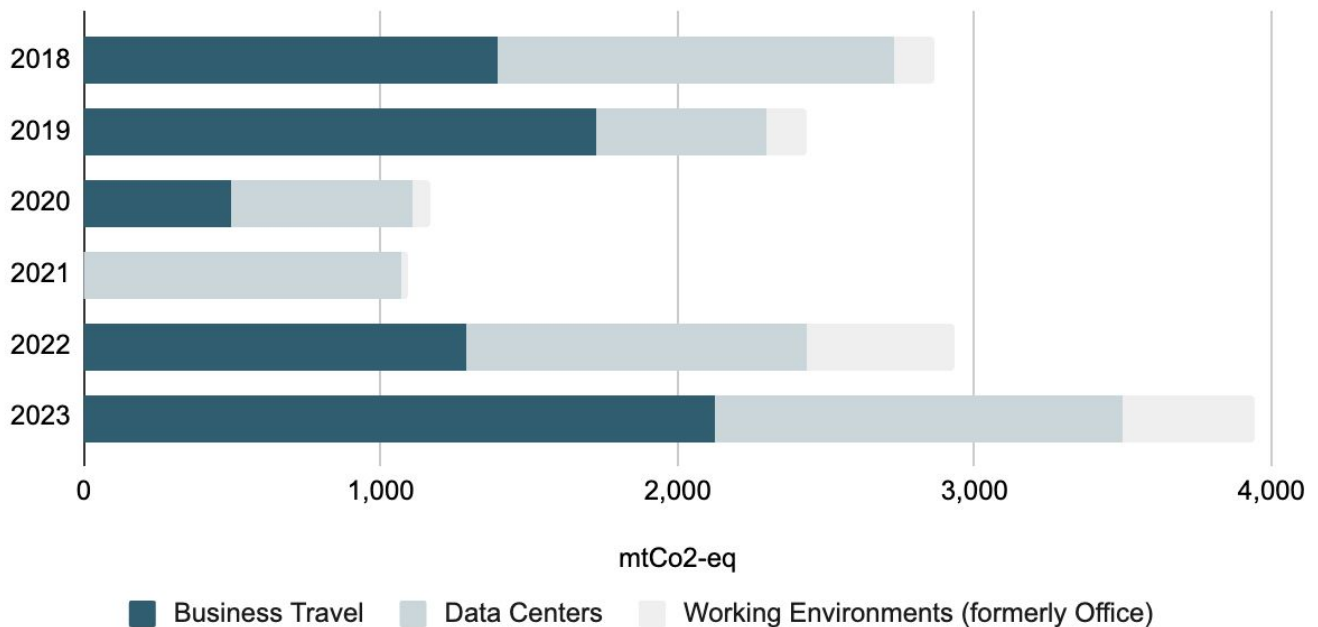
3,946

Metric tons CO₂-eq

In 2023, our emissions totaled 3,946 mtCO₂e, less than 1% of other top ten websites like Google and Meta.

Wikimedia Foundation

Emissions by Functional Area



Methodology

Scope	Activity	Functional Area	Activity Data	Emission Factor Source(s)
1	Natural Gas & Refrigerants	Working Environments	Total building consumption information prorated by WMF % of total building area	Emission Factors for GHG inventories, EPA (2023)
2	Purchased Electricity	Working Environments	Electricity consumption from Wikimedia monthly utility billing statements	Emission Factors for GHG inventories, EPA (2023)
	Purchased Steam	Working Environments	Total building consumption information prorated by WMF % of total building area	Emission Factors for GHG inventories, EPA (2023)
3	Waste to landfill, Recycling, Composting, Ewaste	Working Environments	Total building consumption information prorated for WMF % of total building area	Emission Factors for GHG inventories, EPA (2023)
	Water Usage & Waste Water treatment			DEFRA (2023) (EPA does not publish water usage emission factors)
	Commuting	Working Environments	2022 staff survey, 26% response rate. Data from respondents apportioned across non-respondents	Emission Factors for GHG inventories, EPA (2023)
	Home Energy Use	Working Environments	Staff numbers provided by human resources department	DEFRA (2023)
	Electricity purchased by data center vendors	Data Centers	Energy consumption for Wikimedia application and caching sites pulled from Grafana, with the data for networking sites captured directly from network routers. Local site-specific PUE information provided by data center vendors.	Emission Factors for GHG inventories, EPA (2023); Google Cloud Platform data used for Singapore and Netherlands; Electricity Maps used for France
	Business Travel - Air	Travel	Air miles provided by Wikimedia's travel agency	Emission Factors for GHG inventories, EPA (2023)
Business Travel - Lodging	Hotel emissions factors include estimates for natural gas, electricity, and steam consumption		Hotel Footprinting Tool , worldwide average for 3-4 star hotels	

