EDF Greenhouse Gas Emissions Inventory 2018

Office of the Chief Scientist
Corporate Services

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Sustainability Efforts at EDF

EDF consists of more than 700 scientists, economists and other professionals. We are inspired by working together with experts and partners from many fields to tackle tough environmental challenges. And we focus on results. We envision our business operations as a model for others by taking specific, measurable actions to achieve broader results that reflect our mission.

In 2018, EDF renewed its focus on its own organizational sustainability. We now have a full-time staff member in Corporate Services focused on sustainability, and organizational efficiency and cost reduction. In 2019, we relaunched our staff Sustainability Council to engage and mobilize EDF staff and leadership to advance internal sustainability initiatives that further our mission.

The Sustainability Council's seven volunteer working groups aim to measure and mitigate EDF's environmental impacts – including but not limited to greenhouse gas emissions – in our travel, paper usage, building operations and office practices. This report was produced prior to the launch of the Council. The Sustainability Council's Greenhouse Gas and Measurements Working Group will produce all future emissions inventories.

Summary

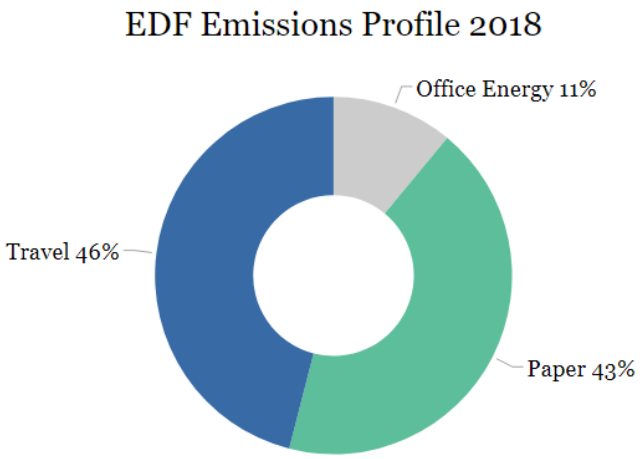
This is our twelfth greenhouse gas (GHG) emissions inventory report. It includes emissions from staff travel, office energy, and paper.

From 2017 to 2018, EDF's total annual emissions increased 2.6%, from 3900 metric tons of carbon dioxide equivalent ($MtCO_2e$)[1] to 4000 $MtCO_2e$. Because the number of full-time employees (FTEs) increased almost 22% from 2017 to 2018, the emissions intensity per FTE decreased from 5.9 $MtCO_2e$ to 5.1 $MtCO_2e$. Approximately 46%, 11% and 43% of EDF's 2018 emissions were from travel, office energy and paper, respectively.

EDF GHG Emissions ($MtCO_2e$)					
	2014	**2015**	**2016**	**2017**	**2018**
Travel Total	**1800**	**1500**	**1800**	**1600**	**1800**
Air	1400	1100	1400	1100	1300
Rail	21	18	21	22	25
Rental Car	48	16	16	16	14
Hotel Stays	120	100	120	120	89
Employee Commutes	230	240	250	300	420
Office Energy Total	**800**	**630**	**500**	**450**	**440**
Electricity	530	520	400	380	390
Natural Gas	170	20	20	21	12
District Steam	89	89	80	48	38
Oil	-	-	-	-	-
Paper Use Total	**780**	**1000**	**1300**	**1800**	**1700**
Office Copy Paper	6	6	4	6	12
Membership Mailing	770	1000	1300	1800	1700
Contracted Projects	8	4	9	5	7
Grand Total ($MtCO_2e$)	**3400**	**3100**	**3600**	**3900**	**4000**
Full-Time Employees (FTEs)	460	510	560	640	780
Emission Intensity $MtCO_2e$ per FTE	7.6	6.1	6.4	5.9	5.1

