FY 2020 Sustainability Report and Greenhouse Gas Inventory

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FY 2020 Sustainability Report and Greenhouse Gas Inventory

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ABOUT THIS REPORT

This report provides an overview of Environmental Defense Fund's efforts to improve organizational sustainability, and it details EDF's greenhouse gas (GHG) emissions in fiscal year (FY) 2020 (October 1, 2019 – September 30, 2020). Researchers around the world continually review and improve emissions factors and best practices for calculating environmental impacts. There are also several different approaches for calculating emissions. Identifying the "best" approach to use depends on the data that are available, simplifying assumptions that must be made and other factors. This report uses emissions factors and methodologies that are most appropriate for EDF's organizational context, and therefore, it should not be viewed as a recommendation of best or only practice.

ENVIRONMENTAL DEFENSE FUND

Environmental Defense Fund is dedicated to protecting the environmental rights of all people, including the right to clean air, clean water, healthy food and flourishing ecosystems. Guided by science, we work to create practical solutions that win lasting political, economic and social support because they are nonpartisan, cost-effective and fair.

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Executive Summary

Environmental Defense Fund (EDF) is dedicated to protecting the environmental rights of all people, including the right to clean air and water, healthy food and flourishing ecosystems.

In 2020, we won major victories on a wide range of issues that benefited the environment and communities around the world. A few of our top achievements include setting the stage for the widespread adoption of zero-emission heavy-duty vehicles in the U.S.; developing tools for water management in California; increasing the sustainability and resilience of American, Caribbean and Indonesian fisheries; mapping air pollution in the U.S., the U.K. and China; pushing influential companies to remove harmful chemicals from personal care products; and designing a satellite that can detect methane leaks from global oil and gas infrastructure.

The COVID-19 pandemic affected nearly every aspect of EDF's operations in fiscal year (FY) 2020. Most of our offices closed in mid-March 2020, and staff travel was severely restricted. Our greenhouse gas (GHG) emissions reflected these changes: compared to our previous emissions inventory, which was for calendar year (CY) 2019, office energy emissions fell by about 15% and travel emissions decreased more than 50% in FY 2020. While office energy and travel-related emissions decreased, emissions related to mailings to current and prospective members increased slightly. In FY 2020, our total GHG emissions were 15% below those of CY 2019 on a 100-year time horizon, and 20% lower on a 20-year time horizon. Paper-related emissions made up more than two-thirds of total emissions.

In late 2020, members of the EDF Sustainability Council began analyzing lessons learned from travel restrictions and office closures, with the goal of better understanding how we can minimize post-pandemic travel and maximize sustainability in our leased office spaces. Moving forward we will continue to produce publicly available sustainability reports and GHG emissions inventories describing our progress. Each year we will strive to reduce our emissions, improve the quality of our data, identify and adopt the best available methodologies, purchase high-quality carbon credits and work with other organizations to share best practices.

Introduction

2020 was an extraordinary year, shaped by a global pandemic that altered nearly every aspect of EDF's operations. EDF's Beijing office closed shortly after COVID-19 emerged in China. Starting on March 16, all EDF employees were required to work from home and refrain from business travel. The Beijing office reopened in March 2020, but all other EDF offices remain closed at the time of publication.

Despite these restrictions and the many challenges brought on by a horrific global pandemic, EDF's staff members — now based in dozens of countries, given our increasingly global focus — continued working toward ambitious environmental goals. Our **accomplishments in 2020** included helping achieve climate action at the local, state, corporate and international levels. We worked to prevent the Trump administration from permanently damaging America's bedrock environmental safeguards, and we laid the legal groundwork that would enable the Biden administration to restore strong protections. We persuaded 15 U.S. states, which together represent about one-third of the American truck market, to commit to ensuring that 30% of medium- and heavy-duty trucks and buses sold in their jurisdictions are zero-emission vehicles by 2030. We helped prepare China to launch the world's largest carbon market, and we partnered with researchers, practitioners and communities to develop technologies that will equip farmers, fishing communities and health officials with the information needed to foster sustainable water use, manage fisheries sustainably and understand air pollution at unprecedented resolution.

As part of an organization-wide effort to improve post-pandemic operations, EDF's Sustainability Council (SC) formed a task force to develop recommendations on how to adjust policies, procedures and behaviors to reduce GHG emissions from post-pandemic business travel. SC members also served on an EDF task force to assess our office spaces and develop recommendations for increasing efficiency, flexibility, staff well-being and cost-savings in the workplace. Over the past year, the SC also worked to educate and engage staff on sustainability issues and initiatives. Finally, as it has done since 2007, the SC developed a comprehensive FY 2020 GHG emissions inventory, described in detail below.