Emissions by Functional Area

Emissions (tCO ₂ -eq)	2019	2020	2021	2022	2023	% Change (YoY)
Data Center Operations₁	576.2118	614.3248	1,072.7170	1,141.3402	1,376.5308	+ 21%
Server - eqiad	166.5654	163.1974	589.1320	652.1399	718.4189	+ 10%
Server - codfw	389.59	437.3246	408.9160	418.9221	550.5087	+ 31%
Server - esams	0.1467	0.1525	35.5020	25.7926	34.0261	+ 32%
Server - eqsin	7.6778	7.7485	27.2490	23.2396	43.9981	+ 89%
Server - ulsfo	6.0610	0.0000	10.5030	16.1324	25.0436	+ 55%
Server - drmrs ₂	<i>not online</i>	<i>not online</i>	0.0620	2.7785	2.7059	-3%
Server - eqord ₃	0.1911	0.1778	0.4730	0.8655	1.0361	+ 20%
Server - eqdfw ₃	0.1547	0.1414	0.4430	0.7979	0.7934	-1%
Server - knams	0.0019	0.0019	0.4370	0.6716	<i>merged with esams</i>	
Server Room ₄ - San Francisco Office	5.8234	5.5807	<i>data not available</i>	<i>data not available</i>	<i>data not available</i>	
Working Environments	131.2813₅	62.0252	17.6656	498.9116	446.4841	-11%
San Francisco Office	24.7648	10.4607	15.3550	17.8016	20.6066	+ 16%
Purchased Electricity ₄	61.1705	42.5593	2.3106	3.2465	3.1168	-4%
Employee Commuting	45.3461	9.0051	0.0000	0.0000	0.0000	
Energy - Natural Gas	2.1850	0.4735	0.4678	0.6253	0.6568	+ 5%
Energy - Steam	19.4472	9.0866	13.4218	13.0114	15.8578	+ 22%
Waste - composting	0.0551	0.0209	0.3244	0.0209	0.0253	+ 21%
Waste - eWaste	0.0043	0.0011	0.0018	0.0003	0.0000	
Waste - landfill	2.2112	0.5544	0.8159	0.7422	0.8366	+ 13%
Waste - mixed recycling	0.1057	0.0371	0.1153	0.0428	0.0326	-24%
Water Management - Municipal Water	0.2473	0.0939	0.0674	0.0397	0.0378	-5%
Water Management - WWT	0.5090	0.1932	0.1407	0.0725	0.0429	-41%
Remote Work₆	<i>data not available</i>	<i>data not available</i>	<i>data not available</i>	481.1100	425.8776	-11%
Home energy use	<i>data not available</i>	<i>data not available</i>	<i>data not available</i>	465.0000	412.7123	-11%
Employee Commuting ₉	<i>data not available</i>	<i>data not available</i>	<i>data not available</i>	16.1100	13.1653	-18%
Business Travel	1,725.8553	493.0863	0.0000	1,290.9753	2,122.9923	+ 64%
Internal Staff Convenings	817.6469	309.6826	0.0000	947.4461	901.9040	-5%
Air	762.4984	288.1272	0.0000	827.9357	763.5218	-8%
Hotel	55.1485	21.5553	0.0000	119.5104	138.3822	+ 16%
Community Convenings	536.6478	98.4796	0.0000	227.6829	1,077.0613	+ 373%
Air	489.0362	80.3018	0.0000	192.8363	960.9963	+ 398%
Hotel	47.6116	18.1778	0.0000	34.8467	116.0650	+ 233%
Miscellaneous Business Travel₇	371.5606	84.9241	0.0000	115.8462	144.0270	+ 24%
Air	350.2828	74.5557	0.0000	109.9277	136.9835	+ 25%
Hotel	21.2778	10.3684	0.0000	5.9186	7.0435	+ 19%
Total Emissions (tCO₂-eq)	2,433.34₈	1,169.44	1,090.38	2,931.23	3,946.01	+ 35%

