NIH Recipients of an FY2020 HHS Green Champion Award

The recipients of the FY2020 HHS Green Champion Awards have been announced and many individuals, groups, projects and programs from the NIH were recognized with an award. Of the 37 total awards, 14 were from the NIH. The topics of these awards included ULT energy efficiency, Styrofoam waste diversion, proper PPE disposal, heat retention in hot water pipes, and many more. Please join us in recognizing these accomplishments, which are described below!

SUSTAINABLE ACQUISITIONS

NIH NIEHS Ultralow Temperature Freezer Replacement Project
Paul Johnson, Brian Harris, Kerri Hartung, Rachel Faison, Michael Spencer, Chris Long, Rachel Scroggins, Tom Sliwa, Kim Jones, Steven Smith

The National Institutes of Health (NIH) National Institute of Environmental Health Sciences (NIEHS) campus, located in Research Triangle Park, North Carolina, replaced 35 existing ultralow temperature (ULT) freezers with new ENERGY STAR certified ULT freezers. The current inventory of more than 400 cold storage units were analyzed to identify older, energy inefficient freezers with an inherent increased risk of scientific sample loss, elevated maintenance costs and increased operating costs.

Thirty-five ULT freezers, between 12 and 24 years old, were replaced and are projected to reduce electricity usage, cost, and greenhouse gas (GHG) emissions by 64% annually. The new units will annually save 232,896 kilowatt-hours (kWh) of electricity (equivalent to about 20 US households), $12,809 (equivalent to the annual replacement cost of one ULT freezer replacement), and 150 metric tons (MT) of carbon dioxide equivalent (CO2) (equivalent to 15 trips around the world in an average passenger car). This initiative encourages the proactive annual review and replacement of aging ULT and lab grade freezers.

CHANGE AGENTS

NIH Building 49 Styrofoam Take Back Program
Denise Larson, Cristin Davidson

The National Institutes of Health (NIH) Styrofoam Cooler Return Program was initiated on the NIH Bethesda main campus in 2010, as a free Take-Back program offered by Thermofisher. However, widespread implementation has been difficult since each building on the Bethesda campus poses its own unique challenges and barriers that can hinder a successful program.

Denise Larson and Cristin Davidson have been the trailblazers, making such efforts possible in Building 49. Their efforts contributed significantly in changing workplace sustainability practices and helping NIH achieve its goal to recycle at least 50% of all non-hazardous solid waste. The success of this program has resulted in positive environmental and economic impacts since coolers are recycled free of charge for beneficial reuse, eliminating disposal in landfills.

Their leadership embodies the NIH mission and has gone above and beyond the scope of their duties. Their efforts have left an immeasurable impact on the staff of Building 49 and inspired employees to incorporate sustainability into their daily routines.

ELECTRONIC STEWARDSHIP

NIH NIEHS Direct Donation Program
Kimberly Jones, Richard Weaver, April Byrd, Kelly Powell

In January 2020, the National Institutes of Health (NIH) National Institute of Environmental Health Sciences (NIEHS) team implemented a new Direct Donation Program that has realized positive impacts on the culture of sustainability at the NIEHS and in local North Carolina communities.

Effective lifecycle management is required for the $3 million worth of goods purchased annually to support NIEHS research. The NIEHS Administrative Services and Analysis Branch ensures timely performance assessments to monitor usage, maturity and the potential for efficiency decline for a broad range of products and equipment. Changes in programs, projects and technology create surplus assets that are no longer required in the same capacity, if at all.

When products and equipment are replaced, they may not have met their end-of-life expectancy and may still be operating efficiently. Each year, NIEHS generates more than 2,000 surplus items including monitors, laptops, printers, office furniture and scientific equipment such as centrifuges and shakers.

Under authority of the Stevenson-Wydler Technology Innovation Act, the NIEHS Direct Donation Program identifies high value excess research equipment that is then donated to educational institutions and nonprofit organizations to conduct technical and scientific education and research. In the first year of this program, donations valued at more than $250,000 were diverted from landfills and directed to Duke University, North Carolina Central University, and E.E. Smith High School in Fayetteville, NC.