Overview of Methods

The inventory includes emissions from staff travel, office energy use and paper use, and it covers only those facilities and activities over which EDF has operational control. Following the **GHG Protocol**, the inventory includes emissions from the following scopes:

- Scope 1: Direct GHG emissions from stationary combustion of natural gas.
- Scope 2: Indirect GHG emissions resulting from the consumption of electricity and steam.
- Scope 3: Indirect GHG emissions resulting from copy paper, membership mailings, business travel and staff commutes.

We collected activity data for Scope 1 and Scope 2 emissions from property managers and energy providers. For Scope 3 emissions, we gathered activity data from EDF's corporate travel provider, surveys of staff and trustees, mileage reimbursement records, print management software and internal purchase records. We used methodologies and emissions factors (i.e., the coefficients that convert activity data into GHG emissions) from the **GHG Protocol**, the **United States Environmental Protection Agency (EPA)**, the **United Kingdom Department for Environment, Food and Rural Affairs (DEFRA)**, the **Intergovernmental Panel on Climate Change (IPCC)**, the **Environmental Paper Network**, **Enerdata**, **Mexico's Registro Nacional de Emisiones** and the **Cornell Hotel Sustainability Benchmarking Index**. Details on data sources, assumptions, emissions factors and calculation methods are available in the appendix.

For the very first time, we are reporting fiscal year (FY) emissions rather than calendar year (CY) emissions to align sustainability planning and reporting with other internal cycles. Because FY 2020 (October 1, 2019 – September 30, 2020) includes one quarter of CY 2019, many of the emissions reported here were also reported in the previous (CY 2019) report.

All emissions factors included carbon dioxide (CO_2) emissions, and most included methane (CH_4) and nitrous oxide (N_2O), both of which are powerful GHGs. The emissions factor for paper included non-GHG pollutants such as black carbon, nitrogen oxides, particulate matter and sulfur dioxide, which have a range of harmful effects on the environment and human health. We did not include these pollutants in the GHG inventory, but we have reported their emissions in the appendix.

It is important to note that there are different ways to calculate emissions. Identifying the "best" approach depends on the data that are available and other factors. This report uses emissions factors and methodologies that were most appropriate for EDF's organizational context in FY 2020. We are committed to continually reviewing and improving our approach, and therefore, it may change in the future.

We calculated emissions using a Global Warming Potential (GWP) with a 20-year time horizon (GWP-20) and a GWP with a 100-year time horizon (GWP-100). GWP is a measure

of how much energy a pulse of emissions of a gas will trap over a given time period, relative to the same amount of emissions of CO_2. By using GWP-20 and GWP-100 as multiplying factors, we can convert non-CO_2 emissions to CO_2 equivalent (CO_2e). This provides a common unit of measure, and it allows comparisons of the global warming impacts of different gases over a select timescale. The larger the GWP, the more that a given gas warms the Earth compared to CO_2 over that time period.

The GWP-100 is based on the energy trapped by a gas (or mix of gases) over the following 100 years after emission and can be considered a proxy for the long-term climate impact of the emissions. GWP-20 is based on the energy trapped over the following 20 years after emission and can be considered a proxy for the near-term climate impact of the emissions. For gases with short atmospheric lifetimes, such as CH_4, GWP-20 will elevate their impact compared to CO_2 because it captures the period when the gas traps the most heat and omits impacts after 20 years, when CO_2 is still trapping heat but the other gas is not. Conversely, when non-CO_2 emissions are negligible, CO_2e calculated from GWP-20 and GWP-100 will be similar regardless of the time horizon because it is essentially all CO_2. It is best practice to report GHG emissions over both timescales (20 and 100 years) because the two combined convey climate impacts in the near- and long-term.[1]

According to the emissions factors used in this report, flights and ground travel produce minimal emissions of non-CO_2 pollutants. As a result, in most cases GWP-20 emissions were identical to GWP-100 emissions for these sources. For ease of reading, we report these emissions as metric tons of carbon dioxide equivalent (tCO_2e) and note any exceptions.

Throughout this report, we use two significant figures for all calculated values. Reported totals may differ from the sum of their terms due to rounding.