Notes

1. Due to data collection limitations, we stopped accounting for emissions related to water use in 2021.
2. Our drmrs data center site went online in November 2021 and did not fully start serving Wikipedia users until April 2022.
3. Electricity consumption at our eqdfw and eqord network routers was more fully captured in 2022.
4. Beginning in 2021, electricity-related emissions for the WMF server room are included in the San Francisco Office's electricity emissions. In 2022, we also began using data directly from the Foundation's metered billing statement, rather than prorating building-wide electricity usage.
5. During the COVID-19 pandemic, select data at the San Francisco office was unavailable and estimates for 2019 were used instead. In 2021, actual data was obtained and the results were restated in the report covering calendar year 2020.
6. In 2022, we expanded our scope 3 emissions to include remote work impacts (e.g. estimated home energy use & commuting to alternative workspaces).
7. Miscellaneous business travel was not tracked separately until 2019. In 2018, it was included under community convenings (previously "non-telecommuting").
8. While reviewing our emissions data for the 2021 report, we discovered a calculation error - 2019 emissions have been correctly restated here.
9. In a 2023 report, a correction was made to 2022 employee commuting, which slightly decreased total emissions in that year.

Emissions by Scope

Emissions (tCO2-eq)	2019	2020	2021	2022	2023	% Change (YoY)
Scope 1	2.18	0.47	0.47	0.63	0.66	+ 4%
Natural Gas	2.18	0.47	0.47	0.63	0.66	+ 4%
Scope 2	86.44	57.23	15.73	16.26	18.97	+ 17%
Electricity - San Francisco Office ₁	66.99	48.14	2.31	3.25	3.12	-4%
Steam - San Francisco Office	19.45	9.09	13.42	13.01	15.86	+ 22%
Scope 3	2,344.72	1,111.74	1,074.18	2,914.35	3,926.38	+ 35%
Electricity - Data Center - eqiad	163.44	159.87	589.13	652.14	718.42	+ 10%
Electricity - Data Center - codfw	389.59	437.32	408.92	418.92	550.51	+ 31%
Electricity - Data Center - esams	0.00	0.00	35.50	25.79	34.03	+ 32%
Electricity - Data Center - eqsin	7.59	7.66	27.25	23.24	44.00	+ 89%
Electricity - Data Center - ulsfo	6.06	0.00	10.50	16.13	25.04	+ 55%
Electricity - Data Center - drrms	<i>not online</i>	<i>not online</i>	0.06	2.78	2.71	-3%
Electricity - Data Center - eqord	0.19	0.18	0.47	0.87	1.04	+ 19%
Electricity - Data Center - eqdfw	0.15	0.14	0.44	0.80	0.79	-1%
Electricity - Data Center - knams	0.00	0.00	0.44	0.67	<i>merged with esams</i>	
Remote Employee Home Energy Use ₃	<i>data not available</i>	<i>data not available</i>	<i>data not available</i>	465.00	412.71	-11%
Waste	2.38	0.61	1.26	0.81	0.89	+ 10%
Water Management ₄	4.12	3.87	0.21	0.11	0.08	-27%
Business Travel - Air	1,601.82	442.98	0.00	1,130.70	1,861.50	+ 65%
Business Travel - Hotel	124.04	50.10	0.00	160.28	261.49	+ 63%
Employee Commuting to Office	45.35	9.01	0.00	0.00	0.00	
Employee Commuting to Alternative Workspace ₆	<i>data not available</i>	<i>data not available</i>	<i>data not available</i>	16.11	13.17	-18%
Total Emissions (tCO2-eq)	2,433.34₅	1,169.44	1,090.38	2,931.24	3,946.01	+ 35%

Notes

1. In our 2021 report, we began using data directly from the Foundation's metered billing statement, rather than prorating building-wide electricity usage, which led to a large decrease in these calculated emissions.
2. Because the electricity consumed at our collocated data center sites is purchased by our data center vendors directly (and therefore included in their scope 2 emissions), data center electricity emissions were moved from our scope 2 to scope 3 category in our 2021 report. Electricity-specific emissions data for each of our data centers is not available for 2018, as
3. In 2022, we expanded our scope 3 emissions to include remote worker impacts (e.g. home energy use & commuting to alternative workspaces).
4. Due to data collection limitations, we stopped accounting for emissions related to data center water use in 2021. From 2021 onward, water management emissions include water used at our San Francisco office space only.
5. While reviewing our emissions data for the 2021 report, we discovered a calculation error - 2019 emissions have been correctly restated here.
6. In our 2023 report, a correction was made to 2022 employee commuting, which slightly decreased total emissions in that year.

