



NIEHS Sustainability Report 2021





Table of Contents

Introduction: Sustainability in Action at the National Institute of Environmental Health Sciences	1
A Message From Our Director	4
Natural Resources Stewardship	5
Energy	7
Water	11
Waste Management and Pollution Prevention	13
Transportation	20
Sustainable Labs	22
Green Purchasing	23
Progress Through People	25
Looking Ahead.....	33

Introduction: Sustainability in Action at the National Institute of Environmental Health Sciences

Mission and Vision

The National Institutes of Health (NIH) is made up of 27 Institutes and Centers, each with a specific research agenda or mission. The mission of the National Institute of Environmental Health Sciences (NIEHS) is to discover how the environment affects people in order to promote healthier lives. The vision of NIEHS is to provide global leadership for innovative research that improves public health by preventing disease and disability.

Overview of Operations

NIEHS research uses state-of-the-art science and technology to investigate the interplay between environmental exposures, human biology, genetics, and common diseases to help prevent disease and improve human health. NIEHS has about 1,800 employees, guests, contractors, and volunteers, and is comprised of nearly 1.1 million gross square feet of research and support facilities, including the Clinical Research Unit and the newly added Net-Zero Energy (NZE) warehouse, Building 110. NIEHS also leases space at the nearby Keystone campus, which houses various NIEHS administration groups.

NIEHS is located at a joint campus that serves as host to both NIEHS' and the U.S. Environmental Protection Agency (EPA)'s Research Triangle Park offices and research facilities. NIEHS and EPA operate under various communal resources and supporting infrastructure on 511 total acres that include the Central Utility Plant, recreational areas, the beautiful man-made Discovery Lake located at the center of the joint campus, and the First Environments Early Learning Center daycare. Though separate entities, both organizations work together to ensure that the property is safely and properly maintained.



In 2020, the COVID-19 virus significantly affected operations at NIEHS, resulting in maximum telework and scaling back laboratory operations or working in shifts to allow for physical distancing. Despite the challenges, critical research and essential support services continued, facilitating contributions to the global knowledge base of the COVID-19 virus. NIEHS also enacted a safe work plan to support its staff, including offering voluntary asymptomatic drive-thru testing, and provided access to multiple resources for balancing work and personal demands during the pandemic.





Sustainability at NIEHS


At NIEHS, we incorporate sustainability into our mission to ensure that we have, and will continue to have, the resources needed to protect human and environmental health indefinitely. NIEHS recognizes that sustainable operations align with our mission, and strives to meet or exceed all applicable federal sustainability requirements, including those of the U.S. Department of Health and Human Services (HHS) and the NIH.

The NIEHS Sustainability Report is published biennially. The 2021 Sustainability Report was guided by worldwide, federal, local, and regional standards; aligns with applicable reporting guidelines set forth by the [Global Reporting Initiative \(GRI\) Sustainability Reporting Standards](#); and considers the [United Nations Sustainable Development Goals](#) where appropriate. Analyses in this report focus on fiscal years 2019 and 2020, unless otherwise noted, and apply the standards in effect at that time. References to the “NIEHS campus” and “NIEHS” entail the property and/or operations specific to the Institute, whereas references to the “joint campus” entail the entire federal property.

NIEHS and Sustainability at a Glance in 2020 highlights our key sustainability accomplishments in the context of our mission, square footage, and number of personnel associated with the Institute. As discussed in the relevant sections of the report, improvements in waste generation, electricity and water usage, and other metrics were often driven by campus sustainability initiatives, as well as reduced campus occupancy due to the pandemic.




19%
ENERGY USE INTENSITY
0.21 mmBtu/GSF of energy use intensity, a 19% decrease since 2015.



POTABLE WATER USE INTENSITY 26 gal/GSF of potable water use, a 11% decrease since 2015.


11%



WASTE DIVERSION
2.1 million pounds of waste and materials recycled or reused since the program began in 1993.




2.1M



EXCESS SOLAR ENERGY GENERATION from the Net-Zero Energy Warehouse to support four average U.S. houses since 2018.

BIODIVERSITY
15 years as a Wildlife and Industry Together Certified Campus and four years as part of the NC Wildlife Federation Butterfly.



FACILITIES 1.1 million gross square feet of research and support facilities.

PEOPLE Nearly 2,000 employees, guests, contractors, and volunteers.



AWARDS 16 DHHS Green Champion Awards since 2015.

MISSION 55 years of discovering how the environment affects people in order to promote healthier lives.

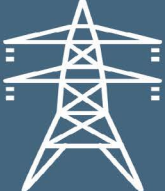


SOLAR ENERGY More than 76,000 kWh of solar energy generated on-site in 2020.

PAPER 57% decrease in paper purchases since 2012.



GHG EMISSIONS AVOIDED 2,400 MT CO₂ emissions avoided annually from energy efficiency projects completed in 2019 and 2020.





A Message From Our Director

Sustainability During Challenging Times

Environmental stewardship is an integral part of successfully executing the mission of NIEHS – to discover how the environment affects people in order to promote healthier lives. The relationship between humans and their environment is complex and intertwined, and NIEHS embraces our role in contributing to a healthy environment.

The 2021 NIEHS Sustainability Report focuses on 2019 and 2020, and it reflects on historical efforts and data. I'll touch on a few of those efforts and achievements, and I encourage everyone to read through this comprehensive report to better understand how environmental sustainability is linked to everything we do at NIEHS.

Sustainability in 2020 must be viewed through the lens of the COVID-19 pandemic, which affected all operations at NIEHS and required a reduced occupancy on campus to maintain employee safety. I am proud of our efforts to support a safe and sustainable workplace, despite the pandemic.

During the two-year timeframe of this report, a lot of work was accomplished that improved the physical environment on our campus. To protect and maintain the forest land on NIEHS grounds, we collaborated with the North Carolina Forest Service to assess forest health and evaluate fire risk. We implemented several energy conservation projects, including upgrading to energy-efficient ultralow temperature freezers and cold rooms, installing efficient electrochromic glass in our main walkway, restoring insulation to our underground high-temperature hot water lines, and completing additional energy-saving upgrades to our data centers. We continue to work toward using reclaimed water in our cooling towers to reduce potable water usage, and we added four electric vehicles to our fleet with the aim of increasing our use of alternative fuels. During recent renovations of the Rodbell Auditorium, we focused on reducing waste by refurbishing existing furniture instead of buying new and installing recycled content carpeting.

While our sustainability goals are primarily driven by E.O 13834 "Efficient Federal Operations" and the [Global Reporting Initiative \(GRI\) Sustainability Reporting Standards](#), we also considered the [UN Sustainable Development Goals](#) in an effort to contribute to the global partnership it fosters.

Our upcoming sustainability efforts include evaluating the feasibility of a net-zero energy campus, focusing on increased energy efficiency, and expanding on-site renewable energy generation. To further foster a culture of sustainability, NIEHS will be launching a Green Researcher program and participating in both the NIH and the International Freezer Challenges. These programs are designed to both educate and encourage sustainable laboratory practices on campus, and I look forward to seeing these initiatives in action and sharing the results of their progress with you in our next report.

Rick Woychik, Ph.D.
Director, NIEHS and the National Toxicology Program (NTP)



Natural Resources Stewardship

The NIEHS portion of the RTP federal campus encompasses 375 acres, including 220 acres of forest land. NIEHS natural resource stewardship efforts emphasize habitat preservation and conservation, which, in turn, protect and strengthen biodiversity and the pollinator ecosystem.

The following sections outline natural resources initiatives at NIEHS, which were guided by the following GRI Standards and United Nations Sustainable Development Goals (SDGs):

- [GRI 304-1](#), Biodiversity – Operational sites owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas
- [GRI 304-2](#), Biodiversity – Significant impacts of activities, products, and services on biodiversity
- [GRI 304-3](#), Biodiversity – Habitats protected or restored
- [UN SDGs - Goal 15](#): Life on Land, Targets 15.1, 15.2, 15.5, 15.8

Fostering Biodiversity

Biodiversity plays a significant role in the long-term stability of ecosystem health, and NIEHS takes pride in the efforts taken to foster biodiversity and the abundance of species that inhabit the campus. Through proactive practices, such as maintaining a forest stewardship plan, performing and acting on invasive species inventories, participating in the joint campus Site Ecology Team when activated, and monitoring for the presence of potentially harmful pests, the campus remains host to many native North Carolina species of reptiles, amphibians, mammals, fish, birds, and insects.

In 2020, the North Carolina Forest Service visited and reviewed campus forest health, management practices, and wildfire risk. While providing key information on overall forest health and management practices, the visit also addressed the potential for increased wildfire risk under drought conditions per the [NIEHS Climate Resilience Plan](#). The Forest Service provided a stewardship plan outlining actions that can be taken to reduce wildfire risk and maintain biodiversity, thereby supporting a healthy forest for future generations. NIEHS will begin to act on the plan's recommendations starting in 2021.

NIEHS continues to maintain the Wildlife and Industry Together (WAIT) certification originally achieved in 2005 from the North Carolina Wildlife Federation. WAIT certification requires an organization to maintain a systematic program for its site that includes enhancing wildlife habitat and providing education of employees and community partners on wildlife.





Parasitoid wasp. Photo courtesy of NC Forest Service.



Eco-Conscious Pest and Invasive Species Management

NIEHS manages invasive pests through an Integrated Pest Management (IPM) program. The goal of the IPM program is to prevent pest problems without the use of non-selective pesticide applications. This is achieved through extensive monitoring, as well as the application of behavioral, physical, and mechanical controls. Performing inspections, selective planting and placement of grasses and plants to prevent attracting undesirable pests, and proper sanitation and storage are only a few of the steps taken by the IPM program to naturally deter pest populations.

In early 2019, free-tailed bats (*Tadarida brasiliensis*) were discovered inside a campus building. Bats promote biodiversity and play important ecological roles, such as pollinating, seed dispersal, and regulating the insect populations they feed on, but can cause safety concerns inside buildings. A licensed humane wildlife removal specialist assisted NIEHS with designing a plan to facilitate removing the bats from the space and ensuring the bats could no longer enter. Removed bats were taken to a remote wooded area on campus and released.

The Emerald Ash Borer (EAB) is a non-native invasive insect first discovered in several North Carolina counties in 2013. EABs feed on the bark of ash trees, disrupting the tree's ability to transport water and nutrients, often killing the tree. In anticipation of its arrival to campus, 21 ash trees at NIEHS are treated with preventative root flare injections every two years. In late 2020, the North Carolina Forest Service confirmed that ash trees on the NIEHS Campus are becoming infested, which resulted in updates to NIEHS's treatment program to include all ash trees and those in the same family (Oleaceae). In the future, NIEHS plans to release a parasitoid wasp on campus as a biological control measure for the EAB. The pandemic impacted wasp supplies and their release on campus has therefore been delayed, but is discussed further in [Looking Ahead](#).