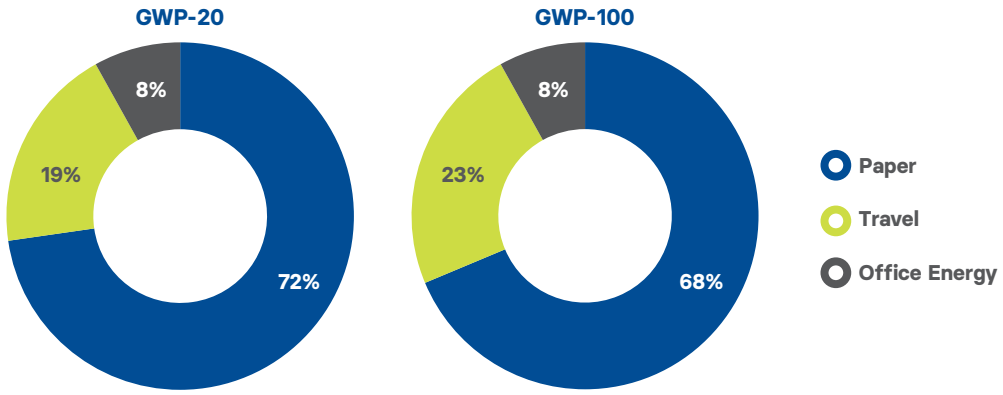
[1] Ocko, I.B. et al. 2017. Unmask temporal trade-offs in climate policy debates. *Science* 356 (6337):492-493.

Greenhouse Gas Inventory

EDF's total emissions for FY 2020 were 6,700 (GWP-20) / 5,500 (GWP-100) tCO_2e, and the emissions intensity per full-time employee (FTE) was 9.1 (GWP-20) / 7.5 (GWP-100) tCO_2e.

EDF GHG EMISSIONS FY 2020 (tCO_2e)

	GWP-20	GWP-100
Travel Total	**1,300**	**1,300**
Air	940	940
Rail	16	16
Vehicles	28	28
Hotel Stays	97	84
Employee Commutes	200	200
Office Energy Total	**550**	**460**
Electricity	330	290
Natural Gas	190	140
District Steam	31	31
Paper Use Total	**4,800**	**3,700**
Office Copy Paper	1	1
Membership Mailings	4,800	3,700
Contracted Projects	18	12
Grand Total	**6,700**	**5,500**
Full-Time Equivalent Employees (FTEs)	734	734
Emission Intensity (tCO_2e per FTE)	9.1	7.5



The vast majority of our FY 2020 GHG emissions came from Scope 3 emissions, i.e., air travel, rail travel, rental cars, hotel stays, employee commutes, office paper use, membership mailings and contracted print projects.

TOTAL EMISSIONS BY SCOPE FY 2020 (tCO_2e)

	GWP-20	GWP-100
Scope 1 Emissions: Natural Gas	190	140
Scope 2 Emissions: Electricity & Steam	360	320
Scope 3 Emissions: Travel & Paper	6,100	5,000

Business Travel

According to the emissions factors used in this report, air and ground travel produced minimal emissions of non-CO_2 pollutants. As a result, GWP-20 emissions were nearly identical to GWP-100 emissions for these sources. For ease of reading, we report these emissions as tCO_2e.

Air Travel

EDF staff and trustees flew nearly 5 million miles in FY 2020, generating 940 tCO_2e (780 tCO_2e by staff and 160 tCO_2e by trustees). This was slightly less than half of air travel emissions in CY 2019. Although air travel emissions were much smaller in FY 2020 than in past years, they still accounted for nearly 14% (GWP-20) / 17% (GWP-100) of total emissions in FY 2020.

Just over half of total miles flown were on long-haul flight segments (2,300 miles or longer). Short-haul flights (fewer than 300 miles) produce more emissions per mile flown, but these segments accounted for only 2% of total miles traveled.

PERCENTAGE OF TOTAL MILES FLOWN BY FLIGHT TYPE AND SEAT CLASS FY 2020

Flight Type	Economy	Business	First	Total
Short-haul (<300 miles)	2%	< 1%	0%	2%
Medium-haul (≥300 miles, <2300 miles)	46%	1%	< 1%	47%
Long-haul (≥2300 miles)	44%	6%	1%	51%
Total	**93%**	**6%**	**1%**	**100%**

Flying first or business class accounted for 29% of total air travel emissions. If every passenger who flew first or business class in FY 2020 had flown economy instead, total air travel emissions would have been 23% lower.