ENERGY & FLEET MANAGEMENT

NIH RTP Campus Underground HTHW Piping Thermal Restoration
Bill Blair, Benjamin Hocutt, Lee Howell, Marcos Flores

The National Institutes of Health (NIH) Office of Research Facilities at Research Triangle Park (RTP) and the National Institute of Environmental Health Sciences completed a project to restore the RTP Campus underground high temperature hot water (HTHW) piping insulation. The piping system is integral for the campus buildings' supply of steam, heating hot water, and domestic and laboratory hot water.

A review was conducted of the high temperature hot water system to determine viable energy saving initiatives. This led to the discovery that the drastic temperature losses in the piping were equivalent to not having any insulation at all. Two options to mitigate the temperature losses were investigated. The first option was a full replacement of the piping with an estimated cost of $30 million. However, for the second option, the RTP Facilities Management Branch team discovered a novel approach to restore the insulation by injecting a three-part expanding foam. This option could be completed for one-third of the

cost of full replacement and would also reduce ground water absorption, leading to an increased piping system lifespan.

Analysis of the temperature losses before and after the insulation restoration was performed utilizing the system's calibrated temperature sensors. The resulting comparison indicated a 50% reduction in thermal losses. This equates to a reduced annual natural gas usage of 300,000 therms by the RTP Central Utility Plant and a decrease in 1,587 metric tons of CO2. The reduction in CO2 is equivalent to 1.75 million pounds of coal burned or 3,675 barrels of oil consumed. Other benefits of the thermal restoration resulted in lower soil temperatures around the buried piping, creating suitable conditions for ground cover to be established and a reduction in soil erosion and runoff.

NIH Leading Sustainment in a COVID-19 Operating Environment
Mark Minnick, Terrance Coates, John Cheatham, Michael Jones, Matthew Fortier, Woodrow Harrison, James Lewis

The National Institutes of Health (NIH) Fleet Management Services (FMS) has developed and implemented a Sustainability Implementation Plan in order to meet federal goals for optimizing and right-sizing fleet composition, reducing vehicle size, eliminating underutilized vehicles, and acquiring and locating vehicles to match local fuel infrastructure.

The plan also requires increased utilization of alternative fuel in dual-fuel vehicles, implementation of vehicle idle mitigation technologies, and the establishment of policy and plans to reduce miles traveled. This is accomplished by installing Global Positioning System (GPS) on fleet vehicles so that data captured can provide the user and the FMS an effective measuring tool to obtain fuel consumption, vehicle idle time, and overall vehicle usage. In FY 2020, 18 vehicles were surplussed and 26 sedans were identified for future surplus. In addition, nine fully operational electrical vehicles are now included in the fleet and 4,529 gallons of alternative fuel was purchased.

ENVIRONMENTAL STEWARDSHIP

NIH WRRB PPE Disposal Response
Mansi Mehta, CDR Matthew Deptola, Ruth Rilee, Sarah Yenoli, Eduardo Saavedra Rodriguez

In response to the COVID-19 pandemic, the National Institutes of Health (NIH), Office of Research Facilities (ORF), Waste and Resource Recovery Branch (WRRB) acted quickly to ensure contaminated personal protective equipment (PPE) could be properly disposed. Wearing a mask, face covering, gloves, etc., has become a new normal that everyone around the world has had to adapt to, but the disposal of such equipment has received little thought. However, the WRRB implemented efforts to ensure contaminated PPE could be properly and safely disposed, while not inconveniencing the NIH staff.

A total of 89 (76 onsite, 13 offsite) labeled hands-free step bins were used to allow for the safe disposal and limit the risk of direct and indirect contamination of the user. This effort followed early guidelines provided by the CDC along with establishing a system that was user friendly to all NIH staff. Placement of the PPE disposal receptacles involved strategic planning to consider population density, common travel routes, and locations where staff would be most likely to remove PPE for disposal. After the initial

implementation, the WRRB group expanded PPE disposal bins to off-site D.C. metro locations due to the lack of available options.