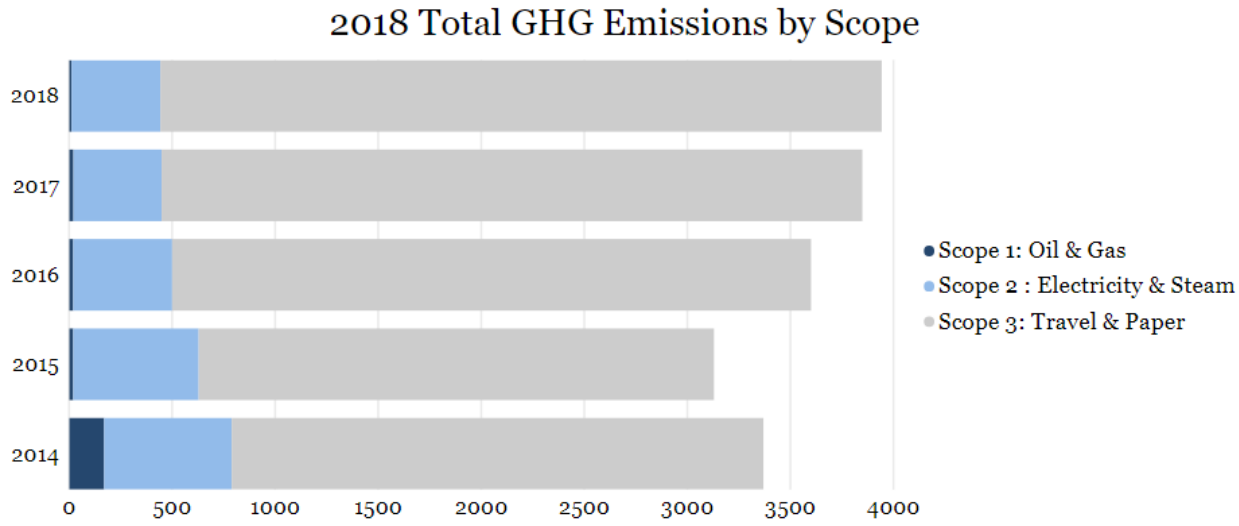
Throughout this report, we use two significant figures for all calculated values in 2018. Reported totals may differ from the sum of their terms due to rounding.

[1] The metric carbon dioxide equivalence with a 100-year time horizon (CO_2e-100) is used for emissions estimates when non-CO_2 pollutants are included in addition to CO_2. For short-hand purposes we use the abbreviation CO_2e. Non-CO_2 emissions in this report are mostly methane emissions from natural gas use. The emissions factors we employ for natural gas are provided by our source using a Global Warming Potential (GWP) of 28 for methane, which is from the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (2013). This represents the relative potency of methane as an agent of climate change compared to CO_2 over the following 100 years. We note that this undervalues methane's potency in the near-term (methane's GWP is 84 for a 20-year time horizon), and that alternatively using a GWP-20/CO_2e-20 would undervalue CO_2's potency in the long-term. Given that the majority of emissions reported here are CO_2, a 100-year time horizon is reasonable for this assessment.



Scope 3 emissions account for approximately 88% of our emissions profile in 2018 and include air travel, rail travel, rental car, hotel stays, employee commutes, office copy paper, membership mailings and contracted print projects.

Total Emissions by Scope, 2014-2018 ($MtCO_2e$)					
	2014	**2015**	**2016**	**2017**	**2018**
Scope 1 Emissions: Oil & Gas	170	20	20	21	12
Scope 2 Emissions: Electricity & Steam	620	610	480	430	430
Scope 3 Emissions: Travel & Paper	2600	2500	3100	3400	3500



We describe recommendations for improving future greenhouse gas inventories in the final section of this report, and we provide further details in the appendix about the data, emissions factors, estimates, assumptions and uncertainties used in this inventory, as well as errors found in previous reports.

Employee Travel

The following section details emissions from air travel, Amtrak, rental cars, hotel stays, and employee commutes.

Air Travel

Air travel is consistently one of the largest components of EDF's carbon footprint, accounting for nearly 32% of total emissions in 2018. Travel emissions increased from 1100 $MtCO_2$ in 2017 to 1300 $MtCO_2$ in 2018, primarily due to increased emission factors.