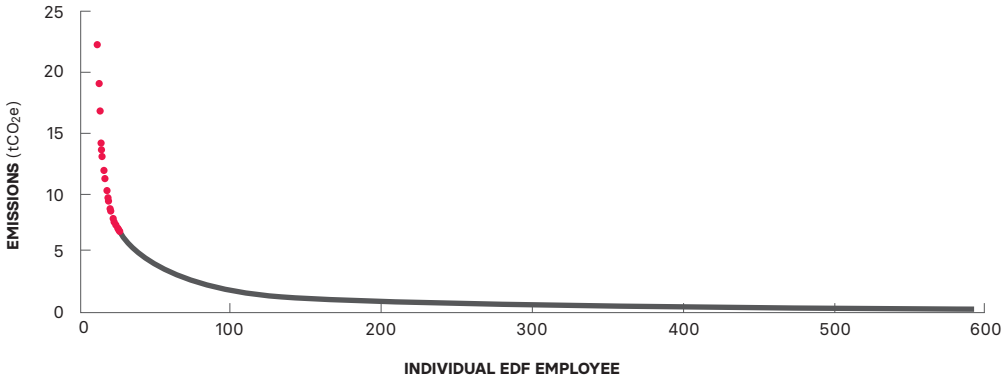
Three EDF Programs (Oceans, Climate and Energy) collectively accounted for nearly half of EDF's air travel footprint, with the Oceans Program being the top emitter.

AIR TRAVEL EMISSIONS BY PROGRAM/DEPARTMENT FY 2020

Program/Department	tCO_2e	% of Total Air Travel Emissions
Oceans	140	18%
Energy	130	16%
Climate	110	14%
Office of the Chief Scientist	62	8%
Ecosystems	59	8%
Development	46	6%
Political Affairs	44	6%
EDF+Business	43	5%
Global Strategy	38	5%
Marketing & Communications	36	5%
Executive Office	26	3%
Environmental Health	22	3%
Human Resources	16	2%
Office of the Chief Economist	7	1%
Legal & Compliance	3	<1%
IT Operations	3	<1%
Finance	2	<1%
Corporate Services	1	<1%
Internal Audit	1	<1%
Diversity	1	<1%
Grand Total	**780**	**100%**

Ten percent of travelers accounted for 40% of miles flown and 50% of corresponding emissions. Of the 587 unique airline passengers in FY 2020, the top 20 individuals (shown in red below) accounted for 28% of EDF's overall air travel emissions.

DISTRIBUTION OF AIR TRAVEL EMISSIONS PER EMPLOYEE FY 2020



Amtrak

In FY 2020, EDF staff traveled approximately 110,000 miles on Amtrak, generating 16 tCO_2e.

Car Rentals and Mileage Reimbursement

EDF employees rented vehicles for 286 days, with most of those (201) in intermediate, full, standard or premium-size cars and minivans/SUVs. This compares to 84 rental days in compact and economy cars and one rental day in hybrid cars. Car rentals generated 5 tCO_2e.

EDF staff drove approximately 64,000 miles in personal vehicles for EDF business, emitting approximately 24 tCO_2e.

Hotel Stays

EDF staff and trustees stayed 2,050 nights in hotels around the world, with 1,479 of those nights in the U.S. Emissions from hotel stays in FY 2020 were 97 (GWP-20) / 84 (GWP-100) tCO_2e.

Employee Commutes

According to a survey of EDF employees about pre-pandemic commuting, nearly one-third of staff commuted via transit rail. Fourteen percent used a zero-emission mode of transportation and, depending on the day of the week, between 15% and 32% of employees worked from home. Other modes of transportation included personal vehicles, intercity rail, buses and ferries. Employee commutes generated an estimated 200 tCO_2e in FY 2020.

Office Energy Use

EDF operated 13 offices in five countries in FY 2020. In that timeframe, energy use in our leased office spaces generated 550 (GWP-20) / 460 (GWP-100) tCO_2e. Scope 1 (natural gas), Scope 2 (electricity) and Scope 3 (steam) emissions were responsible for 35%, 60% and 6% (GWP-20) / 30%, 63%, 7% (GWP-100) of total office energy emissions, respectively.

This year, we estimated fugitive emissions (i.e., leaks) of CH_4 from the electricity and natural gas supply chains for EDF offices. This added 0.6 and 1.0 tCH_4 to emissions from electricity and natural gas use, respectively. The inclusion of fugitive CH_4, a powerful short-lived GHG, explains the difference between GWP-20 and GWP-100 emissions for electricity and natural gas.

EMISSIONS BY OFFICE ENERGY SOURCE FY 2020 (tCO_2e)

	GWP-20	GWP-100
Natural Gas	190	140
Electricity	330	290
Steam	31	31
Total Emissions	**550**	**460**

Office energy emissions varied due to differences in office features, square footage and regional emissions factors. The energy use reported for the Austin and Washington, DC offices was anomalously low; we are investigating whether there were errors in the data.