NIEHS Pollinator Program

Pollinators include bees, birds, butterflies, bats, and other insects that transport pollen between flowers as they feed on nectar, create nests, or hunt. They play an important role in the production of healthy crops for food, fibers, medicine, and a variety of other goods. They also have a vital role in the ecosystem, as they support biodiversity and are a food supply for many animals. These pollinators are put at risk when anthropogenic activities, such as climate change, land loss, and the misuse of pesticides, threaten their natural habitat. The NIEHS Pollinator Program plays a vital role in working to expand the natural habitat of pollinators on its campus, including:



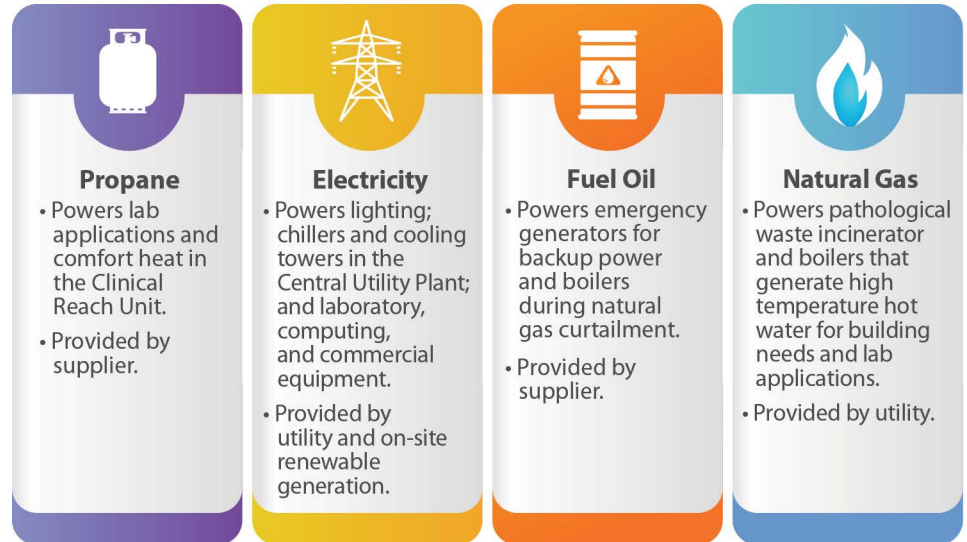
- Maintaining approximately two acres of wildflower meadows that provide pollen and nectar for bees, butterflies, and other insects in support of the [North Carolina Wildlife Federation Butterfly Highway Program](#).
- Cultivating milkweed to serve as a host plant for monarch nesting within the Monarch Butterfly Garden.
- Hosting four honeybee hives as part of an EPA study, and four mason bee nesting chambers on campus.
- Hosting 16 nesting pairs of purple martins in 2019, and 14 pairs in 2020.



Energy

NIEHS utilizes a variety of renewable and non-renewable energy provided by multiple sources to support campus operations. Electricity and natural gas are the most significant sources of energy in use at NIEHS.

NIEHS Energy Sources and Uses



The following E.O. and GRI Standards guided energy use and efficiency initiatives at NIEHS:

- [E.O. 13834](#) Section 2(a), (b) – Energy Reduction, Renewable Energy, and Data Center Management
- [GRI 302-1](#), Energy: energy consumption within the organization
- [GRI 302-3](#), Energy intensity
- [UN SDGs - Goal 7: Affordable and Clean Energy, Target 7.2](#)

Energy Use

Electricity and natural gas are the two predominant sources of energy in use on campus, and usage trends over time supported E.O. 13834's goal of achieving and maintaining annual reductions in energy use. Between 2015 and 2020, NIEHS reduced electricity usage by approximately 5%, with 2020 having the lowest consumption since 2008; natural gas usage decreased by 18% between 2015 and 2020. Electricity usage in 2020 was the lowest to date due mainly to the newly operational computer-controlled optimization system for the CUP chillers, described under Energy Reduction Initiatives, and the decrease in campus occupancy during the pandemic. Natural gas usage in the boilers at the CUP was not significantly affected by a drop in the occupancy levels on campus during the pandemic, but stayed relatively unchanged due to similar weather conditions experienced in 2019 and 2020.

NIEHS Energy Use From an Intensity Perspective

Laboratory space accounts for approximately 60% of gross square feet in NIEHS buildings, and is energy intensive due to ventilation, 24-hour access, and research equipment requirements. This results in a high energy use intensity

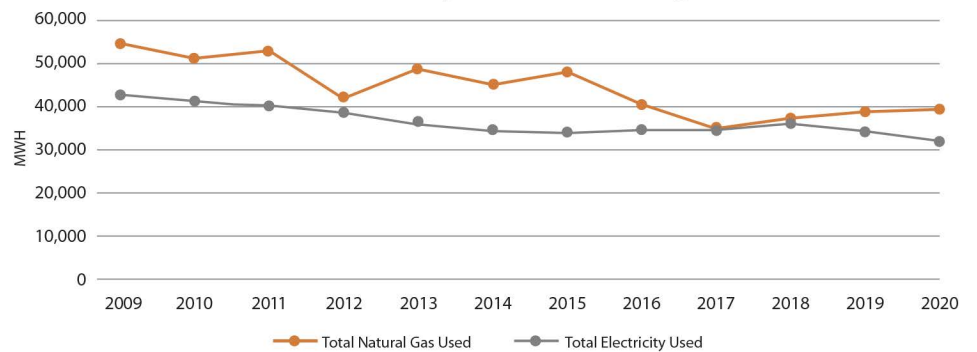


(EUI) on a gross square footage basis for NIEHS (0.22 mmBtu/GSF in 2019, and 0.21 mmBtu/GSF in 2020).

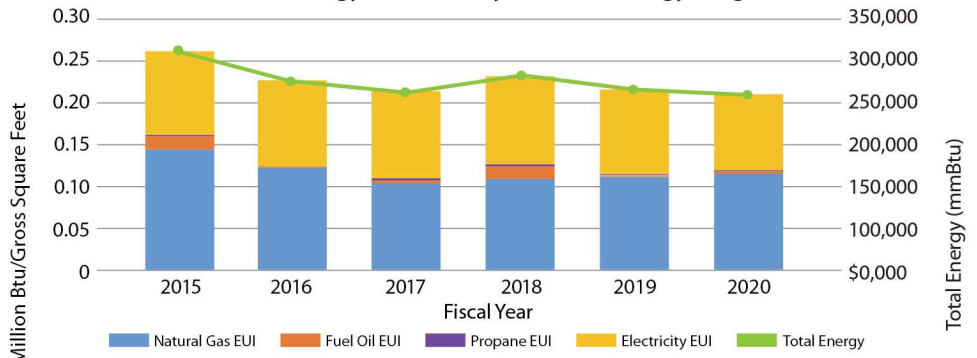
E.O. 13834 directs an annual reduction in energy use intensity. EUI on a gross square footage basis at NIEHS decreased 2.5% from 2019 to 2020, and decreased 19% when compared to 2015. Decreases observed between 2019 and 2020 were driven predominantly by energy reduction initiatives described below, and to a lesser degree by a decrease in campus occupancy due to the pandemic.

NIEHS' EUI, when compared to its peers, shows that our energy performance compares favorably per the International Institute for Sustainable Laboratories Laboratory Benchmarking Tool. The energy intensity of laboratory spaces can vary greatly based on a number of factors, including the type of laboratory, operating conditions, and climate. This type of benchmarking assessment is therefore best used for general comparison purposes rather than determining operating efficiency.

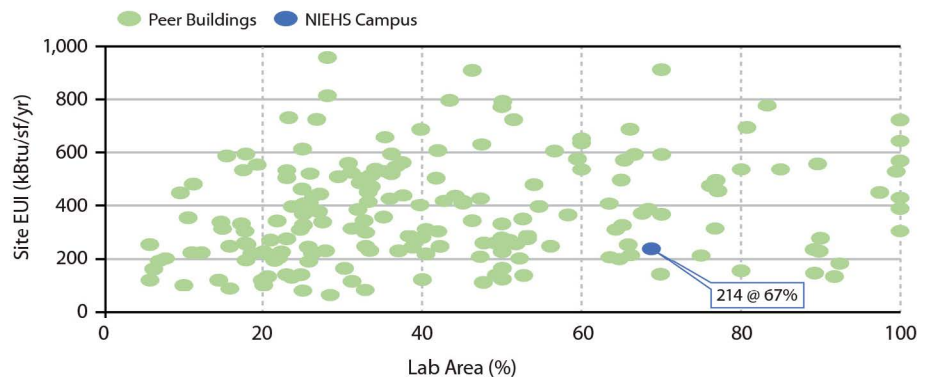
NIEHS Electricity and Natural Gas Usage



NIEHS Energy Use Intensity and Total Energy Usage



NIEHS FY2019 Energy Use Intensity Compared to Peers





Energy Reduction Initiatives

In 2019 and 2020, NIEHS identified and implemented several projects to reduce energy consumption and associated cost and CO₂ emissions.

Infrastructure Focused Projects

In 2020, NIEHS implemented a computer-controlled optimization system for the two newer, variable speed chillers in the Central Utility Plant (CUP). The system automatically reviews operating and temperature data on a real-time, hourly basis, and modulates water use and cooling controls accordingly to achieve optimized operation. This optimization system resulted in water and energy savings at the CUP for the seven months it was fully operational in 2020, and the Institute anticipates seeing the full benefits of the system starting in 2021.

To reduce temperature losses associated with the High Temperature Hot Water (HTHW) system on campus, underground piping insulation was restored in 2020 using an injection system that avoided costly disruptions to campus operations. After restoration, there was a 50% reduction in system thermal losses, saving 300,000 therms of natural gas use and 1,587 metric tons of CO₂ annually.

In 2019, skylights and windows in key areas of the Rall Building, the main research facility at NIEHS, were replaced with electrochromic glass. The glass is expected to reduce overall energy loads in the affected areas by 20%, decrease cooling requirements, and save the equivalent energy use of seven average homes per year.

Equipment-Focused Projects



Ultra-low temperature freezers (ULTs) and lab-grade freezers are essential for preserving samples used in research at NIEHS. However, freezers use a significant amount of energy. Improvements in insulation and compressor technology have resulted in new freezers consuming much less energy than older models. Between 2019 and 2020, NIEHS purchased 45 ULT and 13 lab-grade Energy Star certified freezers. These replacements

will offer improved reliability and reduced risk of sample loss, and when fully deployed will save the equivalent energy use and CO₂ emissions of 26 average households annually.

In 2020, NIEHS replaced 15 cold rooms for temperature-controlled research that were originally installed in the early 1980s with more sustainable and energy-efficient versions. The upgraded rooms include a variety of sustainable design features and materials, including the use of digital temperature recorders instead of paper chart recorders. The improved cold rooms are projected to save the equivalent energy use and CO₂ emissions of 62 average households annually.

Data centers require a large amount of energy to run, maintain, and cool to prevent equipment from overheating. Data center efficiency is often measured by an industry-derived ratio called power use effectiveness (PUE); a decrease in PUE indicates an increase in energy efficiency. PUE in 2019 and 2020 was 1.9 and 1.8 respectively, a decrease from the 2016 baseline of 2.24. This continual decrease was due to a combination of equipment, software, and monitoring system upgrades.