Approximately 50% of the miles traveled were on long-haul flight segments (2,300 miles or longer). Short-haul flights (fewer than 300 miles) have higher emission rates, however these segments account for only 3% of travel emissions.

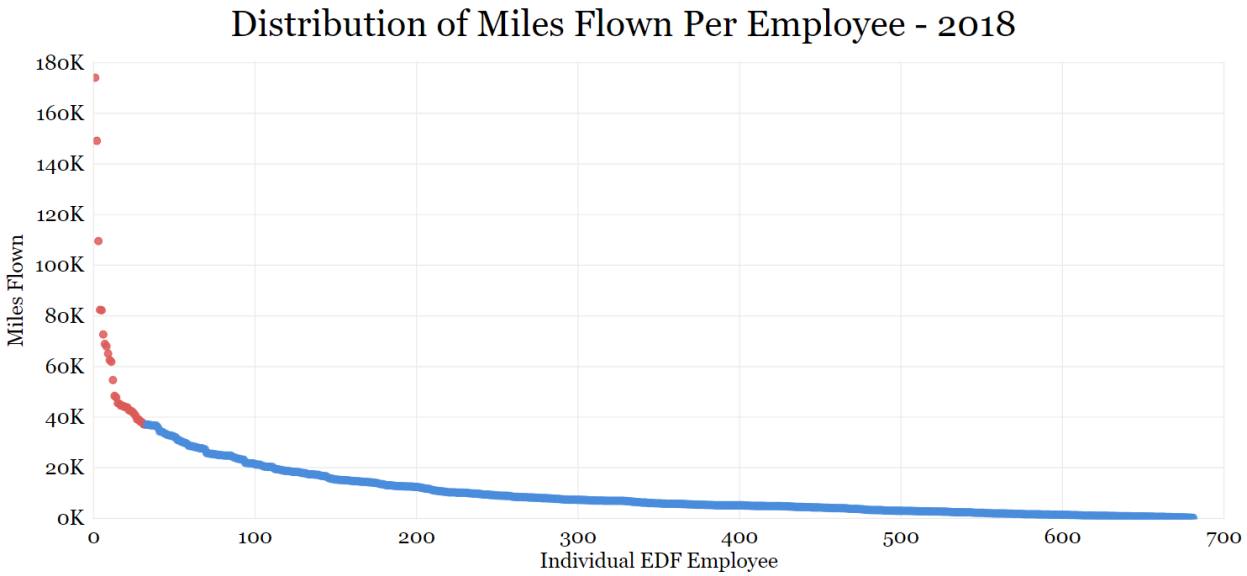
Percent of Total Miles Flown by Flight Segment and Seat Class, 2018				
Flight Type	**Economy**	**Business**	**First**	**Total**
Short-haul (<300 miles)	3%	< 1%	< 1%	3%
Medium-haul (≥300 miles, <2300 miles)	47%	< 1%	< 1%	47%
Long-haul (≥2300 miles)	44%	5%	1%	50%
Total	**94%**	**5%**	**1%**	**100%**

Flying first or business class accounted for 17% of total air travel emissions. If every employee who flew first or business class in 2018 had flown economy instead, our total air travel emissions would have been 1100 $MtCO_2$, or 15% lower.

The Oceans, Climate and Energy and Ecosystems programs collectively accounted for 58% of EDF's air travel footprint, with Oceans being the top emitter.

Program/Department	$MtCO_2$	% of Total Air Travel Emissions	% of Program's Air Travel Emissions from First and Business Class
Oceans	310	24%	39%
Climate and Energy	290	23%	3%
Ecosystems	150	12%	0%
EDF+Biz	110	9%	5%
Development	110	9%	6%
Executive Office	77	6%	62%
Office of the Chief Scientist	46	4%	0%
Political Affairs	36	3%	1%
Human Resources	32	3%	57%
MarComm	25	2%	0%
Office of the Chief Economist	23	2%	39%
Health	19	2%	1%
Global Operations	11	1%	0%
Corporate Services	11	1%	23%
Finance	6.9	1%	0%
IT	6.6	1%	0%
Unknown	6.5	1%	25%
Diversity	3.9	< 1%	0%
Grand Total	**1300**	**100%**	

Looking at the distribution of air travel in 2018 per individual, the top 15% of travelers accounted for 51% of miles flown and 56% of corresponding emissions. The following chart illustrates this distribution, showing the total miles traveled in 2018 by each passenger. Of the 681 distinct passengers, the top 32 individuals (shown in red) accounted for 25% of EDF's overall air travel emissions.