For communication outreach, the team developed and distributed global messaging and signage of PPE disposal protocol and a map of locations. The group also presented at working group and committee meetings to spread awareness and answer any questions. Pictograms are used on each bin to make it clear what is acceptable and what is not. Most bins are also located near general waste and recycling bin stations, so staff can prioritize placing PPE in the bin and other waste in the appropriate containers without disrupting their routine.

NIH Building Community Through Environmental Consciousness
Willie Davis, Christopher Batzel, Michael Turner, Kimarlo Burke, Javier Arce-Colon, Marie Kyer, Dawin Rodriguez

The National Institutes of Health (NIH) Property Reutilization and Disposal Section (PRDS), Division of Logistics Services, collaborated with the NIH community and other government agencies to utilize surplus serviceable property items, thereby helping to meet sustainability and environmental goals of the HHS Sustainability Report and Implementation Plan.

Through this collaborative effort, the PRDS was able to re-utilize over 2,000 property items, resulting in a savings to the government of over $8 million. By promoting environmental consciousness throughout NIH, the PRDS has successfully recycled over 40,000 pieces of equipment, equivalent to over 324 tons, and netted over $700,000 of revenue for NIH in return. The PRDS also recycled over 13 tons of freezers and refrigerators contributing to the proper disposal of Freon and netting a savings of over $50,000.

In addition, the PRDS advocated efficient business processes and procedures to avoid unnecessary scrapping and disposing of excess computer and scientific equipment by using the Direct Donation Program, which provides for donations to local schools, universities and not-for-profit organizations. Program participants received over 1,000 property items valued at over $3 million.

<u>GOOD NEIGHBOR</u>

NIH Drain Disposal Policy
Paul Johnson, Timothy Adkins, Craig Upson, David Mohammadi, Roger Weidner, Thomas Carol, Crispin Hernandez, Bill Steinmetz, Carranza Smith, Antares Nicklow

During fiscal year 2020, the National Institutes of Health (NIH) Office of Research Facilities, Division of Environmental Protection, in collaboration with a working group from the National Institute of Environmental Sciences, developed an NIH Drain Disposal Guide that informs users about which commonly used laboratory chemicals may be released to the drain. This initiative was established to bring awareness to waste disposal including a complete guide to acceptable sanitary sewer discharges, education on the types of waste streams produced in biotechnology processes, and their appropriate means of disposal, along with accompanying instructions on how to safely discharge to the sanitary sewer.

The new drain disposal policy has a multitude of tools and information in order to assist the waste generator in compiling an accurate conclusion in terms of how their waste must be disposed. The policy outlines over 275 chemicals that are approved for drain disposal along with an eight-step safety protocol that must be followed when performing this action. In addition, the policy provides a decision tree to assist the waste generator with determining the appropriate means of waste disposal along with addressing liquid biohazardous waste, pharmaceutical waste and waste containing nanomaterials.

The intent was not only to provide a clear and concise policy and accompanying tools to assist with proper disposal, but also a means to provide clarity to the decision-making process. This enables the waste generator to understand the nature of the chemicals that make up their wastes and subsequently will result in better waste management. This policy was not only created in conjunction with the NIH environmental specialists, research community, and management, it was vetted through the local wastewater treatment authority for each specific impacted campus/location.

NIH Collaborative Research Exchange

Lakshmi Darbha, David Jay Goldstein, Bani Bhattacharya, Mariam Malik

Access to innovative, cutting-edge technologies in support of biomedical research had become a significant challenge due to rising costs and rapid evolution of scientific instrumentation and analytical processes. Furthermore, large organizations like the National Institutes of Health (NIH) often failed to leverage the organization’s combined purchasing power or collective consumer experience to ensure efficient spending of research dollars when acquiring research services.

These concerns motivated the NIH National Cancer Institute (NCI) Center for Cancer Research (CCR) to partner with Scientist.com to develop the NIH Collaborative Research Exchange (CREx), a first-of-its-kind research marketplace for an academic institution. CREx is a private online pre-market research platform with research concierge services that enhances visibility of the NIH Intramural Research Program (IRP) technical expertise, facilitates cross-Institute collaborations, and drives planning of new shared scientific resources. NIH's internal service providers include nearly 170 cores and over 30 collaborative resources. CREx also includes a listing of over 30 Trans-NIH facilities open to any NIH investigator, regardless of the institution or center where they work.