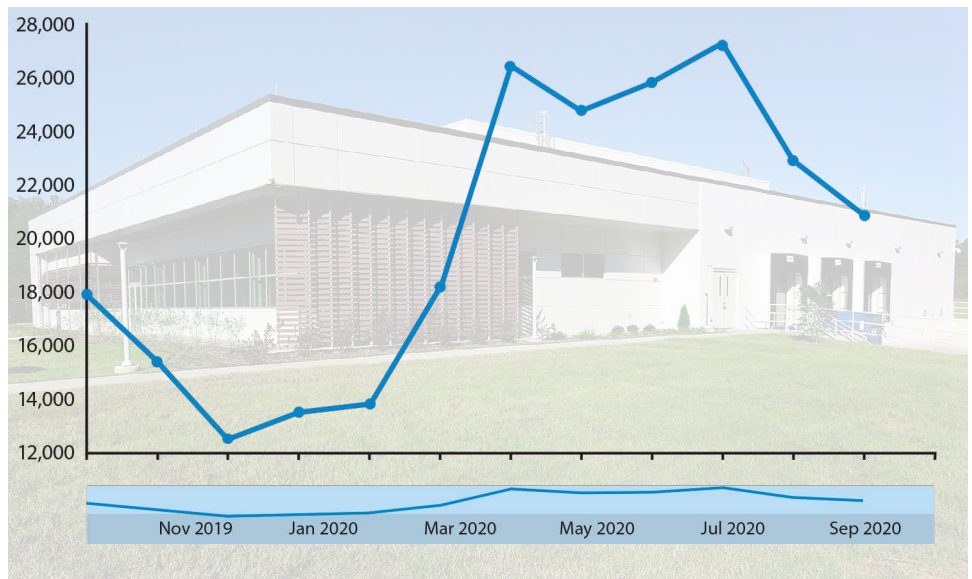


On-Site Renewable Energy

NIEHS has installed 210 kW of solar capacity on campus, comprised of a 120 kW solar array at the NZE Warehouse building and two solar arrays at Rall Building 101 and Building 102, totaling 90 kW. The renewable electricity produced by these solar arrays reduces the amount of purchased electricity at NIEHS, as well as associated greenhouse gas emissions. In total, between 2019 and 2020, these three solar arrays contributed nearly 155,000 kWh of renewable energy.

In the case of the NZE Warehouse, any excess electricity generated is returned to the grid and that amount is then credited against future billings under a net metering agreement with the utility. The figure below illustrates the difference in solar energy generation at the NZE Warehouse compared to usage for FY 2020. Excess energy generation is highest during spring and summer months (indicated by peaks in the graph), and lower in the fall and winter months (indicated by valleys in the graph). The net energy gain since the warehouse began operation in 2018 was large enough to power approximately four households. The NZE Warehouse, in operation since 2018, is certified LEED (Leadership in Energy and Environment Design) Platinum and an Energy Star Certified building.

Amount of Change in Power Generated Versus Used at the NIEHS Net-Zero Warehouse

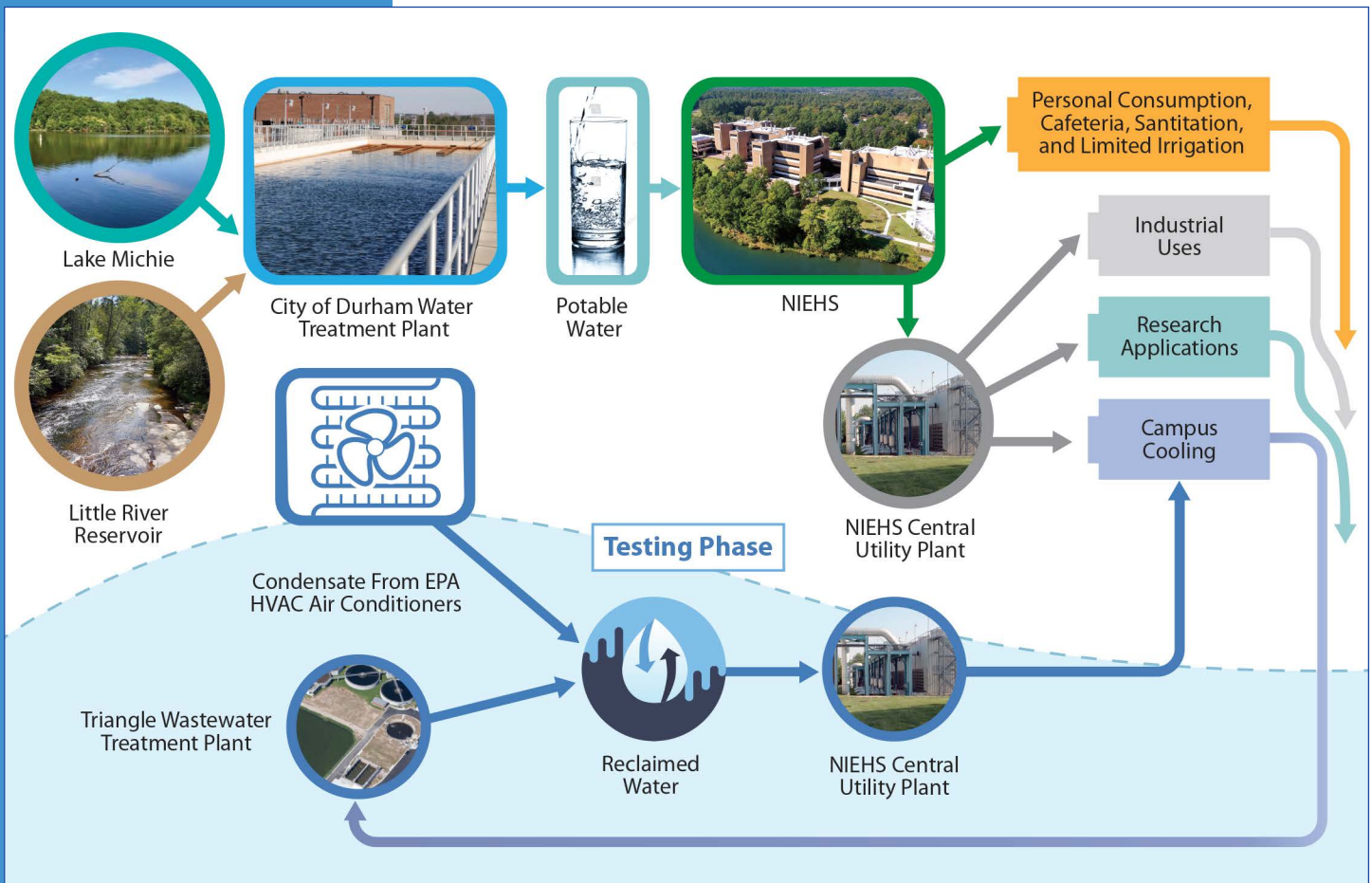


E.O. 13834 directs at least 7.5% of total electricity consumption at the agency level (e.g., Health and Human Services in the case of NIEHS) should be from renewable sources in the form of on-site generation, purchase of electricity from renewable sources, or purchases of Renewable Energy Certificates (RECs). At present, NIEHS sources less than 1% of its electricity directly from renewable generation on-site and does not purchase electricity from renewable sources or purchase RECs. During 2020, NIEHS began to assess the feasibility of a net-zero energy campus (see [Looking Ahead](#)), which includes an analysis of the feasibility of increasing on-site renewable electricity generation along with decreasing energy demand and increasing energy efficiency in combination with purchasing Renewable Energy Certificates.

Water

Water is an essential resource to support campus operations, and NIEHS is making significant strides to use reclaimed water to reduce our usage of potable water. About half of the water currently used at NIEHS for industrial activities is to support the joint campus cooling system at the CUP. Industrial activities collectively, including the CUP, are responsible for approximately 75% of all water consumed by the Institute. As a fellow steward of local water resources, NIEHS participates in regional water supply status meetings and seminars with other facilities located in RTP, as well as the broader Cape Fear River Basin. Meetings are hosted by Environment@RTP, Cape Fear River Assembly, and the Triangle J Council of Government. Central North Carolina where NIEHS is located is not considered to be an area with water stress.

Water Sources and Usage at NIEHS



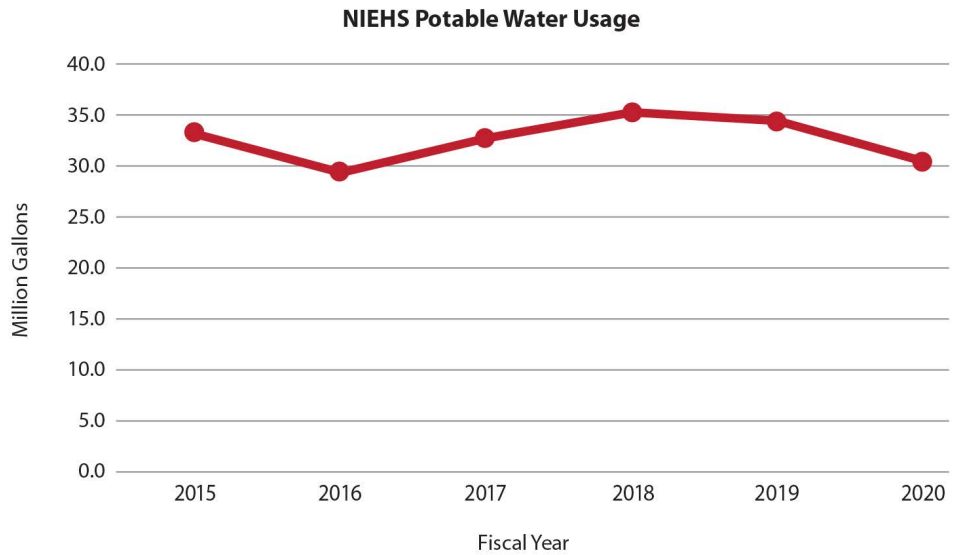
Water use efficiency and conservation initiatives at NIEHS were guided by the following standards.

- E.O. 13834 Section 2(c) – Water Management
- GRI 303-1, Water – Interactions with water as a shared resource
- GRI 303-3, Water – Water withdrawal
- GRI 303-5, Water – Water consumption
- UN SDGs - Goal 6: Clean Water and Sanitation, Targets 6.3, 6.4, 6.5 and 6.6

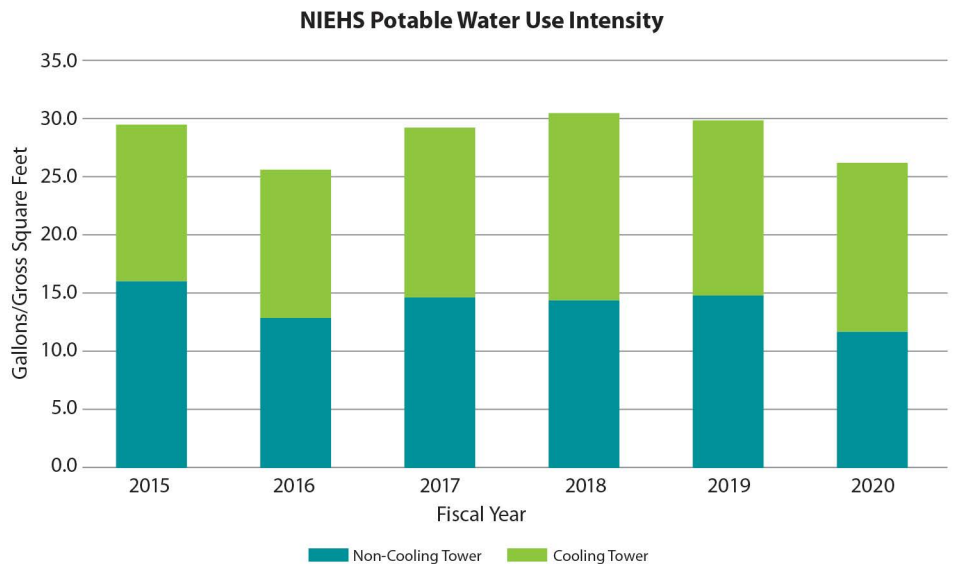


Water Use Efficiency and Management

Water meter installation and enhanced record-keeping enabled NIEHS to track its potable water usage separately from joint campus totals starting in 2015. NIEHS potable water usage held nearly steady from 2018 to 2019 at approximately 34 million gallons, and decreased to nearly 30 million gallons in 2020. This decrease was likely the result of the decrease in campus occupancy due to the pandemic, as well as initial testing for a reclaimed water system to support operation of the cooling towers at the CUP. Approximately 6.5% of total water usage in the cooling towers was reclaimed water in 2020.