EMISSIONS BY OFFICE FY 2020

	GWP-20			GWP-100		
Office	Total tCO_2e	kg CO_2e/ Square Foot	tCO_2e/ FTE	Total tCO_2e	kg CO_2e/ Square Foot	tCO_2e/ FTE
Austin, Texas	5	0.28	0.10	4	0.25	0.091
Beijing, China	17	2.2	0.78	16	2.0	0.73
Bentonville, Arkansas	5	3.8	1.1	5	3.6	1.1
Boston, Massachusetts	38	3.7	1.4	37	3.5	1.3
Boulder, Colorado	31	5.0	1.1	28	4.4	1.0
Jakarta, Indonesia	13	5.5	1.6	12	5.0	1.5
La Paz, Mexico	2	1.5	0.30	2	1.3	0.26
London, England	2	1.4	0.16	2	1.2	0.14
New York, New York	330	5.3	1.7	260	4.2	1.3
Raleigh, North Carolina	56	4.6	2.6	51	4.2	2.4
Sacramento, California	5	1.8	0.39	3	1.3	0.28
San Francisco, California	40	1.4	0.64	29	1.0	0.46
Washington, DC	5	0.1	0.031	4	0.1	0.027

Although nearly all EDF offices were closed for more than half of FY 2020, total office energy emissions were only 17% (GWP-20) / 15% (GWP-100) lower than in CY 2019 (when reported CY 2019 emissions are updated to include upstream CH_4 leakage to allow for a side-by-side comparison). Emissions from natural gas and steam heat dropped sharply after offices closed. Some of that decrease would probably have happened even if the offices had remained fully occupied, since the closures coincided with spring warming and buildings would have required less heating.

Average monthly emissions from electricity use in our leased office spaces only fell by about a third after staff began working from home, even though all non-essential equipment and appliances were unplugged. This is mostly because building systems outside of EDF's control continued to operate. This pattern was not unusual; for instance, across the U.S., researchers observed a 12% reduction in commercial electricity consumption in the second quarter of 2020,[2] and a modest 7.3% reduction in energy consumption in commercial buildings over the full year.[3]

We did not estimate energy use in EDF employees' home offices, but it is likely that at least some of the decrease in office energy emissions reported here was offset by an increase in home office energy use and emissions. The U.S. National Bureau of Economic Research estimated that residential electricity consumption in the U.S. increased an average of 10% in the second quarter of 2020 due in part to increased working from home.[4]

Paper Use

Paper-related GHG emissions accounted for 72% (GWP-20) / 68% (GWP-100) of EDF's total emissions in FY 2020. EDF emissions from paper use generated 4,800 (GWP-20) / 3,700 (GWP-100) tCO_2e. EDF mailed 777 metric tons of paper (3% more than in CY 2019) to existing, former, and prospective members, generating nearly all paper-related emissions. The remaining emissions came from office paper use.

Nearly half of the paper used by Membership, and therefore almost half of the department's paper-related emissions, was for acquisitions. The remaining emissions came from paper used for EDF's *Solutions* newsletter and mailings for reinstatements, appeals, conversions, renewals and cultivation.

The emissions factor for paper, developed by the **Environmental Paper Network**, accounts for carbon lost during logging, fossil CO_2, CH_4 and N_2O, as well as end-of-life emissions. These emissions include enough CH_4 to drive a substantial difference between GWP-20 and GWP-100 emissions.

[2] Cicala, S. 2020. Powering work from home (No. w27937). National Bureau of Economic Research.

[3] U.S. Energy Information Administration. 2021. Annual Energy Outlook 2021.

[4] Cicala, S. 2020. Powering work from home (No. w27937). National Bureau of Economic Research.

EMISSIONS FROM PAPER USE BY CATEGORY FY 2020 (tCO_2e)

	GWP-20	GWP-100
Membership Mailings	4,800	3,700
External Print Projects	18	12
Office Copy Paper	1	1
Total Emissions	**4,800**	**3,700**

EDF uses software that requires employees to log in to a printer to release a print job. If the job is not released by the user within four hours, it is deleted. In 2020, this feature saved over 13,000 sheets of paper.

Looking Forward

EDF's organizational values of Results, Respect, Innovation, Optimism and Integrity drive us to create solutions, welcome diverse perspectives, design problem-solving tools, embrace ambitious goals and uphold a commitment to science, rigorous analysis, intellectual honesty and ethical action. We strive for our sustainability efforts to reflect these values and goals, via regular reviews of our methodology, transparent reporting of our impacts and determined efforts to reduce our operations' negative environmental impacts. In short, we want to ensure EDF is "walking the talk."

EDF will continue to produce annual, publicly available sustainability reports and GHG emissions inventories. Each year we will strive to improve the quality of our data, identify and adopt the best available methodologies and work with other organizations to share best practices in calculating environmental impacts. We will integrate sustainable practices into our day-to-day operations to reduce our negative environmental impact, increase our resilience and drive cost savings. We will continue to support private sector investments in emissions reduction projects (commonly referred to as "carbon offsets"). See our website for more information on recent projects we supported.

