



REPORT

2017/2018

Climate & Energy

Climate Change & Energy
Environmental Sustainability Use

Welcome

This is the corporate responsibility report of Merck & Co., Inc., Kenilworth, N.J., U.S.A., which is known as MSD outside the U.S. and Canada.

Scientific data support that climate change is increasing economic and public health risks

...taking action to reduce the

RESOURCES



Public Policy Position Statement: Climate Change



CDP—Climate Change 2017



Performance Data Spreadsheet (Excel)

As a global biopharmaceutical company, we recognize the important role we play in identifying and responding to the public health risks associated with climate change, such as threats to clean air and water, insufficient food supplies, and the spread of disease. We believe our longstanding support of stronger health systems and expanded access to medicines and vaccines in underserved areas is even more important given the evidence that certain disease patterns can be associated with changing climate conditions.



GOAL: By 2025, we will reduce global Scope 1 and market-based Scope 2 GHG emissions by at least 40% from 2015 levels.

2017 PROGRESS: 13% reduction

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GOALS: By 2025, at least 50% of our purchased electricity will come from renewable sources. By 2040, 100% of our purchased electricity will come from renewable sources.¹

2017 PROGRESS: 4.9%

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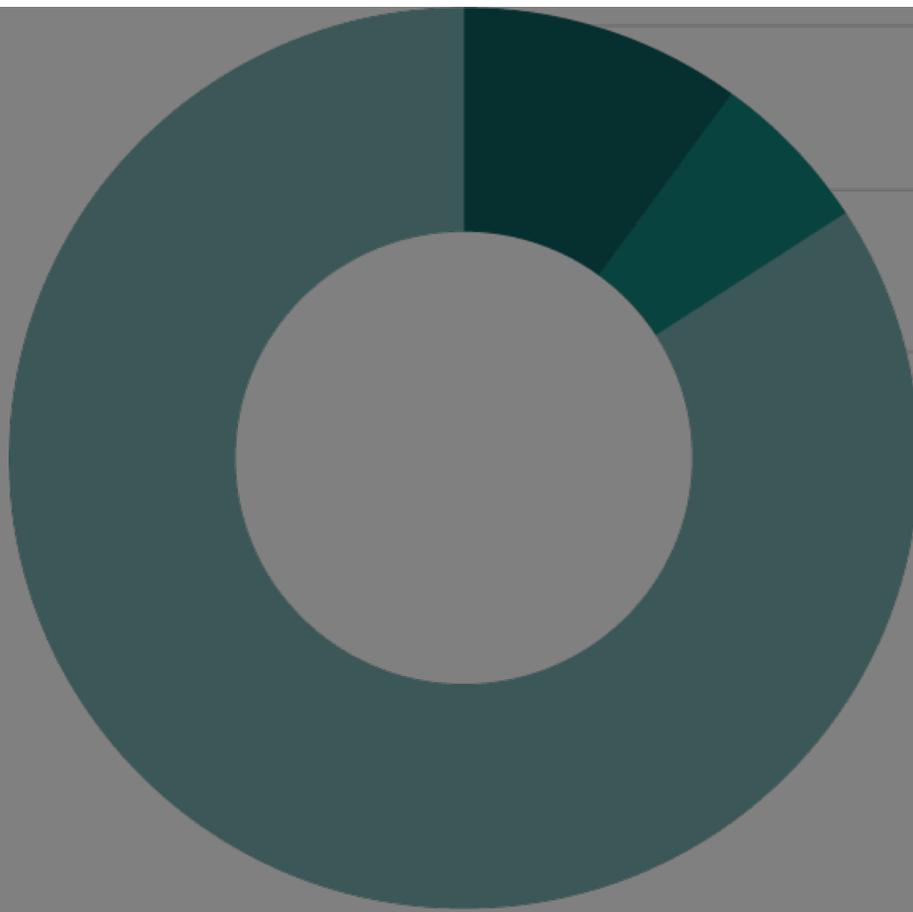
1. We have defined “purchased electricity” as electricity sourced from external suppliers as well as renewable electricity that was generated and utilized on-site where we retained the renewable attributes or where we have obtained renewable attributes through contract.

We have committed to reducing our Scope 1 and market-based Scope 2 absolute GHG emissions by 40 percent between 2015 and 2025. This goal is designed to meet the science-based criteria to limit the global temperature increase to below 2°C. We have submitted our goal to be evaluated by the Science-Based Targets initiative (SBTi) and joined [We Mean Business](#) to emphasize our commitment.