NIEHS annual potable water use intensity has fluctuated between 26 and 30 gallons/GSF in the years spanning 2015 to 2020. As a comparison, potable water use intensity across all Department of Health and Human Services agencies was 51 gallons/GSF in 2019. E.O. 13834 directs a 20% reduction in potable water use intensity relative to the baseline year (2015 for NIEHS when meters were installed to differentiate campus usage). Potable water intensity at NIEHS decreased 11% in 2020 compared to 2015.





Water Conservation Efforts

The CUP optimization control system discussed under Energy Conservation also helps to reduce potable water use. The addition of a reclaimed water system to support cooling tower operations will further decrease the need for potable water. Readily available during months with high humidity, air conditioning condensate from EPA's main building will be blended with reclaimed water provided by the Triangle Wastewater Treatment Plant (Triangle WWTP). When the system is operational, potable water will only be used in the cooling towers during reclaimed water system maintenance and when condensate is not available (usually during cooler months with less humidity). The system began testing in October 2019 and is expected to be fully functional in 2021.

Additionally, in 2019, NIEHS replaced chilled water fan coil loop piping in the Rall Building, the main research and laboratory building on campus. The project will save an estimated 119,000 gallons of water annually, equivalent to nearly 5,000 10-minute showers or more than 900,000 bottles of drinking water.

Waste Management and Pollution Prevention

Pollution prevention is defined as any practice that reduces, eliminates, or prevents pollution generation at its source. Reducing the generation of pollution means less waste to control, treat, or discard, and fewer hazards posed to public health and the environment. NIEHS monitors wastewater, stormwater, and air emissions, and tracks solid waste generation and disposal with the continued goal of preventing pollution. The following E.O. and GRI standards NIEHS pollution prevention and waste reduction practices and reporting:

- [E.O. 13834](#) Sections 2(a), (f), (g), (h) – Waste Management, Electronics Stewardship, Greenhouse Gas Management, and Reporting
- HHS Sustainability Report and Implementation Plans – 2019 and 2020
- [GRI 303-2](#), Water – Management of water discharge-related impacts
- [GRI 303-4](#), Water – Water discharge
- [GRI 306-2](#), Effluents and Waste – Waste by type and disposal method
- [GRI 306-3](#), Effluents and Waste – Significant spills
- [GRI 306-4](#), Effluents and Waste – Transport of hazardous waste

E.O. 13834 and NIEHS prioritize the following waste management approaches, also known as the waste management hierarchy, from most to least environmentally preferred:

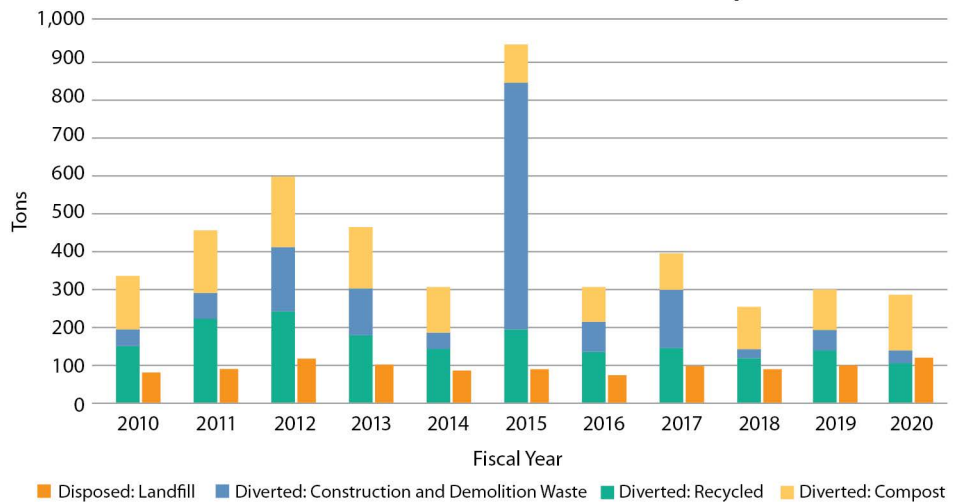
- Source reduction and reuse
- Recycling and composting
- Energy recovery
- Treatment and disposal



Non-Hazardous Solid Waste

NIEHS generates a variety of non-hazardous solid waste, including food scraps, office supplies, and lab items. E.O. 13834 directs agencies to prioritize strategies that reduce waste, cut costs, enhance resilience, and enable more effective accomplishment of their missions. E.O. 13834 Implementing Instructions allows for agencies to identify targets for non-hazardous waste, and NIEHS aims to divert at least 50% of non-hazardous solid waste (including food and compostable materials, and excluding construction and demolition materials) from landfills. On average, between 2010 and 2020, NIEHS diverted 80% of the non-hazardous solid waste that it generated. Landfill disposal was slightly higher in 2019 and 2020 compared to previous years mainly due to shipments of pathological waste incinerator ash, which is a byproduct of incinerator operation that is accumulated until a waste shipment is merited. Dumpsters weights in 2020 indicated solid waste generation was otherwise relatively stable compared to pre-pandemic operations.

NIEHS Non-Hazardous Solid Waste Diversion and Disposal



The NIEHS recycling and reuse program has been in place for 27 years, during which the Institute has diverted approximately 21.4 million pounds of materials from landfill disposal. NIEHS recycles paper and cardboard, glass, mixed metals, rechargeable batteries, electronic waste and printer toner cartridges, cooking oil, ice packs, laboratory materials, plastics, X-ray film, and polystyrene foam and polypropylene packing materials. In 2020, NIEHS held a “Toss-It Week” in which 68 large bins of surplus IT equipment, scientific equipment, office/lab supplies, and shredded paper were collected for reuse and recycling. In addition, NIEHS employees participated in the Environment@RTP Committee’s 2019 consumer electronics recycling event open to all RTP employees and recycled 461 pounds of personal electronic waste in 2020 via a [GreenDisk](#) collection point at NIEHS.

NIEHS composting streams included suitable pre- and post-consumer waste from the cafeteria, research animal breeding colony bedding, and, starting in 2020, expended research animal breeding colony feed. In the first year, 46 tons of expended animal feed was composted, which also eliminated the use of 3,000 trash bags. Unfortunately, as of September 2020, animal feed and bedding are no longer being accepted by the vendor and NIEHS is currently seeking other composting options.



Hazardous Waste and Radioactive Waste

Hazardous waste, regulated under the Resource Conservation and Recovery Act (RCRA), is a waste with properties that make it dangerous or capable of having a harmful effect on human health and/or on the environment. The NIEHS Chemical Inventory Management System was launched in 2019 to track hazardous chemicals at NIEHS in use above de minimis amounts. The goals of the system are to improve access to chemical safety data and help researchers manage their chemical inventories, thereby avoiding excess ordering and accumulation of expired stock that can become hazardous waste. The initial launch focused on inventorying new chemical stock as it is received. NIEHS plans to resume inventorying chemicals already on-site when the Institute returns to normal post-pandemic operations.

RCRA-regulated hazardous waste generation at the Institute dropped from 16,000 pounds in 2019 to slightly less than 9,000 pounds in 2020. This was mainly driven by a decrease in research activity levels on-site during the pandemic. NIEHS does not transport, import, export, or treat hazardous waste.

NIEHS further groups the hazardous solid waste generated on its campus into three categories: universal waste, energy recovery waste, and incinerated waste.

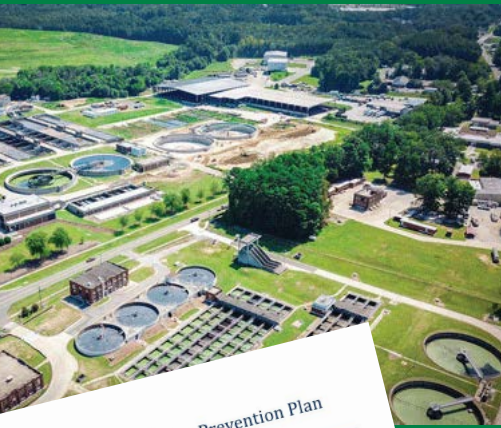
- Universal waste includes batteries, pesticides, mercury-containing equipment, and certain types of lamps and bulbs. NIEHS shipped slightly more than 2,300 pounds of batteries and lamps and bulbs between 2019 and 2020 for off-site recycling.
- Energy recovery waste refers to waste solvent from NIEHS research operations that is sent off-site for use as a fuel. NIEHS provided slightly more than 9,087 pounds of waste solvent between 2019 and 2020 for off-site energy recovery.
- The remainder of NIEHS-generated RCRA-regulated waste is sent off-site for destruction in a highly regulated, air emissions controlled incinerator; incineration is the primary and preferred treatment method because it destroys toxins, achieves the greatest possible reduction in the volume of the waste, and avoids landfill disposal.

Radioactive isotope use at the Institute has declined over time reflecting the direction of the research conducted at the Institute. Between 2019 and 2020, there were a total of four shipments of radioactive waste sent off-site for disposal. There were no radioactive material spills reported in either year.

Wastewater Effluent

Industrial and sanitary wastewater from NIEHS is gravity discharged to the Triangle WWTP, which is operated by Durham County and services the Research Triangle Park and surrounding areas. In 2020, NIEHS discharged 39 million gallons of wastewater, down from 42 million gallons in 2019, and a 38% decrease when compared to the 2008 baseline of 64 million gallons.

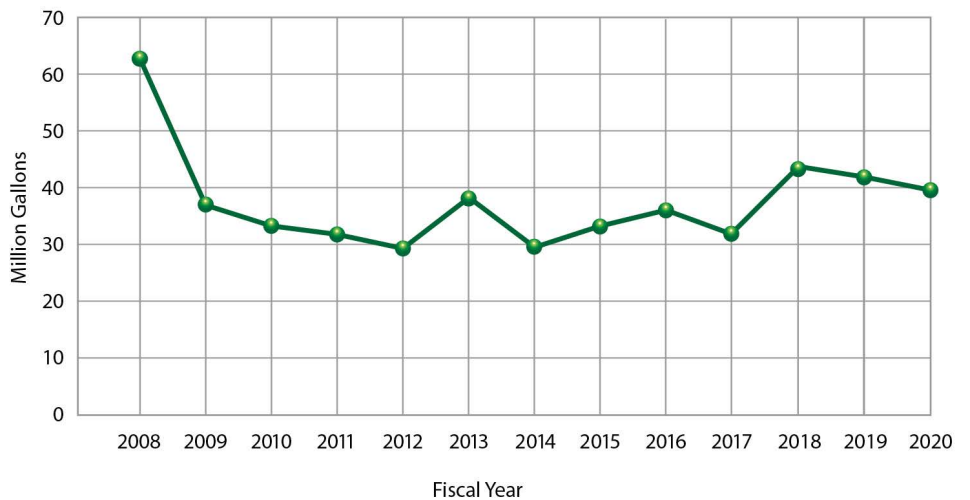
An increase in wastewater discharge in 2018 prompted a determination of where stormwater inflow or groundwater infiltration from record annual rainfall may have entered the NIEHS sanitary sewer system. Based on an investigation conducted in 2020 and its recommendations, manhole lid inserts designed to help prevent stormwater from entering the sanitary sewer system were installed at NIEHS.