A promotional video was developed that highlights the new website and the ease with which one can use CREx to explore and connect with scientific or technical expertise. Through this comprehensive and easy-to-use platform, more than 3,500 NIH IRP investigators have taken advantage of CREx to find technologies or vendor capabilities needed to meet their research objectives and more than 300 known connections have been tracked based on the specialized research requests. Utilization of internal resources has helped reduce the costs of outsourcing research services to external companies by half. In addition, CREx allows users to review and rate vendors and their services, letting them share their knowledge and experiences with the rest of NIH.

GREEN LABS

NIH Freezer Challenge

Elise Bowman, Mary Ellen Urick, Minoo Shakoury-Elizeh, Barbara Murphy

The National Institutes of Health (NIH) held its second Freezer Challenge to reduce energy consumption from laboratory grade freezers within the NIH from January 1 to July 1, of 2020. Labs were challenged to adopt one or more initiatives from a set of freezer management techniques such as defrosting freezers, discarding samples, transferring samples to liquid nitrogen freezers, consolidating samples, sharing space, retiring freezers, changing the temperature setting of ultra-low temperature freezers from -80 °C to -70 °C, and several more.

The four labs that participated in the challenge will annually save the NIH 134,681 kWh, $14,815, and 56.6 MT CO2e greenhouse gas emissions. The NIH submitted these results to the International Freezer Challenge held by the International Institute for Sustainable Laboratories (I2SL) and My Green Lab. The NIH won the 2020 I2SL Freezer Challenge in the government organization category. Additionally, the NCI Laboratory of Cell Biology won the 2020 I2SL Freezer Challenge in the individual government laboratory category.

NIH NIEHS Replace 15 Cold Rooms

Kyle Askins

The NIH Office of Research Facilities, Research Triangle Park, and the National Institute of Environmental Health Sciences, completed a project to replace 15 environmentally controlled lab rooms with more sustainable and energy efficient spaces.

The construction impacted approximately 2,100 square feet in Building 101, the main scientific research building on campus. All the rooms that were replaced were either not working or had unreliable climate control, causing unwanted infiltration and condensation in the units leading to mold growth and high maintenance costs. The project was designed to reduce heat transfer into the cooled spaces, reduce the amount of energy used to cool and condition the space, allow fresh air to circulate, and exhaust from the space to achieve efficient, reliable, economical, and healthful lab operations.

To accomplish the design plans, thermally efficient non-ozone depleting urethane foam insulation, high efficiency permanent split capacitor fan motors for the new fan coil units, and corrosive-resistant non-toxic, non-leaching welded polypropylene piping for the fan coil chilled water piping loop were installed. The new rooms also utilize digital temperature recorders that can be accessed via a USB drive instead of paper chart recorders, leading to a more sustainable way of logging room temperature.

These energy efficient features are being replicated in a phase two environmentally controlled room replacement project. Since substantial completion of this project in September 2020, these new rooms are projected to save 520,000 kWh per year and $28,000 annually compared to the existing cold rooms. This energy savings equates to saving the equivalent of 368 metric tons of greenhouse gases, over 62 households of annual electrical usage, 912,310 miles driven by an average passenger vehicle, or 405,112 pounds of coal burned.

WATER USE EFFICIENCY & MANAGEMENT

NIH NIEHS Optimized Heating Hot Water Preheat and Reheat Piping System
Kyle Askins, James Victor Stancil III, Bill Blair, Terry Wells, Daniel Burk, Heather Davis, Joseph Shealey

The National Institutes of Health (NIH) Office of Research Facilities, Research Triangle Park, completed a design in September 2020, to convert the existing preheat and reheat heating hot water system in Rall Building 101, Modules A-E, from a constant to a variable volume pumping system. The Modules A-E heating hot water system currently consists of three 40-horsepower (hp) pumps on variable frequency drives that pump water continuously through valves at each piece of equipment. Since the valves are three-way type, the water either flows through the equipment or is bypassed, never allowing the pumps to reduce speed below 100 percent, leading to increased energy consumption.