In FY 2021, we aim to:

- Set a science-based, organization-wide GHG reduction goal;
- Revise our policies and practices to reduce post-pandemic travel-related GHG emissions;
- Improve data collection and energy efficiency in our leased office spaces;
- Implement a centralized waste system in our New York office to increase recycling and reduce waste; and
- Investigate ways to reduce paper-related emissions while maintaining or increasing current levels of fundraising.

Appendix

GHG Emissions from Previous Years

This table shows EDF's past emissions (GWP-100), as reported in previous calendar years. We have not adjusted them using the emissions factors for FY 2020. As noted in the CY 2019 report, the sharp increases in travel- and paper-related emissions from 2018 to 2019 were due to increased air travel and a new emissions factor for calculating paper emissions (rather than a massive increase in paper use), respectively.

CY 2014-2019 GHG EMISSIONS (tCO_2e) (GWP-100)

	2014	2015	2016	2017	2018	2019
Travel Total	**1800**	**1500**	**1800**	**1600**	**1800**	**2600**
Air	1400	1100	1400	1100	1300	2000
Rail	21	18	21	22	25	27
Rental Car	48	16	16	16	14	60
Hotel Stays	120	100	120	120	89	100
Employee Commutes	230	240	250	300	420	440
Office Energy Total	**800**	**630**	**500**	**450**	**440**	**510**
Electricity	530	520	400	380	390	350
Natural Gas	170	20	20	21	12	130
District Steam	89	89	80	48	38	26
Paper Use Total	**780**	**1000**	**1300**	**1800**	**1700**	**3600**
Office Copy Paper	6	6	4	6	12	3
Membership Mailing	770	1000	1300	1800	1700	3,600
Contracted Projects	8	4	9	5	7	11
Grand Total	**3400**	**3100**	**3600**	**3900**	**4000**	**6800**
Full-Time Equivalent Employees (FTEs)	460	510	560	640	780	718
Emission Intensity (tCO_2e per FTE)	7.6	6.1	6.4	5.9	5.1	9.4

Defining Full-Time Employees

We calculated FTEs as an employee's scheduled hours divided by the number of hours for a full-time workweek. To account for new hires and departures in FY 2020, we calculated FTEs on a monthly basis and used the annual average. Reports from prior years included regular and temporary contingent staff members, so FTE numbers (and therefore emissions intensity per FTE) are not fully comparable across years.

Calculating Emissions from Travel

EDF's Travel Policy requires employees to book travel through a corporate travel provider, which is the source of much of our travel activity data. This report does not include any business-related travel that EDF staff may have arranged outside a preferred travel provider. We also surveyed EDF trustees about their travel arrangements to attend EDF board meetings. Commuting emissions were calculated using data from a survey of EDF employees about their pre-pandemic commuting habits.

Calculating Emissions from Air Travel

For trustees who did not respond to the travel survey, we estimated air travel using their city or state of residence as the point of origin.

We used emissions factors from the **U.S. EPA** for short-, medium- and long-haul flights.

EMISSIONS FACTORS BY FLIGHT TYPE FY 2020

Flight Type	$kgCO_2/Mile$
Short-haul (< 300 miles)	0.215
Medium-haul (≥ 300 miles, < 2300 miles)	0.133
Long-haul (≥ 2300 miles)	0.165

First and business class seats take up considerably more room in an aircraft than economy seating and therefore reduce the total number of passengers that can be carried. This in turn raises the average GHG emissions per passenger mile. Seat numbers were based on the U.K.'s Department for Environment, Food and Rural Affairs (DEFRA) **2020 methodology paper** for emissions factors.

EQUIVALENT NUMBER OF ECONOMY SEATS BY FLIGHT TYPE AND SEATING CLASS FY 2020

Flight Type	Cabin Seating Class	# of Economy Seats
Short-haul	Economy	1.0
	First/Business	1.5
Medium-haul	Economy	1.0
	First/Business	1.5
Long-haul	Economy	1.0
	Economy+	1.6
	Business	2.9
	First	4.0

Aviation has additional climate impacts from the radiative forcing of contrails.[5] We purchase additional carbon credits to account for this effect. We will continue to monitor this area of research.

Calculating Emissions from Rail Travel

We collected rail travel data from EDF's corporate travel provider, and we used an emissions factor of 0.058 $kgCO_2$/mile for the U.S. Northeast Corridor and 0.150 $kgCO_2$/mile for all other rail routes, as defined by the **U.S. EPA**.