NIEHS holds an industrial wastewater discharge permit with Durham County that requires monitoring for flow, temperature, pH, and a variety of pollutants and water quality parameters, typically on a semiannual basis. Results of sampling conducted in 2019 and 2020 complied with all permit limits.

NIEHS collaborated with the NIH Division of Environmental Protection (DEP) and Durham County to prepare a Drain Discharge Guide that was completed in September 2020. The guidance is designed to address chemicals that are not regulated, but can still have a negative impact to the environment. The guide underscores that wastewater treated at the publicly owned treatment works (POTW), Triangle WWTP in the case of NIEHS, flows to recreational and drinking water resources and stewardship of these important natural resources is our collective responsibility, and that drain discharge of unapproved chemicals can also impact the POTW's operation. The Drain Discharge Guide, therefore, lists which pre-approved chemicals may be discharged to the sanitary sewer and provides lab personnel with discharge procedures and additional resources including how to request an evaluation of an unlisted chemical.

NIEHS Wastewater Discharge



Stormwater

Campus stormwater becomes surface water upon discharge to Discovery Lake, which ultimately reaches Jordan Lake, part of the Cape Fear River Basin. NIEHS monitors its stormwater discharges to avoid flooding, erosion, and water pollution on its campus and in the surrounding community. No unplanned discharges to the stormwater management system occurred in 2019 and 2020.

NIEHS holds a Stormwater permit and maintains a Stormwater Pollution Prevention Plan with the North Carolina Division of Energy, Mineral, and Land Resources. All materials stored outside have concrete basin secondary containment, a double-walled tank design, or are covered. Stormwater collected in the secondary containment basins is visually evaluated for contamination before cleared for release to the environment. Visual and analytical stormwater samples are collected on a semiannual basis and tested for various pollutants and water quality parameters.

Excess nitrogen is of particular concern as it can overstimulate aquatic plant and algae growth which depletes dissolved oxygen, clogs waterways, and prohibits light from reaching deeper waters. The profile of Jordan Lake as a



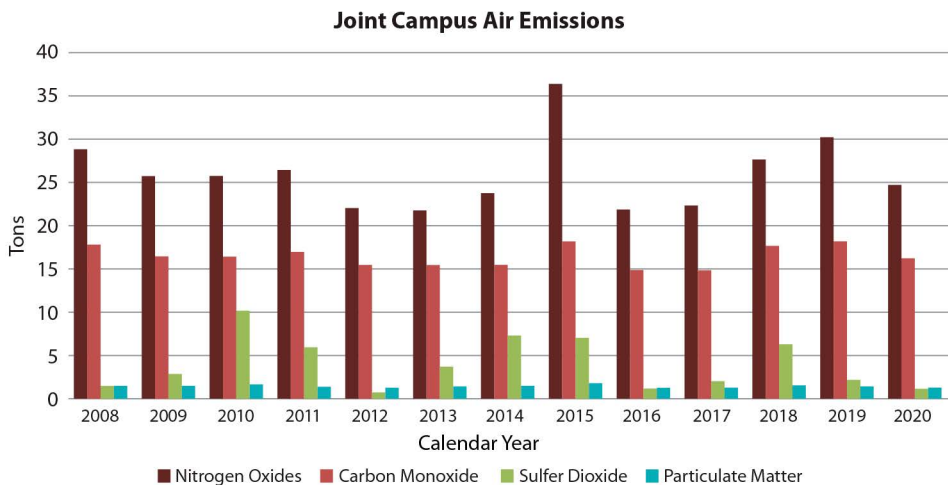
nutrient sensitive water (NSW) body (specifically nitrogen and phosphorus) was considered by the State of North Carolina when developing stormwater monitoring requirements and discharge limits. NIEHS has been below its 30 mg/L nitrogen permit limit since 2011. Stormwater results for the May 2020 sampling event were all in compliance with associated permit benchmarks and results were lower than typically found on the NIEHS Campus, especially total phosphorus, which was non-detect at both analytical monitoring sites for the first time ever.

There were several ground-disturbing projects in 2020. Silt fencing was installed to prevent sediment migration, and wattles were installed and maintained around downstream storm drains. Finally, practices at these sites were reviewed and project personnel were provided stormwater protection guidance as needed.

Chemical spill response materials are maintained at 10 outdoor locations across campus. Training is provided annually to all spill response and chemical handling personnel. In February 2020, a contractor delivery truck released a maximum of 10 gallons of diesel fuel from a ruptured engine fuel line. Absorbents were applied to road surfaces and affected surface soil at the road shoulder was removed. Environmental impacts are expected to be minimal and there was no release to the stormwater system.

Air Emissions

Air emissions result from the combustion of fuels at the boilers in the CUP and in campus emergency generators, and from the combustion of waste and fuel in the joint campus pathological waste incinerator. NIEHS holds a synthetic minor air permit for the joint campus issued by the North Carolina Department of Environmental Quality (NCDEQ). The permit limits air emissions of select criteria pollutants. Per the permit, NIEHS submits an emissions inventory to NCDEQ every seven years on a calendar year basis, with the next report due in 2024; additionally, NIEHS reports permitted air emissions on an annual calendar year basis. Emissions in 2019 and 2020 remained well below the 100 tons per year major source threshold for criteria pollutants included in the joint campus air permit. In 2020, there was a decrease in all emissions due to a decrease in emergency generator operations, as well as a decrease in fuel oil and natural gas combusted in the boilers. NIEHS has not had an air permit violation for over 10 years and strives to reduce joint campus air emissions whenever possible.





Changes in nitrogen oxides (NO_x), sulfur dioxide (SO₂) emissions, and particulate matter (PM) are closely tied to fuel oil usage. Fuel oil combustion is a major contributor to air emissions, and to reduce this impact, NIEHS uses Ultra Low Sulfur Diesel (ULSD) fuel oil, which is combusted only in the emergency generators and in the boilers during natural gas curtailment.

Natural gas is considered a cleaner burning fossil fuel than fuel oil, and is therefore the primary fuel for the boilers at the CUP. All four boilers use oxygen trim systems to optimize combustion efficiency, and the three newest boilers are outfitted with low nitrogen oxide burners to minimize nitrogen oxide emissions. Additionally, NIEHS uses a wet scrubber control device to capture pollutants from the incinerator before they reach the atmosphere. A decrease in sulfur dioxide (SO₂) emissions in 2019 was mainly due to a decrease in the amount of fuel oil combusted in the boilers compared to 2018.




Emergency generators can only be operated for limited periods outside of emergencies, and as long as needed during emergencies. Increases in emissions of NO_x in 2019 were caused primarily by longer generator runtimes campus-wide in nonemergency and maintenance modes.

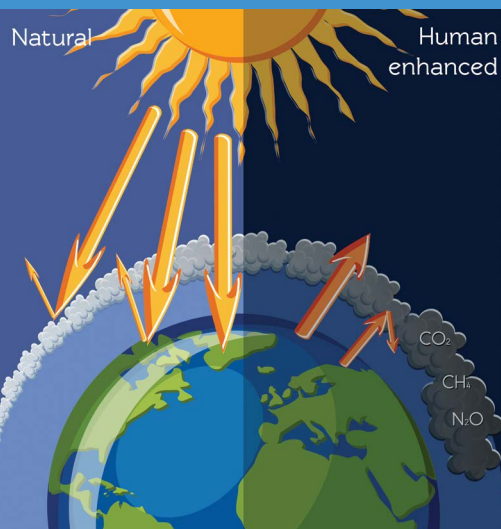
The pathological waste incinerator combusts pathological waste and uses a wet scrubber for highly effective control of metals, acid aerosols, and other byproducts. The number of incinerator operating days has been decreased by about 15% per month to reduce natural gas usage during the two-hour preheat and two-hour burndown periods when the incinerator is operating. The incinerated waste stream volume dropped dramatically during the pandemic due to reduced research activities on-site, resulting in the incinerator operating significantly less in 2020.

Greenhouse Gas Emissions

Greenhouse gases (GHGs) trap heat in the atmosphere. Some examples include carbon dioxide, methane, and nitrous oxide, which are naturally present in the atmosphere. However, human activities, such as the combustion of fossil fuels for transportation and electricity generation, as well as agriculture and industrial processes, have greatly increased GHG concentrations in the atmosphere.

GHG emissions can be described as direct or indirect, depending upon where the emissions generation takes place, and is accounted for under one of three “scopes” of emissions. GHG emissions at NIEHS from Scope 1 and 2 sources included carbon dioxide (CO₂), methane, and nitrous oxide. GHG emissions are commonly expressed in metric tons. E.O. 13834 does not specify a reduction goal for GHG emissions, but instructs agencies to track and report GHG emissions and reductions annually.

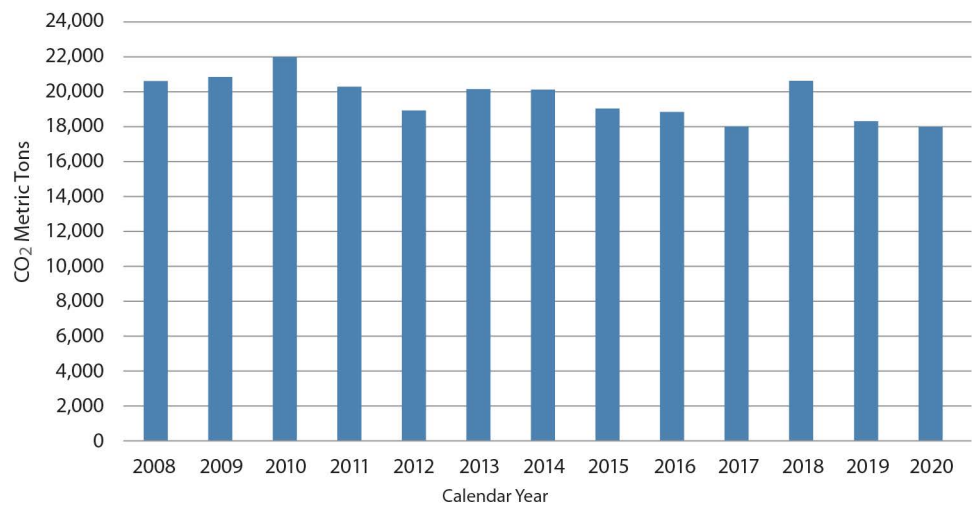
Emission	Description	Examples of NIEHS Sources
Scope 1 	Direct emissions from sources we control.	Combusting fuel in the boilers at the CUP and emergency generators on-site, driving government-owned vehicles.
Scope 2 	Indirect emissions that are the consequence of the electricity or steam we purchase.	Purchased electricity from Duke Energy used on the NIEHS campus and at Keystone.
Scope 3 	Other indirect emissions that are a consequence of our activities, but are emitted from sources we do not control.	Employee commuting, employee business travel, transportation to and disposal of solid waste in a third-party landfill, emissions that are a consequence of making the products we buy. Scope 3 emissions were not calculated for NIEHS.