We realize that in order to make a truly meaningful reduction in our overall environmental impact, we must engage with our suppliers to drive positive change. We have set a goal that includes a three-phase process:

- By 2018, we will collect GHG emissions data from at least 90% of our strategic suppliers with the highest environmental impacts
- By 2020, we will engage with those suppliers and request them to identify GHG emission reduction opportunities
- By 2025, at least 90% of our strategic suppliers with the highest environmental impacts will set their own GHG emission reduction targets

We have made it a priority to reduce our demand for energy, and have established internal policies and practices focused on reducing energy use at all of our sites and minimizing greenhouse gas (GHG) generation throughout the company. By taking these steps, we are not only minimizing GHG emissions but also reducing our operating costs and mitigating the business impacts expected to be associated with future climate change requirements.



Scope 1
801,600 MT CO₂e

Scope 2
462,500 MT CO₂e

Scope 3
6,586,100 MT CO₂e

Note: Scope 2 is the market-based value in accordance with the Greenhouse Gas Protocol.

For more information on our GHG emissions, please see our CDP Climate Change 2017 report.

To see all of our Scope 1, 2 and 3 GHG data, see the Performance section below.

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Initiatives

Our company has launched initiatives around the world to improve energy use, reduce greenhouse gas (GHG) emissions from our operations and understand our supply chain-related impacts.

Our Energy Center of Excellence (CoE) identifies, shares and standardizes best practices, and prioritizes the funding of energy projects to reduce energy usage across the company. Our manufacturing facilities, warehouses, laboratories, major offices and vehicle fleet are the primary targets of our energy-demand-reduction programs, as they represent the majority of our energy consumption.

We have established an Energy Capital Fund of up to US\$12 million per year in order to transition to more

energy-efficient technology and to better position the company to respond to energy demands in the future. The Energy Capital Fund supports the implementation of projects with a simple four-year payback averaged over the entire portfolio. In 2017, we spent US\$3.8 million on projects that resulted in US\$1.4 million in annual savings and will result in a reduction of more than 9,100 metric tons of carbon dioxide from our facilities. In 2018, we have over 100 projects in progress that when completed, will reduce carbon dioxide emissions from our facilities by over 35,000 metric tons.

FACILITIES

We continuously strive to make our facilities energy-efficient. Our Energy CoE has created an “energy road map” to help our facilities reduce energy demand and associated GHG emissions. The energy road map’s foundation includes large-scale metering and monitoring to assess and identify opportunities for continuous improvement. As facility energy management programs mature, energy savings are sought by improving the reliability of the equipment, by the efficient operation of utility systems and by building efficiencies into systems design.

All of our new facilities are required to comply with our Energy Design Guide and Energy Conservation Planner. If we purchase a facility, it is evaluated for energy efficiency and assessed against our energy scorecard as part of its integration into our company.

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WORK PRACTICES & RECOGNITION

Our company takes advantage of technology advances in order to save energy, time and money while also reducing emissions.

- Site energy use is tracked monthly by our Energy CoE through a centralized system
- A global energy scorecard is issued monthly and sites receive a letter grade based on an internal assessment of their energy intensity and performance. Our companywide average score has consistently been a top-level grade of “A.”
- We developed an energy management strategy that seeks to achieve energy savings through continuous improvement, reliability, operations and design
- A rail-travel option is included in our online business-travel booking tool to make it easier to travel by train when appropriate. Train travel has a smaller carbon footprint than traveling by either airplane or personal vehicle.
- The long-range freight carriers that transport our products use alternatives to air freight whenever practical. In 2017, 45 percent (by weight) of our products were shipped by ocean freight, which reduces the amount of transportation-related GHG emissions by over 90 percent as compared to air shipping.

In 2017, our company presented internal Energy Awards to recognize sites, teams or individuals from around the world who exhibited leadership through their energy management efforts:

- Energy Savings by Design
 - Our site in Singapore has utilized tri-generation, installed LED lighting and undertaken eight Energy Capital Fund projects with over US\$1.5 million in savings
 - Our site in Italy modified an air compressor to reduce 50% of compressed-air losses and installed LED lighting and sensors

- Energy Savings by Operations
 - One of our New Jersey sites has implemented automated schedules for HVAC and lighting, and utilized free-cooling or pre-cooling for 80% of the year
- Energy Savings by Reliability
 - A site in Ireland performs regular infrared steam trap inspections, has an air leak inspection program, and has completed several Energy Kaizens
- Energy Savings by Energy Program Management
 - One of our sites in Pennsylvania has formalized standard operating procedures to support its energy management team and conducted several operator care and Energy Kaizen events

RENEWABLE ENERGY

Our company has set bold renewable energy targets. We have committed to sourcing 100 percent of our purchased electricity from renewable energy sources by 2040, with an interim goal of 50 percent by 2025.¹ Photovoltaic arrays, wind turbines and other renewable-energy installations avoid emissions, help reduce energy-demand peaks and postpone or preclude adding new power plants.

While renewable energy accounts for a small percentage of the electricity we currently purchase (6 percent), we continually analyze our sites to look for opportunities for new on-site installations, power-purchase contracts, vendor-supplied renewable energy through the electrical grid and virtual power-purchase agreement (VPPA) projects.