Calculating Emissions from Vehicle Travel

For miles driven in personal vehicles for business purposes, we used data from EDF's expense reimbursement records. In the absence of actual data on miles driven in rental vehicles, we assumed that rental cars were driven an average of 36.92 miles per day, based on the **U.S. Department of Transportation Federal Highway Administration** estimate that the average American's annual mileage is 13,476 per year. We used emissions factors from the **U.S. EPA**.

Calculating Emissions from Hotel Stays

We collected data from EDF's corporate travel provider as well as a survey of EDF trustees regarding their travel arrangements for attending EDF board meetings. For trustees who did not respond to the survey, we assumed that they stayed two nights in a hotel at the board meeting location. We used country- and (where available) city-specific emissions factors from the **Cornell Hotel Sustainability Benchmarking Index**.

Despite a ban on travel for over half of FY 2020, total emissions from hotel stays did not drop significantly compared to CY 2019. This was due to having more comprehensive data and using updated emissions factors. The FY 2020 inventory includes hotel stays by staff in our Beijing and Jakarta offices, which were unavailable in previous inventories; in addition, the new emissions factors for hotels in China are higher than average.

[5] Lee, D.S. et al. 2009. Aviation and global climate change in the 21st century. *Atmospheric Environment* 43: 3520-3537, https://doi.org/10.1016/j.atmosenv.2009.04.024

The global food system produces significant GHG emissions, but we have not included such emissions in our inventories thus far. We are investigating the best way to account for food-related emissions from hotel stays, conferences and events.

Calculating Emissions from Employee Commutes

We conducted an anonymous staff survey in April 2020 to gather data about pre-pandemic commuting, including but not limited to modes of transportation, distance traveled and commuting frequency. The survey received a 62% response rate, with proportional representation of offices and programs. We assumed the survey responses were representative of all staff, and that employees commuted for 22 weeks in FY 2020. We used emissions factors defined by the **U.S. EPA**.

EMISSIONS FACTORS BY TRANSPORTATION TYPE FY 2020

Transportation Type	$kgCO_2/Mile$
Car - Driving alone	0.335
Carpool	0.115
Ferry	0.030
Intercity/commuter rail	0.15
Transit rail	0.009
Bus	0.053

Calculating Emissions from Office Energy Use

We collected data from property managers and energy providers, and we used emissions factors from the following sources:

- For Austin, Bentonville (electricity), Boston (electricity), Boulder, New York, Raleigh, Sacramento, San Francisco (electricity) and Washington, DC we used conversion factors from the **U.S. EPA's eGRID output rates**.
- For Beijing and natural gas for Bentonville, New York and San Francisco, we used emissions factors from WRI's **GHG protocol** and the **IPCC**.
- For Boston (district steam), we used emissions factors from the **U.S. EPA.**
- For Jakarta, we used conversion factors from **Enerdata**.
- For La Paz, we used emissions factors from **Registro Nacional de Emisiones**.
- For London, we used emissions factors from **DEFRA**.

Office energy emissions include CO_2, CH_4 and N_2O. The emissions of non-CO_2 gases from direct electricity generation are minimal. However, CH_4 leaks in the natural gas supply chain have additional climate impacts.

To calculate fugitive CH_4 emissions from the electricity supply chain, we used state-specific upstream leak rates of delivered gas.[6] For international offices, we assumed a leak

[6] Burns, D. and E. Grubert. 2021. Attribution of production-stage methane emissions to assess spatial variability in the climate intensity of US natural gas consumption. *Environmental Research Letters* 16 (4): 044059. DOI: 10.1088/1748-9326/abef33

rate of 2.9%.[7] We also included state-specif i c heat content of consumed natural gas (**U.S. Energy Information Administration**) and the fraction of electricity generation by fuel (**U.S. EPA eGRID**). We assumed a power plant ef f i ciency of 7,732 BTU/kwh (**U.S. Energy Information Administration**).

To calculate fugitive CH_4 emissions from the natural gas supply chain, we assumed a leak rate of 2.9%[8] and used state-specif i c heat content of consumed natural gas (**U.S. Energy Information Administration**).

EMISSIONS FACTORS BY OFFICE AND USE TYPE FY 2020

Office	Use Type	Emissions Factor ($kgCO_2$/unit, GWP-100)	Unit
Austin, TX	Electricity	0.394	kWh
Beijing, China	Electricity	1.019	kWh
Bentonville, AR	Electricity	0.440	kWh
Boston, MA	Natural Gas	5.917	therm
	Electricity	0.222	kWh
	District Steam	6.633	therm
Boulder, CO	Electricity	0.564	kWh
Jakarta, Indonesia	Electricity	0.761 (CO_2e)	kWh
La Paz, Mexico	Electricity	0.505	kWh
London, England	Electricity	0.231	kWh
New York, NY	Electricity	0.251	kWh
	Natural Gas	5.917	therm
Raleigh, NC	Electricity	0.306	kWh
Sacramento, CA	Electricity	0.206	kWh
San Francisco, CA	Electricity	0.206	kWh
	Natural Gas	5.917	therm
Washington, DC	Electricity	0.315	kWh

Four offices had missing or anomalous energy data.