GHG emissions estimates focused on CO₂, the largest amount of GHG emitted from the joint campus. Mobile fleet emissions are also considered Scope 1 emissions; however, fleet emissions from NIEHS are relatively small compared to other Scope 1 emissions, contributing approximately 1%, and are therefore discussed separately under Transportation. Over the last five years, Scope 1 emissions of CO₂ from the joint campus have averaged approximately 19,000 metric tons. Scope 1 emissions remained fairly level between 2019 and 2020. Boiler operation at the CUP, which contributed most to Scope 1 emissions, was not significantly affected by a drop in the occupancy levels on campus during the pandemic, but stayed relatively unchanged due to the similar weather conditions experienced during the two years. Annual reportable emissions of GHGs, which are derived from select Scope 1 emissions, have remained below the EPA Mandatory Reporting Rule threshold.

Scope 2 emissions from NIEHS have averaged approximately 12,000 metric tons per fiscal year. Scope 2 emissions in 2020 were the lowest to date due to the newly operational optimization system for the CUP chillers, and the decrease in campus electricity usage during the pandemic. The net energy gain from the NZE Warehouse totaled 42 metrics tons in avoided CO₂ emissions from the grid since the facility began operation in 2018.

SCOPE 1 – Joint Campus CO₂ Emissions From Stationary Combustion Sources



SCOPE 2 – NIEHS CO₂ Emissions From Electricity Utilization





PM88 / Shutterstock.com

Transportation

Per an analysis of EPA's most recently published [Inventory of U.S. Greenhouse Gas Emissions and Sinks](#), light duty vehicles (passenger cars and light duty trucks and vans) represented nearly 60% of CO₂ emissions from domestic transportation fossil fuel combustion. This data underscores the importance of sustainable transportation efforts and the use of alternative fuels.

The Institute continued to support sustainable approaches to fleet management and employee commuting in 2019 and 2020. The following standards guided sustainable transportation management at NIEHS:

- [E.O. 13834](#) Section 1 – Fleet Management
- [Energy Independence and Security Act](#), Section 142

Vehicle Fleet Management

The NIEHS vehicle fleet is primarily comprised of passenger vehicles, vans, and trucks. These vehicles are used for various purposes, including maintenance and employee transport. The NIEHS vehicle fleet was comprised of 40 vehicles in 2019, and 39 vehicles in 2020, six of which were electric in both years. Per the E.O 13834, NIEHS strives to:

1. Right-size the fleet.
2. Reduce vehicle miles traveled.
3. Replace ineffective vehicles with more fuel-efficient vehicles.
4. Align deployment of alternative fuel vehicles with fueling infrastructure.

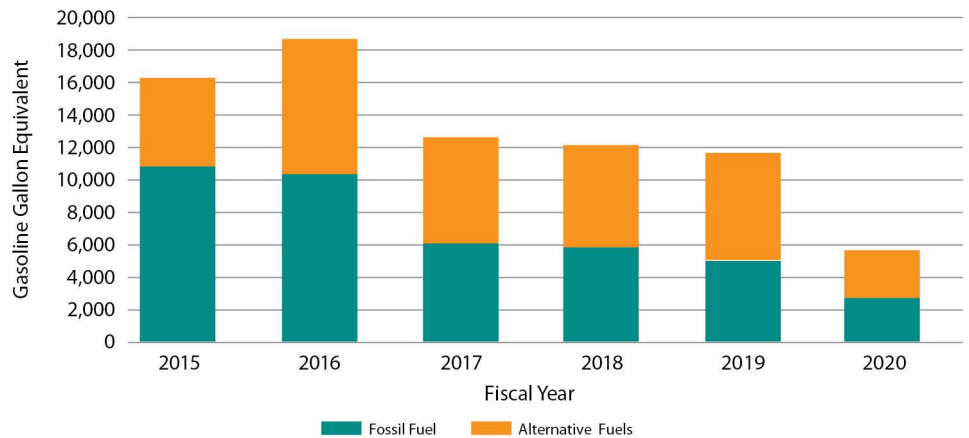
NIEHS fleet vehicles combust gasoline, B20 biodiesel, diesel, and E85 (flex fuel), and use electricity. NIEHS monitors the fuel usage and miles traveled of its fleet on an annual basis. NIEHS has used alternative fuels as far back at 2007, but tracking began in 2015.

NIEHS increased the number of electric vehicles in the fleet from two in 2018 to six in 2019. Three of these vehicles are primarily used on campus for operations and maintenance activities by transporting staff and tools between the shops and NIEHS research facilities. The vehicles meet federal highway safety requirements for low speed vehicles with a maximum speed of 25 MPH and can make approximately 10 round trips of 1.5 miles per day between the main Institute building and the engineering shops building. Overall, these three vehicles are estimated to save approximately 14 metric tons of carbon emissions over a five-year lifecycle.

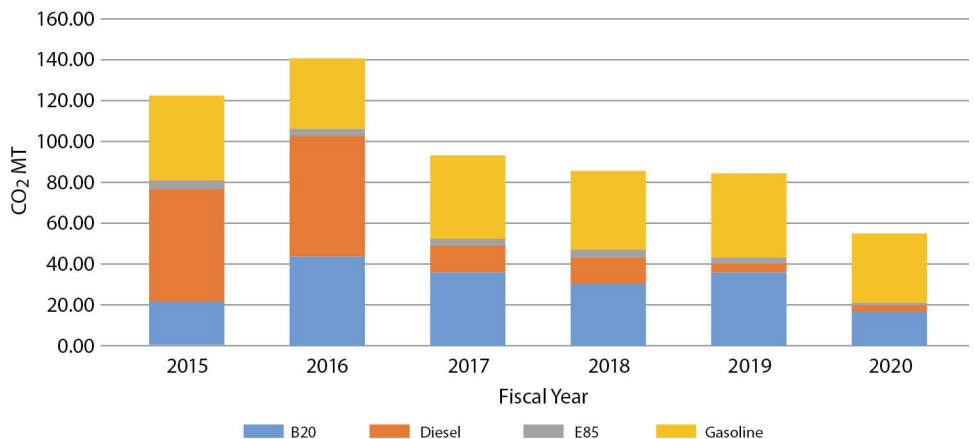


A decrease of nearly 64,000 miles traveled between 2019 and 2020 was due to limited staff on campus, as well as travel restrictions caused by the pandemic. A decrease in observed fleet fuel efficiency, dropping from 9 miles per gasoline gallon equivalent (GGE) in 2019 to 7 miles per GGE in 2020, was likely due to shorter distance and lower speed travel patterns for the fleet in 2020 caused by the pandemic as well. While fleet fuel use has generally declined over time, the amount of alternative fuel used has generally increased; 56% of fleet fuel use was attributed to an alternative fuel in 2019, compared to 38% in 2015. Mileage and energy use are not currently tracked for the six electric vehicles in the fleet. Fleet-wide GHG emissions have generally decreased over time as well.

NIEHS Vehicle Fleet Fossil Versus Alternative Fuel Usage



Scope 1 – CO₂ Emissions From the NIEHS Vehicle Fleet



Alternative Transportation

NIEHS encourages and supports employee telecommuting and using alternative transportation methods through initiatives that include subsidizing the cost of bus fares and ridership in GoTriangle’s vanpool program. To encourage use of public transportation, starting in 2019, NIEHS collaborated with GoTriangle to allow staff and visitors to take a free Uber or Lyft between NIEHS and the Regional Transit Center on nearby Slater Road. Beginning in 2019, staff who live more than 10 miles from NIEHS were able to receive a monthly voucher for costs associated with participating in a vanpool with other staff members to encourage ride-sharing and reduced commuting emissions. The vanpool program was suspended in 2020 due to the pandemic.



NIEHS is also a registered employer with GoTriangle's Emergency Ride Home (ERH) program. Under the ERH program, if an employee using alternative transportation needs to leave unexpectedly, they are eligible for a voucher for a free rental car or taxi up to six times per year. This program allows employees to use alternative transportation with the reassurance of knowing they can still have access to a car ride home in an emergency, overtime, or if their carpool leaves early or late.

Due to physical distancing to reduce the spread of the COVID-19 virus, most employees transitioned to teleworking in March of 2020 and did not commute to campus except for essential workers, those who were performing critical research functions in laboratories, and those who came for voluntary, weekly asymptomatic COVID-19 testing that began later in 2020.

Sustainable Labs

NIEHS strives to evaluate and reduce the environmental impacts of its lab operations as much as possible. Traditional lab spaces contain many fixed elements that require major renovations to modify. To increase the efficiency of lab renovations, NIEHS has begun installing flexible labs – labs that have components that can be easily changed. NIEHS has



three lab groups that currently operate in flexible labs and aims to expand as laboratories are due for updates or renovations. Lab benches are lighter and not permanently fixed to the floor. Shelving units can be added or removed from the wall easily. Electricity is wired through tracks in the ceiling or through the center of the lab for easy modification, so placement of equipment is not dictated by accessibility to wall outlets. NIEHS selected durable materials for the new components so replacement is required less frequently.

In 2020, the Institute worked to identify and encourage sustainability in the labs by collaborating with laboratory staff to develop a voluntary NIEHS Green Researcher Self-assessment (GRSA). This self-assessment asks each respondent to answer questions on their energy, water, waste, and green procurement laboratory practices, and includes links and information to help researchers learn more about how to reduce their environmental impacts. High-achieving researchers will be awarded an NIEHS Green Researcher Certification – bronze, silver, gold – depending on their score. The GRSA results and inaugural certifications will be awarded in 2021 in recognition of Earth Day.



Green Purchasing

In 2019 and 2020, NIEHS continued to implement practices that promote sustainable procurement, also known as green purchasing. The Institute provides green purchasing training for all purchase cardholders and card-approving officials, as well as training that refreshes green purchasing goals.

The NIEHS Office of Acquisitions follows the federal acquisition regulation and E.O. requirements, as mandated by NIH and DHHS. The following standards guide green purchasing practices.



- E.O. 13834 Section 2(g) – Acquisitions
- Energy Policy Act (EPA) of 2005, Section 104 – Energy Star and Federal Energy Management (FEMP)-designated energy efficient products
- Energy Independence and Security Act (EISA)
- Montreal Protocol and ozone depleting substances
- Solid Waste Disposal Act, RCRA Section 6002 and 40 CFR Part 247, Comprehensive Procurement Guidelines
- The Farm Bill and USDA’s designated biobased products
- UN SDGs Goal 12: Responsible Consumption and Production

The Office of Acquisitions conducted pre-solicitation and pre-award contract reviews for all new solicitations and contract actions in 2019 and 2020 to ensure that at least 95% of new contract actions for the supply of products and acquisition of services, including construction, included one or more green purchasing attribute. Contract actions reviewed included new and existing contracts, as well as task and delivery orders placed against them.

NIEHS continued to stipulate that products required by contract agreements meet agency performance standards for green purchasing.