In January 2018, our company signed a VPPA with Invenergy Wind Development LLC that adds 60 megawatts (MW) of renewable energy to the Electric Reliability Council of Texas (ERCOT) market and provides us with the associated renewable energy credits. This new wind asset will reduce our company's greenhouse gas emissions by more than 100,000 metric tons per year over the life of the 12-year agreement. This agreement will help us reach approximately 50 percent of our 2025 goal and 25 percent of our 2040 goal starting in 2019 when the wind development comes online.

1. We have defined "purchased electricity" as electricity sourced from external suppliers as well as renewable electricity that was generated and utilized on-site where we retained the renewable attributes or where we have obtained renewable attributes through contract.

VEHICLE FLEET

Approximately 10 percent of our total Scope 1 & 2 GHG emissions are associated with our vehicle fleet. We calculate our fleet's GHG emissions on the basis of estimated fuel economy and actual total miles driven.

- In an ongoing effort to improve fuel efficiency, we have converted our U.S. sales fleet from cars with six-cylinder engines to cars with four-cylinder engines, replaced eight-cylinder-engine trucks with six-cylinder-engine trucks, and introduced an all-wheel-drive (AWD) sedan option to replace AWD sport utility vehicles. This resulted in a fuel economy improvement from 25.6 miles per gallon (mpg) to 28 mpg in 2018.
- Our European Union (EU) fleet continues to convert to the use of more fuel-efficient vehicles. In 2017, our EU average emission rate was 106g CO₂/km and we are on track to meet the EU target of 95g CO₂/km by 2020.

PARTNERSHIPS

We have a long-standing partnership with the U.S. Environmental Protection Agency's (EPA's) ENERGY STAR® program. This partnership provides a broad energy-management strategy that serves as a useful framework for measuring our current energy performance, setting goals, tracking savings and rewarding improvements.

In March 2018, the U.S. EPA again recognized our company with the Sustained Excellence Award. This is the 13th consecutive year in which we have been recognized by ENERGY STAR for excellence in energy management. We also received several facility-specific awards from EPA in 2018:

- Our Puerto Rico facility was awarded the ENERGY STAR Pharmaceutical Energy Performance Indicator Award by U.S. EPA for superior energy efficiency and environmental performance among U.S. pharmaceutical manufacturing plants
- Three office buildings and one data center in New Jersey and two office buildings in Pennsylvania earned ENERGY STAR Portfolio Manager Awards from U.S. EPA for being in the top quartile of their sector

For more information on our awards, [click here](#).

Performance

From 2016 to 2017, we made great strides and reduced our year-over-year Scope 1 and Scope 2 market-based GHG emissions by 9.6 percent.

We have once again analyzed and reported our Scope 3 impacts using primary operating data, accepted emission factors, and an economic input-output model based on our third-party spend. In 2017, we estimated lower Scope 3 GHG emissions in several categories due to a change in methodology for calculating impacts from purchased goods and services, a reduction in on-site fuel use, business travel and emissions from sold products from 2016 to 2017. We also saw higher Scope 3 emissions from the end-of-life treatment of sold products due to improved accuracy of our third-party spend data.

Our analysis shows that our Scope 3 GHG emissions impacts are nearly three times greater than our combined Scope 1 and Scope 2 emissions. We are working to reduce those impacts through activities such as reducing waste in our operations, reducing fuel use and looking for opportunities to shift from air shipping to ocean transport when practical. These actions not only reduce our environmental impact but benefit the business by reducing costs.

ENERGY USE & GHG SUMMARY¹	2017
Total energy use (GJ)	19,062,700
Scope 1 and location-based Scope 2 greenhouse gas emissions (MT CO₂e)	1,252,400
Scope 1 and market-based Scope 2 greenhouse gas emissions (MT CO₂e)	1,264,100
Scope 3 greenhouse gas emissions (MT CO₂e)	6,586,100

Note: Tracking of all of our Scope 3 emissions, beyond business travel, began in 2014.

NA: Not available.

1. In accordance with the Greenhouse Gas Protocol, prior-year data have been adjusted to add or remove facilities that have been acquired or sold.

Adjustments also reflect changes in methodology to ensure consistency from year to year.

SCOPE 1 & LOCATION-BASED SCOPE 2 ENERGY USE (% OF TOTAL)¹	2017
Natural gas (Scope 1)	59%
Purchased electricity (Scope 2) ^{2,3}	23%
Fleet fuel (Scope 1)	13%
Purchased steam (Scope 2)	3%
Fuel oil (Scope 1)	2%
Spent solvents (Scope 1)	0.0%
Coal (Scope 1)	0.0%
Renewable energy generated and used on-site ⁴	0.04%

1. May not add to 100 percent due to rounding.

2. Reported using Scope 2 location-based value in accordance with the Greenhouse Gas Protocol.

3. Includes solar, wind and other renewables generated on-site where renewable energy credits (RECs) have been sold.

4. Includes solar, wind and other renewables generated on-site where renewable energy credits or guarantees of origin have been retained or retired.