Activity Data

Activity Data	Unit	2019	2020	2021	2022	2023	% Change (YoY)
Energy							
Total Electricity Consumption	kWh	3,294,359	3,212,519	3,154,197	3,710,680	4,317,817	+ 16%
Data Center - eqiad	kWh	1,636,018	1,741,488	1,912,500	2,295,476	2,463,300	+ 7%
Data Center - codfw	kWh	1,220,794	1,096,052	1,033,530	1,123,770	1,485,160	+ 32%
Data Center - esams	kWh	76,738	79,786	86,591	91,140	107,338	+ 18%
Data Center - eqsin	kWh	45,867	47,830	55,272	62,472	90,160	+ 44%
Data Center - ulsfo ₁	kWh	32,377	34,634	50,876	69,006	103,475	+ 50%
Data Center - drmrs	kWh	<i>not online</i>	<i>not online</i>	1,079	48,490	51,054	+ 5%
Data Center - eqord	kWh	1,226	1,226	971	1,926	2,312	+ 20%
Data Center - eqdfw	kWh	1,226	1,226	1,120	2,141	2,141	-0%
Data Center - knams	kWh	972.4	972	1,066	2,373	<i>merged with esams</i>	
WMF Server Room	kWh	24,264	24,264	<i>data not available</i>	<i>data not available</i>	<i>data not available</i>	
San Francisco Office ₂	kWh	254,877	185,041	11,192	13,887	12,878	-7%
Remote Work ₃		<i>data not available</i>	<i>data not available</i>	<i>data not available</i>	<i>data not available</i>	<i>data not available</i>	
Total Stationary Combustion	mmBtu	337	146	211	208	251.19	+ 21%
San Francisco Office - Natural Gas	mmBtu	43.68	9.42	8.76	11.77	12.37	+ 5%
San Francisco Office - Steam	mmBtu	292.89	136.85	202.14	195.96	238.83	+ 22%
Water₄							
Municipal Water Use	m3	3,921	3,675	198	266	213	-20%
Wastewater Treatment	m3	3,921	3,675	198	266	213	-20%
Waste							
Total Waste Generated	t	14.32	5.05	5.10	5.96	5.98	+ 0%
Landfill	t	3.77	1.21	1.57	1.59	1.61	+ 1%
Recycled	t	4.95	1.74	1.28	2.01	1.53	-24%
Compost	t	5.40	2.05	2.16	2.34	2.84	+ 21%
eWaste	t	0.20	0.05	0.09	0.01	0.0	
Business Travel							
Air Travel	km	16,165,236	4,484,151	0	10,470,203	17,253,279	+ 65%
Hotel stays	nights	8,145	2,592	0	5,063	7,514	+ 48%
Commuting to San Francisco Office₅	km	575,651	114,098	0	0	0	
Commuting to Alternative Workspace₆	km	<i>data not available</i>	<i>data not available</i>	<i>data not available</i>	201,867	182,844	-9%

Notes

1. The ulsfo data center electricity consumption for the years 2018-2020 was calculated using a PUE of 1.12. In 2022, Digital Realty provided a site-specific PUE of 1.58, which led to a significant increase in calculated electricity consumption in 2021.
2. Beginning in 2021, electricity usage for the WMF Server Room is included in the San Francisco Office's electricity consumption. In 2022, we also began using data directly from the Foundation's metered billing statement, rather than prorating building-wide electricity usage, which led to a large decrease in these calculated emissions.
3. Energy consumption data from remote work was not collected; we instead used per person emission factors published in 2022 by DEFRA. We will explore the feasibility of collecting this data for future reports.
4. Due to data collection limitations, we stopped accounting for emissions related to data center water use in 2021. From 2021, water management emissions include water used at our San Francisco Office space only.
5. Office-related commuting emissions were negligible 2021-2023 and have been omitted from our calculations due to their relative insignificance.
6. In our 2023 report, a correction was made to 2022 passenger kilometers.