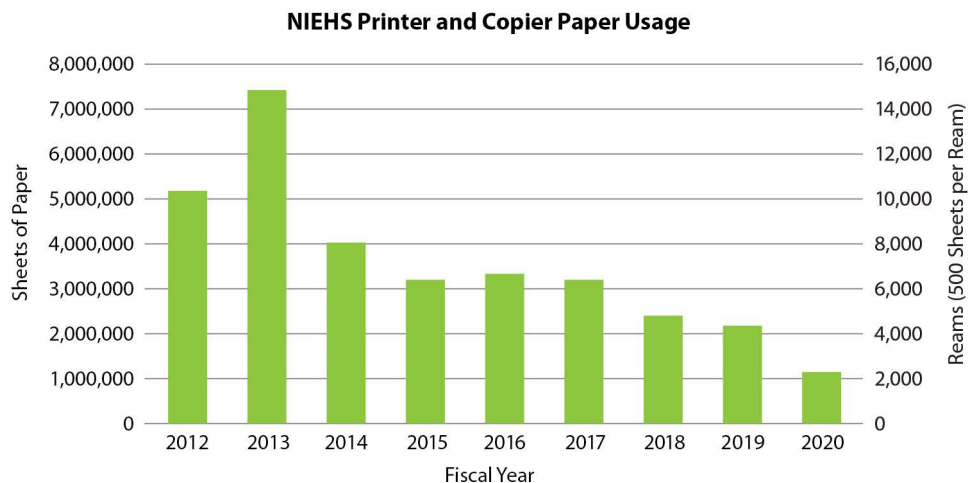
The next page shows some examples of NIEHS green purchasing efforts during 2019 and 2020.



- NIEHS continues to use biobased transformer fluid in two transformers on its campus to avoid contaminating soil and groundwater in the event of a dielectric fluid leak or spill. In addition, most custodial products used were biobased, including floor strippers and waxes. NIEHS continues to explore ways to use biobased alternatives in other applications.
- Cafeteria plates, cups, bowls, straws, and disposable food containers were compostable in 2019. NIEHS identified sturdy compostable flatware, as well as a sanitary dispenser, for use in the cafeteria in the future; this has been a challenge in the past as compostable utensils tended to bend when used with hot foods or beverages. Supply chain and pricing impacts experienced during the pandemic periodically affected the ability of the Institute to offer compostable cafeteria supplies in 2020, but NIEHS and support staff strove to continue to procure them despite the challenges.
- All computers and electronic equipment purchased met Energy Star or Electronic Product Environmental Assessment Tool (EPEAT) requirements.
- EPA published Energy Star specifications for laboratory grade ultra-low temperature (ULT) freezers in mid-2017. NIEHS purchased 35 Energy Star ULTs in 2019, and funded the purchase of an additional 13 Energy Star lab-grade freezers in 2020.
- All letter-sized printer and copier paper purchased contained 100% post-consumer fiber content.
- Most paint used at NIEHS is certified for low chemical and odor emissions.
- Instead of buying new furniture for the auditorium and lobby renovation in 2020, NIEHS reupholstered stackable audience chairs; lobby club chairs, love seats, coffee tables, and end tables; and speaker podiums. The renovation also included the use of sustainable carpeting materials with [Environmental Product Declarations](#) and [Declare labeling](#).

NIEHS continues to decrease the amount of printer and copier paper purchased by 57% from the 2012 baseline. Paper use in 2020 was significantly lower due to the reduction in personnel on-site caused by the pandemic. NIEHS took the following actions in 2019 and 2020 to decrease the amount of paper used.

- Continued education efforts on the Printer Policy implemented in 2015 to reduce the amount of energy, paper, and ink consumed by all printers.
- Reduced the number of printers at the Institute from 981 in 2018 to 843 in 2020, which reduced printer maintenance, supply cost, and paper usage.





Progress Through People

Making progress toward a sustainable future requires the effort of everyone at the Institute, as well as requires outreach and communication at various levels – regionally, nationally, and globally.

This Section is driven by the following guidelines and standards:

- [E.O. 13934 Section 3](#) – Sustainability Goals
- [UN SDGs Goal 3: Health, Target 3.d](#)
- [UN SDGs Goal 5: Gender Equality, Targets 5.1, 5.6, 5.B](#)
- [UN SDGs Goal 13: Climate Action, Targets 13.1, 13.3](#)
- [UN SDGs Goals 17: Partnerships, Target 17.19](#)
- [Federal Energy Management Program – Resilience Planning and Implementation](#)

Workplace Sustainability

In addition to our environmental health science programs, it's also a point of pride that sustainability is incorporated into everyday workplace operations. A variety of initiatives in place help NIEHS decrease the environmental footprint of our activities, including:

- Environmental Management System
- [Green Researcher Self-Assessment](#), developed in 2020 and launching in January 2021
- Upgrading ULT freezers and cold rooms to more energy-efficient models
- Reuse, recycling, and composting programs
- Energy saving modes on computers, copiers, and other electronics
- Sustainable commuting initiatives
- Alternative and renewable energy use
- Outdoor LED lighting
- Electric and hybrid fleet vehicles

Interested employees can also join one of several committees and groups that promote sustainability at the workplace, such as the Environmental Awareness Advisory Committee (EAAC) and the NIH-Wide Sustainable Laboratories Working Group. Employees can also subscribe to the NIH Green Zone Newsletter to stay informed about environmental programs.

Since 1993, NIEHS has participated in the N.C. Department of Transportation's Adopt-a-Highway Program. NIEHS is responsible for collecting trash and debris on a 1.2-mile stretch of road adjacent to the campus. NIEHS volunteers removed a total of approximately 150 pounds of trash and recyclable materials collected during an event in November 2019. Due to the pandemic, Adopt-a-Highway volunteer efforts were suspended for 2020.



THE GREEN CHAMPION AWARDS

Environmental Awards and Recognition

The Green Champion Awards were established in 2009 by DHHS to recognize federal agencies' efforts to reduce GHG emissions, water consumption, and pollution. Awards are typically announced in April during Earth Day for the previous fiscal year. NIEHS received five Green Champion Awards under multiple categories in 2019 (awarded Earth Day 2020) adding to the Institute's long-standing history of recognition.

Energy and Fleet Management: NIH NIEHS All-Electric Vehicles

NIEHS reduced the site's carbon footprint by more than 30,000 pounds of carbon emissions, and fuel costs by \$25,000 over a five-year period by using three all-electric low-speed vehicles for the Maintenance and Operations program. The addition of a small box truck to carry tools and supplies, and a truck with a liftgate for moving heavy equipment, has improved the department's ability to provide high-quality service.

Environmental Stewardship: NIH NIEHS Vivarium Animal Feed Composting Initiative

NIEHS Comparative Medicine Branch worked collaboratively to successfully divert approximately 46 tons per year of used, unconsumed animal feed to composting. This reduced carbon emissions by 41 MT and decreased consumption of natural gas by one million cubic feet, and eliminated the use of 3,000 trash bags annually, representing a significant reduction in the use of plastics associated with vivarium operations

Energy and Fleet Management: NIH Freezer Challenge

NIH held its first freezer challenge from January 1 – April 1, 2019, to reduce energy consumption from laboratory-grade and ultralow temperature freezers across NIH. Eight labs, one bio-repository, and a participant from the Mass Spectrometry Research and Support Group in the Epigenetics and Stem Cell Biology Laboratory at NIEHS participated in the challenge. Their efforts in this challenge will save NIH 14,975 kWh/year, \$12,647/year, and 48 MT CO₂e/year.

Sustainable Design and Facilities: NIH NIEHS Rall Building Public Space Renovations

Renovations and improvements to Rodbell Auditorium addressed life-safety deficiencies and encouraged hosting on-site conferences instead of renting and traveling to off-site venues. Additionally, existing single pane skylights in the Rall Building mall areas were replaced with electrochromic glass, dramatically improving the comfort and usability of these large central circulation spaces while reducing heat load and glare. The projects to replace the mall skylights and the Main Entrance store front resulted in savings of more than 40,000 KWH of energy and represent a coordinated sustainable design and renovation effort.



Water Use Efficiency: NIEHS Rall Building Chilled Water Fan Coil Loop Piping Replacement

NIEHS completed the design and construction of a chilled water fan coil loop piping replacement project in the Rall Building. This phased project reduced pump energy and eliminated the risk for catastrophic failure of the existing corroded 40-year-old steel pipes. The estimated annual water savings is 119,000 gallons, equivalent to 4,760 10-minute showers, or 901,300 bottles of drinking water.

Climate Resilience Planning

E.O. 13834 directed institutions to prioritize resilience, defined as the ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions. NIEHS published a Climate Resilience Report in May of 2018 that identifies and evaluates the probability, impact, and order of magnitude cost of climate-related vulnerabilities to prepare NIEHS to adapt with agility to extreme weather and changes in climate – the first in NIH. Leveraging this report, NIEHS prepared a Climate Resilience Plan in 2019 focusing on implementation of recommended climate resilience measures. NIEHS initiated a feasibility study in 2020 to evaluate adding a water tower and/or groundwater wells on campus to provide enough water for five days (one work week) of mission critical campus operation during limited municipal water availability due to drought or emergency situations, a key implementation measure recommended in the plan. The feasibility study is planned for completion in 2021.

Community Engagement

During 2019 and 2020, NIEHS engaged communities at all levels on environmental health and sustainable environments. This community engagement has allowed NIEHS to forge new connections and exchange ideas both internally and externally. The activities described below offer a small snapshot into the wide array of community engagement at NIEHS and are organized around the following themes:

- Forging connections among communities and researchers.
- Fighting the COVID-19 virus.
- Employee wellness and enrichment.
- Engaging local communities.
- Engaging communities nationwide.
- Global environmental health.

Please visit the [Environmental Factor](#), the NIEHS monthly online newsletter, to read more about our community engagement activities, research, and more.





NIEHS Science Days



NC Women of Color Network



23rd Annual
NIEHS BIOMEDICAL CAREER SYMPOSIUM

Forging Connections

NIEHS collaborates widely to further research and encourage careers in environmental health sciences, and in turn create a healthy, sustainable future. For example, in 2019, NIEHS connected with individuals from North Carolina universities, government agencies, and the private sector to discuss topics ranging from career advancement for women researchers and scientists of color to engaging young scientists in science, technology, engineering, and mathematics (STEM). Due to the COVID-19 virus, much of 2020 connections were moved to virtual platforms and focused on fighting the virus.

2019 Second Annual Symposium of the NC Women of Color Research Network (NoCRN)

NIEHS hosted its second annual symposium of the North Carolina Women of Color Research Network in 2019. The group involved researchers from North Carolina universities, government agencies, and the private sector. The theme was, "Becoming: Women in Science," inspired by the memoir "Becoming" by former first lady Michelle Obama.

2019 Sixth Annual NIEHS Science, Teachers, and Research Summer (STaRS) Experience

STaRS is program for North Carolina teachers to gain laboratory skills, which they utilize to create new classroom projects that will help students become more engaged in science. The goal of STaRS is to make science relevant to real life. Hosted in 2019 as a two week in-person program, STaRS was on hiatus in 2020 due to the pandemic, and plans to provide a one-week virtual program in 2021.

2019 Friends of NIEHS Meeting

The annual Friends of NIEHS (FNIEHS) meeting was held in Washington, D.C., in 2019. More than 30 research, environmental health, and patient organizations are part of NIEHS. FNIEHS shares information on environmental health with members of Congress and their staff.

2020 NIEHS Science Days

The 17th Annual NIEHS Science Days in 2020 celebrated scientific research across the Institute. This event allowed researchers, trainees, and grantees to network and share information. The event had a spotlight on trainees and gave them opportunities to present their research through talks and virtual posters.

2020 Summer STEM Program

The NIEHS Office of Science Education and Diversity (OSD) virtually hosted 55 local teachers in 2020. Teachers explored problem-based learning projects so students can analyze the biological, environmental, and social factors that affect an individual's vulnerability to COVID-19.