SCOPE 1 & MARKET-BASED SCOPE 2 ENERGY USE (% OF TOTAL)¹	2017
Natural gas (Scope 1)	59%
Purchased electricity (Scope 2) ^{2,3}	22%
Fleet fuel (Scope 1)	13%
Purchased steam (Scope 2)	3%
Fuel oil (Scope 1)	2%
Spent solvents (Scope 1)	0.0%
Coal (Scope 1)	0.0%
Renewable energy generated and used on-site or purchased ⁴	1.1%

1. May not add to 100 percent due to rounding.

2. Reported using Scope 2 Market-based value in accordance with the Greenhouse Gas Protocol.

3. Includes solar, wind and other renewables generated on-site where renewable energy credits (RECs) have been sold.

4. Includes solar, wind and other renewables generated on-site where renewable energy credits or guarantees of origin have been retained or retired.

SCOPE 3 GREENHOUSE GAS (GHG) DETAILS (MT CO₂E)	2017
Purchased goods and services ^{1,2}	4,997,600
Capital goods ^{1,3}	192,900
GHG emissions from fuel and energy-related activities not included in Scope 1 & 2 ^{2,4,5}	262,100

Upstream transportation and distribution^{1, 2}	267,100
Waste generated in operations (excluding recycled & composted waste)^{2, 5, 6, 7}	16,000
GHG emissions related to employee business travel^{8, 9}	218,200
Employee commuting²	262,200
Downstream transportation and distribution^{2, 10}	121,900
GHG emissions from use of sold products¹¹	205,800
End-of-life treatment of sold products^{2, 12}	42,200
Total	6,586,100

Note: Limited Data Assurance was granted for emissions calculated from primary travel vendor data and employee reimbursable travel mileage data. The total reported here includes non-primary travel vendor data emissions which were based on our 2016 third party spend data and an Economic Input-Output Model performed by Climate Earth, Inc.

NA = Not available.

1. Based on third-party spend data and an economic input-output model performed by Climate Earth, Inc.

2. Data not available before 2014.

3. Data not available before 2015.

4. Emission factors from Argonne National Laboratory's GREET Model (<https://greet.es.anl.gov/>) were used in conjunction with primary fuel and energy-use data.

5. Data as reported historically, not baseline adjusted.

6. Primary-waste data were used with the U.S. EPA's WARM Model (<https://www.epa.gov/warm>).

7. Including recycled and composted waste in these calculations, would result in negative emissions in 2014 (-39,900 MT CO₂e), 2015 (-40,200 MT CO₂e), 2016 (-60,200 MT CO₂e) and 2017 (-41,200 MT CO₂e).

8. Based on primary travel vendor data, employee-reimbursable mileage and UK Defra factors

(<https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting#conversion-factors-2015>).

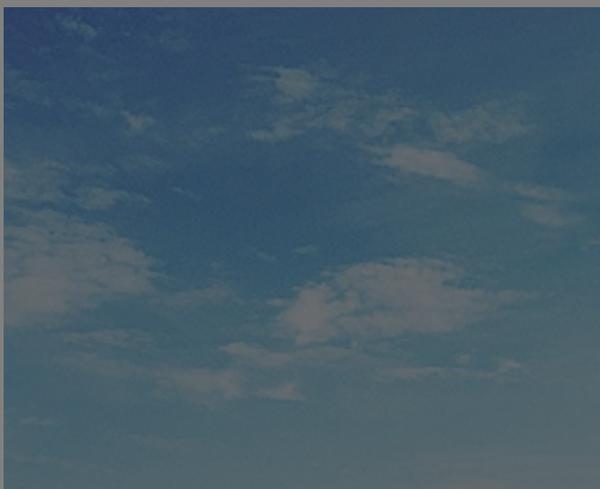
9. Beginning in 2014, emissions are based on primary vendor data where available and economic input-output modelling performed by Climate Earth, Inc., using spend data.

10. Emissions were calculated using our "Upstream transportation and distribution" spend data as a worst case estimate entered into the WRI Quantis tool. We assumed that all "downstream" material would first have been stored, transported and handled "upstream."

11. Assumes that all HFC-containing devices shipped for sale were consumed. The amount and identity of HFC in each product is calculated and multiplied by the appropriate global warming potential (GWP) to determine the CO₂e released as a result of product use.

12. Calculated assuming that all primary, secondary and tertiary packaging purchased was disposed of by our customers. Packaging material data was used with the U.S. EPA's WARM Model.

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