Amtrak

Emissions from approximately 180,000 miles of Amtrak rail travel accounted for 25 MtCO2 (~0.6%) of EDF's total GHG emissions in 2018.

Car Rentals

In 2018, car rental emissions were 14 $MtCO_2$. The total number of rental days dropped from 1,086 rental days in 2017 to 956 rental days in 2018. The majority of those days (602) were spent in intermediate, full, standard, premium-size cars and minivan/SUVs. This compares to 326 rental days spent in compact and economy cars and 28 rental days in hybrid cars. There is a clear opportunity to reduce emissions from rental car use, by choosing more efficient vehicles.

Hotel Stays

Emissions from staff hotel stays in 2018 were 89 $MtCO_2$, a 25 percent decrease from 2017. EDF staff stayed 3,176 nights in hotels throughout the world with the majority of those nights (2,833) spent in the US.

Employee Commutes

We did not collect EDF commuter data in 2018; therefore, this report gives an estimate based on earlier staff surveys of how employees get to work, as well as updated emissions factors for different modes of transportation (see Appendix). The estimated total emissions for 2018 were 420 $MtCO_2$ and 0.54 $MtCO_2$ per capita.

Office Energy

EDF offices are powered by electricity, natural gas and district steam. In 2018, EDF office energy use was responsible for 440 $MtCO_2e$, a 2% reduction from 2017. Of these emissions, 3% came from scope 1 emissions (natural gas) and 97% from scope 2 emissions (88% from electricity and 9% from steam).

Emissions by Office Energy Source, 2014-2018 ($MtCO_2e$)					
	2014	**2015**	**2016**	**2017**	**2018**
Electricity	530	520	400	380	390
Natural Gas	170	20	19	21	12
Steam	89	89	80	48	39
Fuel oil	0	0	0	0	0
Total Emissions	**790**	**630**	**500**	**450**	**440**
% Change from previous year		**-20%**	**-21%**	**-10%**	**-2%**

EDF office energy emissions varied widely depending on office square footage, emissions factors and data availability. See the appendix for more details on the calculations behind the following table, including the anomalously low numbers for the Washington, DC office.

2018 Emissions by Office			
Office	**Total Emissions ($MtCO_2e$)**	**Emissions Per Square Foot (kg CO_2e/sf)**	**Emissions Per Capita ($MtCO_2e$/FTE)**
Austin	39	2.4	0.72
Bentonville	1	0.9	0.61
Boston	47	4.4	2.1
Boulder	28	5.0	1.6
Beijing	17	2.1	0.58
La Paz, Mexico	5	2.3	0.65
New York	200	4.0	1.0
Raleigh	75	6.4	3.2
Sacramento	3	1.2	0.22
San Francisco	23	1.0	0.28
Washington, DC	4	0.98	0.02
London, UK	3	1.6	0.36

Paper Use

Paper-related emissions decreased from 47% to 43% of total emissions in 2018. The Membership Department's paper use (in the form of mailings to existing, former, and prospective members) accounted for approximately 99% of paper emissions.

Emissions from Paper Use by Category, 2014-2018 (MtCO2e)					
	2014	**2015**	**2016**	**2017**	**2018**
Membership Mailings	770	1100	1300	1800	1700
External Print Projects	8	4	9	5	7
Office Copy Paper (US only)	6	6	4	6	12
Total	**780**	**1100**	**1300**	**1800**	**1700**

The Membership Department categorizes its mailings into seven primary groups: Acquisitions, Appeals, Reinstatements, Conversion, Renewals, Cultivation and the *Solutions* newsletter. More than half of the paper used by Membership, and therefore more than half of the department's

paper-related emissions, was for Acquisitions. Reinstatements and Appeals together account for another 20%, while the remaining categories (*Solutions*, Conversion, Renewals, and Cultivation) account for approximately 30% of paper emissions.