This project designed the replacement of 45 control valves, consisting mostly of three-way valves near the end of their useful service life. The 45 new valves are primarily two-way valves that will open and close based on demand, causing the pumps to slow down during periods of non-peak use versus pumping 24/7 at 100 percent capacity. Eighteen in-line pumps were also included in the design for replacement with new electrically commutated motors for increased energy efficiency.

The reheat piping system design also included improvements to combine the Module A and Module B systems, allowing the Module B preheat system to shut off when outdoor temperatures are above 55°F. In addition, the design includes the installation of additional flow sensors and temperature sensors in the preheat and reheat piping loops to provide increased flow and energy usage data for the heating hot water system. The annual estimated savings of the project is 540,000 kWh and $32,500.

WELLNESS

NIH Virtual Fitness For You Program
Christopher Gaines, Russell Mason, Sherrell Freeman

The National Institutes of Health (NIH) believes in a holistic approach to engaging employee wellbeing and its contribution to employee productivity. During the COVID-19 pandemic, when employees have been teleworking and diligently working remotely from the job site, the NIH has endeavored to continue to provide services that benefit employee wellbeing.

The team from the Office of Research Services, Division of Amenities and Transportation Services, Amenities Programs Branch (DATS/APB), partnered with the Recreation and Welfare Association (R&W), to create a virtual fitness program for employees at the NIH. Using social media, DATS/APB and R&W have offered employees the ability to participate in fitness and wellbeing classes covering a wide range of exercise modalities. The classes engage employees across all categories, geographic locations, and fitness levels.

Virtual Fitness for You classes can be taken live or on demand, and all the classes are archived and available for access by all NIH employees. This access allows the agency to reach our most critical workforce, the health care workers at the NIH Clinical Center who remain on the front line during the pandemic, as well as other essential employees working non-traditional hours.

The Virtual Fitness for You program has also been benchmarked by the Office of Personnel Management Worklife Coordinators and the Federal Workplace Health Collaborative. The shutdown of the gyms during the pandemic has had a significant energy-saving impact, but also has provided an opportunity to encourage staff to "Get on the Move." Over the course of the pandemic, a tenfold increase in participation in virtual classes was experienced, increasing monthly participation to an average of 2,200.

NIH NIEHS COVID-19 Testing Operation

Robert LeVine, Ericka Pearce

During fiscal year 2020, if the NIH did not sustain a healthy campus, the NIEHS mission could have been severely impacted while the workforce tried to return to work in July. The NIEHS COVID-19 Testing Operations Project Team contributed to the protection of collective health, efforts to prolong life, and showed positive analytics for its health impacts to the NIH community. Because of the new testing site, employees could be on campus with confidence in their safety and well-being during the pandemic.

The health of the workforce is integral to the success of the NIH mission and the NIEHS was one of the first off-site Clinical Center testing operations using an outside drive-through format. The lessons-learned from that experience with shipping, testing, technology interactions, equipment requirements, and analytics improvements were then utilized at several other NIH remote sites. Through this project, the NIEHS became a leader in deploying many of the newly recommended national health recommendations.

The NIEHS COVID-19 Testing Operations successfully tested 641 NIH staff and conducted 2,577 lab orders for the tests by September 30, 2020. The NIEHS project expanded its testing umbrella to campus daycare staff, janitorial, onsite construction contractors, and other essential personnel who needed to be on campus every day.

The project was a multifaceted success in terms of many teams working as one unit in order to succeed under a very short timeline. From when the return-to-work dates were set, the project had to execute its first test on-site test in less than three weeks. Issues involving cold storage, cold shipping, testing technique, appropriate staff, building a safe site infrastructure, information technology (IT) application access, communications, and testing procedures were all solved within short timeframes.

The NIEHS project used efficient management practices to create a process directed to maximize employee participation in order to have the greatest wellness impacts. An innovative video explained the entire process to enhance facility awareness, employee interest, and eliminate obstacles. NIEHS experienced a very low rate of known cases within its employees and no known on-campus transmission in part thanks to this wellness project. This project is an outstanding example of how a wellness program can have significant and wide impact to a larger community.