2020 NIEHS Scholars Connect Program

This is an annual program and, in 2020, members of the program presented research in a virtual setting. NSCP aims to increase the number of students from underrepresented groups in the sciences, and especially environmental health sciences.



Fighting the COVID-19 Virus

NIEHS played a critical part in fighting COVID-19 through research, education, and training. Below are some of the efforts NIEHS initiated or supported in 2020.

Antibody Study

The NIEHS Clinical Research Unit tested blood from volunteers for the antibodies that signal exposure to SARS-CoV-2, the virus that causes COVID-19. The study is ongoing and aims to determine if a person was exposed and, if they are, how antibodies ebb and flow over time.

Structural Studies

Researchers have used cryo-electron microscopy to see how COVID-19 RNA processing factors bind to small molecules, and used computer simulations to model how the structure of the virus differs depending on whether samples are prepared in water or at the interface of air and water.

Lung Injury

Researchers are studying the implications of the COVID-19 infection on smokers, and determined that smokers seem to be a higher risk for illness and mortality than non-smokers.

COVID-19 Virus Epidemiology

Researchers have created apps to track symptoms, as well as developed tests to identify COVID-19.

COVID-19 Worker Training Program Virtual Workshop

NIEHS offered training through video, virtual reality, and mobile platforms in 2020, focusing on strategies to prevent the spread of COVID-19. Workshop speakers discussed transmission of SARS-CoV-2, the virus that causes COVID-19, as well as worker protections, and federal, state, and local training efforts.

Employee Wellness and Enrichment

NIEHS promotes workforce wellness and quality of work life on-site by integrating the natural environment into the development of NIEHS campus buildings and grounds. An on-campus wellness facility at NIEHS, temporarily closed during the pandemic, and a Discovery Lake walking trail promote employee fitness; during the pandemic, fitness classes and challenges were offered virtually. The Institute hosted educational events focused on wellness, environmental stewardship, and sustainability. Due to the pandemic, most of 2020's events were conducted virtually.



Climate Stewardship Challenge

Employees were challenged in 2019 to think about small steps they can make to reduce energy usage and contribute to climate stewardship at NIEHS. Suggestions included taking the stairs, powering off devices in labs when not in use, and reducing the number of freezers and printers in each lab.

Spirit Lecture

The Spirit Lecture is an annual program at NIEHS designed to recognize highly respected, outstanding women of notable achievement. In 2019, Dr. Germaine Buck Louis presented, "A Winding Path to a Rewarding Career in Public Health," and in 2020, Dr. Frederica Perera presented, "Translational Research to Prevent Environmental Threats to Children: From Chemicals to Climate Change."



Earth Day



Women's Health Awareness Day



Global Health Career Day

Earth Day

The theme of Earth Day 2019 was, “Protect our Species,” and activities included a seminar on endangered red wolves, presentation and tour of the NZE warehouse highlighting its sustainable features, “Drop In” Environmental Management (EMS) Training, “Bring Your Child to Work Day” with Earth Day-related activities, and a seminar on bio-based products. In April 2020, NIEHS celebrated the 50th anniversary of Earth Day. The theme was, “50 Years of the Golden Rule – Reduce, Reuse, Recycle.” Activities included a HHS-wide Kid’s Earth Day Poster Contest and a [virtual presentation by Ms. Sushma Masemore, the State Energy Director for North Carolina](#) on the governor’s Clean Energy Plan and how the state is increasing renewable energy and reducing carbon emissions.

Promoting Mental Health and Wellness During COVID-19

To communicate and provide support during COVID-19, NIH published the “NIH Guidance for Staff on Coronavirus” on the intranet in 2020. This website provided updates on cases, vaccines, and announcements. It also provided many resources for mental health and wellness coping skills for changes or stresses related to the COVID-19 virus.

Engaging Local Communities

NIEHS regularly participates in events with the local community to encourage health and environmental sustainability. Some examples are shown below.

CitSci (Citizen Science) Conference

CitSci 2019 highlighted NIEHS grantees and other researchers collaborating with volunteers to collect and analyze data and return results. More than 800 conference attendees from around the world were treated to several presentations that provided examples of NIEHS-supported citizen science approaches.

Women’s Health Awareness Day

The fifth annual Women’s Health Awareness Day, co-sponsored by NIEHS, was held at North Carolina Central University in 2019. It provides health awareness, education, information, resources, and on-site health screenings.

Global Health Career Day

NIEHS hosted the third annual Triangle Global Health Consortium Career Day in 2019 to educate and empower young professionals with tools and guidance on how to go after opportunities.

NIEHS Speakers Bureau

Community groups, such as schools or Girl Scout troops, can request in-person or virtual speakers from NIEHS through the NIEHS Speakers Bureau, part of the OSED. In 2019, NIEHS visited more than 300 events, with approximately 1,800 participants across the region. In 2020, Speakers Bureau coordinator John Schelp spoke to a local group at the University Club in Durham, North Carolina.



Engaging Communities Nationwide

NIEHS engages with stakeholders nationwide to promote environmental stewardship and sustainability, and address national environmental health challenges. Examples of some of the events NIEHS was involved in during 2019 and 2020 are discussed below.

“A Day in the Life”

Los Angeles, California. For “A Day in the Life” project in 2019, NIEHS partnered with the Community Engagement Program on Health and Environment to help students from communities of color located near high air pollution areas use a story map to visualize community exposure.

Science Take Out

Rochester, New York. NIEHS partnered with the woman-owned small business “Science Take Out” and the University of Rochester (UR) in 2019 to design and create hands-on kits to help students learn lead poisoning and encourage discussions about actions to reduce exposures to environmental health hazards.

Chemical Emergency Response Training

Winslow, Arizona. NIEHS grantee International Brotherhood of Teamsters trained railroad workers in 2019 in the Navajo area of Arizona on hazardous materials and skills to protect their health.

Congressional Briefing on Children’s Environmental Health

Washington, D.C. NIEHS presented on children’s environmental health and harmful algal blooms in the 2019 Congressional Briefing, “A Healthy Start for Every Child – How the Environment Influences Health & Development.” Dr. Linda Birnbaum, former NIEHS Director, and NIEHS Senior Medical Advisor Aubrey Miller, M.D., also met with U.S. Representative Vern Buchanan from Florida’s 16th congressional district.

Duwamish River Tour

Seattle, Washington. During the 2019 NIEHS SRP Annual Meeting, participants toured the Duwamish River to learn about the river’s history as a Superfund site and the community groups that have worked to protect the river. The tour was hosted by the Duwamish Tribe, the Duwamish River Cleanup Coalition, and the EPA.

NIEHS Superfund Research Program (SRP)

Texas and Louisiana. SRP funds university-based grants on basic biological, environmental, and engineering processes to find real and practical solutions to exposures to hazardous substances. Scientists funded by the NIEHS SRP in 2020 developed online tools to inform local communities about potential environmental health risks.

Voices Unheard: Arizona’s Environmental History

Arizona. Voices Unheard is an NIEHS-funded project that captures video accounts, photos, and descriptions from communities near two Superfund sites – Tucson International Airport Area and the Iron King Mine-Humboldt Smelter. In 2020, this project documented the local knowledge and history of the exposure and cleanup.

NIEHS and Apple Conduct Women’s Health Study

Durham, North Carolina. As part of a collaboration with Apple’s new Research app and the Harvard T.H. Chan School of Public Health launched in 2019, NIEHS will contribute data starting in 2020 to better understand menstrual cycles and how they relate to woman’s health. Data will be collected through the app and may help researchers understand polycystic ovary syndrome, infertility, osteoporosis, and menopausal transition.



Global Collaboration

NIEHS provides global leadership by hosting and participating in global forums and conferences related to environmental health science. Some highlights from 2019 and 2020 include the following.

New Delhi Workshop on Community-Based Participatory Research Methodology

New Delhi, India. The Community-Based Participatory Research (CBPR) Methodology workshop brought together U.S. and Indian researchers and practitioners in 2019 with expertise and interest in participatory research approaches. Speakers discussed air pollution, pesticide exposure, environmental disasters, and how CBPR methods used in the United States might be adapted for India.

Environmental Health-Related Social Media Q&A

Internet – Reddit Ask Me Anything. Experts from NIEHS and the Eunice Kennedy Shriver National Institute of Child Health and Human Development answered questions about pollution and pregnancy in 2019; and experts from the National Toxicology Program (NTP), National Institutes of Health Office of Dietary Supplements (ODS), the National Center for Complementary and Integrative Health (NCCIH), and the American Botanical Council (ABC) answered questions about botanical supplements in 2020. Both Q&As were addressed via Reddit’s Ask Me Anything platform, available to anyone globally with an internet connection.

NIEHS and India’s Council of Scientific and Industrial Research - Memorandum of Understanding

India. NIEHS and India’s Council for Scientific and Industrial Research established a formal relationship in 2019 – a memorandum of understanding to address air pollution in India. This partnership encourages collaborations and exchanges of expertise and training focused on air pollution in India.

Bangladesh Ministry of Public Administration Visit

Durham, North Carolina. Bangladeshi officials visited and toured NIEHS in early 2020 to learn about 36 research projects in Bangladesh, including work on arsenic exposure and air pollution.



Looking Ahead

NIEHS continues to recognize the need to actively incorporate sustainable practices into everyday operations. In 2019 and 2020, NIEHS began planning multiple projects that will help to conserve our resources for years to come. NIEHS initiated the following projects:

- Throughout the COVID-19 pandemic, we upgraded facility operations and management practices to protect staff and others who visit the institute's campus. NIEHS anticipates becoming the first federal agency to achieve the [International WELL Building Institute's Health-Safety Rating](#) in recognition of those efforts.
- NIEHS will continue seeking opportunities to use biobased products in new construction and incorporate the use of additional biobased products in operations.
- In 2021, NIEHS plans to purchase and replace lab-grade freezers lacking central monitoring and those with a problematic operating history with newer, Energy Star certified units. In 2022, NIEHS will budget for annual replacement funding that will focus on a 12-year lifecycle.
- In 2021, NIEHS will evaluate and publish on the Institute's intranet best practices to minimize environmental impacts during business travel. These tips will help employees evaluate and minimize their environmental footprint – air, water, waste – when attending meetings and conferences. It will also outline best practices for hosting meetings and conferences at NIEHS with low environmental impacts.
- The NIEHS Campus is an approved USDA parasitoid wasp release site for biological control of the Emerald Ash Borer (EAB) and hopes to release wasps when more wasps become available in 2021. This program involves release of small wasps into an infested area to find and deposit eggs onto the EAB larvae. The wasp larvae are parasitic and will devour the EAB larvae, which is a proven and safe biological method of EAB population control.
- NIEHS has identified sturdy compostable flatware, as well as a sanitary dispenser for use in the cafeteria. Installations are expected to begin in 2021, resulting in reduced plastics going to the landfill, as previous flatware was not compostable.
- At the end of 2020, NIEHS reviewed and updated the Waste and Recycling Guide as an initial step for reviewing and revamping the NIEHS recycling program in 2021.
- In 2021, NIEHS will evaluate the impacts of maximum telework and how it may affect future work practices, and will include safety, health, and environmental considerations.
- Approximately 30 water fountains with touchless water bottle filling stations will be installed on campus in 2021. Each station will calculate and display bottled water savings associated with its water throughput.