Office Copy Paper emissions doubled due to an updated emissions factor compared to previous years. EDF offices in the US use TreeZero paper, while international offices use paper with high recycled content. We only had data on total paper usage for US offices. For all US offices, we used an emissions factor for uncoated paper with 100% recycled content.

Conclusion

Looking Forward

The Sustainability Council is committed to delivering results for the triple bottom line of social, environmental and economic impact. With regards to our social impact, our goals focus around engagement, implementing sustainable office practices, furthering transparency and enriching communications about our sustainability journey. From an environmental perspective, we are driven to better understand, and to use science-based targets to reduce, our impact on the planet. Finally, focusing on our economic impact will mean strengthening resource efficiency, driving cost savings for the organization, and focusing on comprehensive risk management. Together, meeting these goals will help us further embed sustainability into EDF's DNA.

The Sustainability Council aims to create and implement an organizational sustainability strategy that aligns with our mission and *Pathways 2025*, and that results in positive impacts across the organization. Future initiatives associated with this strategy will include staff education and engagement, identifying and executing a sustainable operations plan, and developing a comprehensive annual sustainability report to be shared internally and externally.

Appendix

Details on Full-Time Employees

- In 2018, we counted all regular staff, contributing scientists, fixed-term fellows and fixed-term contract staff as full-time employees, regardless of how long they were on staff during the year. Reports from prior years included regular and temporary contingent staff members, so FTE numbers are not fully comparable across years. Future reports should consider how best to count staff members and thus calculate per capita emissions.

Details on Travel

Air travel

- Our calculations relied on data from EDF's designated travel agency, Ovation.
- Individuals with no program code in their airfare booking, and for whom we had no records (e.g., as staff or trustees), were categorized as Unknown.
- Climate and Energy split into two separate programs in late 2018 but have been kept as one program for this report.
- Trip lengths (short-haul, medium-haul, long-haul) and associated emission factors were defined by the EPA's Emission Factors for 2018:

Flight Type	$kgCO_2$/Mile
Short-haul (< 300 miles)	0.225
Medium-haul (≥ 300 miles,< 2300 miles)	0.136
Long-haul (≥ 2300 miles)	0.166

- 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 greenhouse gas emissions per passenger mile. Seat numbers were based on the UK's Department of Environment Food and Rural Affairs (DEFRA) 2018 methodology paper for emission factors:

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

Rail

- We used an emissions factor of 0.140 $kgCO_2$/mile, as defined by the EPA's Emission Factors for 2018. We revised the rail emissions that were reported for 2014-2017. The new calculations use an updated emissions factor and correct an earlier error: the calculations for 2014-2017 used emissions factors from Defra, which were lower than EPA's current emissions factor, and they failed to convert miles to km.

Rental cars

- In the absence of actual data on miles driven per rental car trip, we assumed that rental cars were driven an average of 36.92 miles per day. This number is based on the US Department of Transportation Federal Highway Administration, which estimates the average American's annual mileage to be 13,476 per year, or 36.92 miles/day.
- The emissions factor was taken from the EPA's Green Vehicle Guide, which reports that the average passenger car emits 0.404 $kgCO_2$/mile.
- We updated the rental car emissions for 2014-2017 from the previous GHG Inventory report in order to correct an earlier error: the calculations for 2014-2017 did not include an emissions factor.

Hotel stays

- Emissions were determined by country-specific emissions factors multiplied by number of nights stayed.
- We used Defra emission factors for 2018. For the four countries in which EDF staff stayed, but for which Defra did not report an emissions factor, we used 50.92 $kgCO_2$/night, which is the average of all the countries on Defra's list.