- London: This office relocated to a sub-metered space in May 2020. For the seven months without data, we assumed that electricity use had changed proportionally with that of the NY office.
- New York City: Building management in the NY office does not provide natural gas usage data per tenant or floor. We assumed our use was a percentage of the building's total use, based on square footage.
- Raleigh: This office is not sub-metered. We estimated our energy use as a percentage of the building's total use, based on square footage.
- Washington, DC: This office's reported energy usage was abnormally low. It is now sub-metered and we will have monthly readings for much of FY 2021.

[7] Alvarez, R. et al. 2018. Assessment of methane emissions from the US oil and gas supply chain. *Science* 361 (6398): 186-188.

[8] Ibid.

Calculating Emissions from Paper Use

EDF's Development Department tracks the weight of membership mailings and contracted projects. EDF offices in the U.S. track paper use with PaperCut print management software. We used purchase records to estimate paper usage in the London office. Due to a lack of data on paper use, this report does not include emissions from office paper used in Beijing, Jakarta or La Paz. This is a data gap we will work to fill in future reports.

U.S. offices use TreeZero paper. According to **TreeZero**, the production and distribution of their sugarcane waste-based paper generates 1 tCO_2 per ton of paper. The price of TreeZero paper includes the cost of carbon credit purchases, but we included the emissions in this inventory and purchased carbon credits for those emissions.

For external printing and membership mailings, we used emissions factors from the Environmental Paper Network Paper Calculator Version 4.0, except for CH_4, where we used a GWP-20 of 84, not the Paper Calculator's default of 102.[9] For more information visit **www.papercalculator.org**. The conversions were 4.04 tCO_2e (GWP-20) / 2.62 tCO_2e (GWP-100) per ton of paper with 100% recycled content and 6.18 tCO_2e (GWP-20) / 4.79 tCO_2e (GWP-100) per ton of paper with 30% recycled content. This calculation does not include emissions from shipping the materials from printers to recipients. The SC hopes to calculate these emissions in future inventories.

Emissions of Other Pollutants

GHG emissions from travel, office energy, and paper included CO_2, CH_4, and N_2O. The emissions factors for paper and office energy also included other pollutants that have a range of deleterious effects on human health and the environment. Most of these pollutants have atmospheric lifetimes on the order of hours to weeks, so including them in calculations of our overall climate impacts over decades-long time horizons is inappropriate. We report them separately here. We are considering how to mitigate the impact of such emissions in the future.

OTHER POLLUTANT EMISSIONS FROM PAPER FY 2020

	Mg (t)	tCO_2e (GWP-20)	tCO_2e (GWP-100)
Black carbon	0.3	1,000	270
Nitrogen oxides (NO_x)	2.8	340	-30
Organic carbon	1.6	-200	-110
Particulate matter (PM)	0.1	370	0
Sulfur dioxide (SO_2)	3.1	-860	-130
Sulfur hexafluoride (SF_6)	0.0001	1	1

GWPs are highly uncertain for aerosols. See section 3.6.2.1 of the Paper Calculator's methodology for the sources of the GWP-20 values used to calculate tCO_2e for paper.

[9] Myhre, G. et al. 2013. Anthropogenic and Natural Radiative Forcing. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, et al. (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

OTHER POLLUTANT EMISSIONS FROM OFFICE ENERGY USE FY 2020

	Mg (t)	tCO_2e (GWP-20)	tCO_2e (GWP-100)
Nitrogen oxides (NO_x)	0.16	15	-1
Sulfur dioxide (SO_2)	0.05	-10	-1

We used the same GWP values as in the Paper Calculator. For SO_2 (GWP-20): Collins, et al. 2013. Global and regional temperature-change potentials for near-term climate forcers. *Atmos. Chem. Phys.* 13: 2471-2485. For NO_x (GWP-20): Collins, et al. 2010. How vegetation impacts affect climate metrics for ozone precursors. *J. Geophys. Res. Atmos.* 115 (D23). For SO_2 and NO_x (GWP-100): Fuglestvedt, et al. 2010. Transport impacts on atmosphere and climate: Metrics. *Atmos. Environ.* 44: 4648–4677.