Employee commutes

- There were no data about how employees commuted in 2018. Based on results from previous surveys of EDF staff, we assumed that employees traveled 20 miles/day, 5 days/week, for 47 weeks/year in the following distribution:
    - 10% of FTEs drive alone
    - 10% carpool
    - 40% take a subway or train
    - 30% take a bus
    - 10% use an emissions-free mode of transportation (e.g., telecommuting, walking, biking)
- Emissions factors were defined by the EPA's Emission Factors for 2018. Note that the car emissions factors used for employee commuting were slightly different than those used for work travel by rental car. For future reports, we need to evaluate emissions factors from different sources, for this and other categories, so that we can be consistent.

Transportation Type	$kgCO_2$/Mile
Car - Driving alone	0.343
Carpool	0.1715
Transit Rail	0.119
Bus	0.056

Details on Office Energy Use

Emissions factors were taken from the following sources:

- Austin, Bentonville (electricity), Boston (electricity), Boulder, New York, Raleigh, Sacramento, San Francisco (electricity), and Washington, DC were based on the EPA's eGRID output rates.
- Beijing, Bentonville (natural gas), Mexico, New York (natural gas), and San Francisco (natural gas) were based on the WRI's GHG protocol emission factors and the IPCC.
- Boston (district steam) was based on the EPA's 2018 emission factors.
- London (electricity) was based on DEFRA 2018 factors.

Office	Use Type	Emission Factor ($kgCO_2e$/unit)	Unit
Austin	Electricity	0.4577	kWh
Bentonville	Electricity	0.5662	kWh
Bentonville	Natural Gas	5.9177	therm
Boston	Electricity	0.2531	kWh
Boston	District Steam	6.6330	therm
Boulder	Electricity	0.6203	kWh
China	Electricity	1.1298	kWh
Mexico	Electricity	0.4998	kWh
New York City	Electricity	0.2883	kWh
New York City	Natural Gas	5.9177	therm
Raleigh	Electricity	0.3652	kWh
Sacramento	Electricity	0.2394	kWh
San Francisco	Electricity	0.2394	kWh
San Francisco	Natural Gas	5.9177	therm
Washington, DC	Electricity	0.3438	kWh
London	Electricity	0.2809	kWh

Five US offices had missing or anomalous energy data.

- Bentonville: There were no data for therms of natural gas usage in Bentonville, but we did have data for San Francisco. We assumed the Bentonville office used the same therms per square foot as the San Francisco office, and then we adjusted for office size. The Bentonville office has 0.06 times the square footage of the SF office.
- London: In the absence of sub-metered electricity data for the London office, we assumed the London office's use to be 10,000 kWh in 2018, the midpoint of the range of kWh used by micro businesses in the UK.
- New York City: There were no data for therms of natural gas usage in New York, but we did have data for San Francisco. We assumed the New York office used the same therms per square foot as the San Francisco office and adjusted for the office size. The New York office has 2.2 times the square footage of the SF office.
- Raleigh: This office is not sub-metered. The energy use reported here was calculated as a percentage of the building's total use, based on square footage.
- Washington, DC: This office's reported energy usage was abnormally low; we are investigating whether there was an error in the sub-metering or if there is some other explanation.

Details on Paper Use

Office paper and external printing

- EDF offices in the US use TreeZero paper and track paper use with PaperCut print management software. International offices use paper with high recycled content but do not collect data on total use. We have data for the total weight of external printing.
- Greenhouse gas emissions were calculated using the Environmental Paper Network Paper Calculator Version 4.0. For more information visit www.papercalculator.org. This calculator does not have emissions factors for EDF's exact paper products, so we selected the emissions factor of Uncoated Freesheet, 0.01 pounds, and 100% Recycled Content for our calculations. This emissions factor (18.1g CO_2/sheet) is considerably larger than what was used in the 2014-17 GHG inventories (12.7g CO_2/sheet).

- Because we do not have data on the amount of paper used in EDF's international offices, the emissions reported for office paper use are only for our domestic offices.

Membership mailing

- We used the total weight of mailed paper and the same emissions factor from previous GHG inventories (2.38 MtCO2e/ton of paper). We do not know the source of this emissions factor, so this is a key area for improvement in future reports.
- This calculation does not include emissions from shipping.