

Northwestern | sustainNU

The background of the cover features a wide-angle aerial photograph of the Chicago skyline and its surrounding urban landscape. In the foreground, the historic Gothic Revival buildings of Northwestern University's campus are visible, nestled among lush green trees. The Chicago River and Lake Michigan are on the left, while the city's dense cluster of skyscrapers, including the Willis Tower (formerly Sears Tower), stands tall in the distance.

# 2021-2022 Sustainability Report



## sustainNU Mission

sustainNU is a University-wide program that engages students, faculty, and staff in reducing Northwestern's impact on the environment, leading the way toward a more sustainable future. The program supports the development and execution of the University Strategic Sustainability Plan and commitment to cultivating an ecologically sound, socially just, and economically sustainable culture at Northwestern. sustainNU spearheads programs and cross-institutional initiatives to realize these goals, encouraging our entrepreneurial students, industry-leading researchers, world-class faculty, and dedicated staff to integrate sustainability into all their endeavors.

# **Message from Greg Kozak, Director of Sustainability**



I am pleased to share the Northwestern sustainNU 2022-2023 Sustainability Report. As one of the world's leading academic institutions, Northwestern strives to be exemplary in addressing sustainability, climate change, and the opportunities and challenges they pose. The University is dedicated to creating a greener campus by reducing waste, conserving water and energy, and promoting sustainable modes of transportation, among others.

Our efforts are guided by Northwestern's 2017 inaugural Strategic Sustainability Plan, which outlines our sustainability commitments across five program areas. The Plan identifies targets for reducing the University's greenhouse gas emissions and waste; outlines strategies for increasing efficiency in energy, water, and resource use; offers measures for incorporating sustainability into University purchasing and operational practices; and sets goals for the participation of academic and operational stakeholders in the University community. Five years into the Plan, we're proud of our progress in advancing sustainability.

In FY22 alone, Northwestern kicked off an Energy Infrastructure Master Planning effort. Now complete, the Plan establishes a pathway to carbon neutrality, emphasizing GHG emissions reduction through fuel transition from natural gas to renewable electricity. Northwestern also kicked off its first phase of energy reduction projects as part of its five-year partnership with Ameresco, Inc. - a leading clean technology integrator specializing in energy efficiency and renewable energy. The initiative identifies energy conservation measures (ECMs) across both the Evanston and downtown Chicago campuses allowing Northwestern to reduce its carbon footprint. Additionally, Northwestern received its third consecutive ENERGY STAR® Sustained Excellence Award - the EPA's highest honor recognizing institutions and businesses committed to excellence in energy efficiency – as well as its first ever Green Ribbon School Post-secondary Sustainability award from the U.S. Department of Education recognizing Northwestern's innovative efforts around sustainability.

With 2022 behind us, we have turned our attention to the future as we finalize the University's next five-year Strategic Sustainability Plan, which lays out an ambitious agenda for the coming years, ensuring that sustainability is integrated into our operations, educational engagement activities, and community endeavors. The next sustainability plan focuses on:

- Committing to Bold Climate Action
- Embedding Diversity, Equity & Inclusion
- Applying Research on Campus and in the Community
- Adopting a Culture of Sustainability
- Being Intentional, Practical & Accountable



# '21-'22 Accomplishments

Northwestern University made long-term sustainability commitments to improve the infrastructure on campus, opportunities for students, and community initiatives.



## Ameresco Partnership - Phase 1 Project Kickoff

In 2022, Northwestern kicked off the first phase of energy reduction projects as part of its five-year partnership with Ameresco. Phase 1 projects focused on smart building technology and automation, lighting upgrades, heating cooling system optimization, and water reclamation. Read more in the Built Environment section.



## Student Sustainability Fellowship and Internship

Northwestern's partnership with Ameresco supports annual funding for a student sustainability fellowship and two paid interns each quarter, enabling students to apply energy and sustainability concepts to real-world problems. Read more in the Experiential Learning section.



## Northwestern-supported Community Solar Projects

In 2020, Northwestern announced a 15-year partnership with Clearway Energy, one of the largest developers of clean energy in the U.S. We are proud to announce that, in 2022, all 16 community solar projects across 7 Illinois counties are now operational and generating clean renewable energy for the surrounding communities: bringing green jobs to the Chicagoland area. Once in full operation, the 16 solar arrays are expected to produce over 76 million kWh of clean energy annually, the equivalent of removing ~12,000 cars from the road each year.

# Awards and Recognition



## PARTNER OF THE YEAR Sustained Excellence

### ENERGY STAR® Partner of the Year – Sustained Excellence

In 2022, Northwestern earned its third consecutive ENERGY STAR® Sustained Excellence award - the EPA's highest honor for leadership in energy efficiency. Several stakeholder engagement and energy management activities led to Northwestern achieving this award, including energy use reduction through LED lighting upgrades, building system controls, and a Green Office Certification program engaging more than 1,000 employees around energy and resource conservation.



### 2022 U.S. Department of Education Green Ribbon Schools Postsecondary and District Sustainability Award

Northwestern University was honored in Washington, DC during the 2022 Award Ceremony for the U.S. Department of Education Green Ribbon Schools Postsecondary and District Sustainability Awards. The University was recognized for our innovative efforts to reduce environmental impact and costs, promote better health, and ensure effective environmental education. The Green Ribbon Schools Award recognizes schools that are at the forefront of sustainability and education, while serving as a resource hub for schools who are looking to augment their sustainability initiatives.



# Built Environment

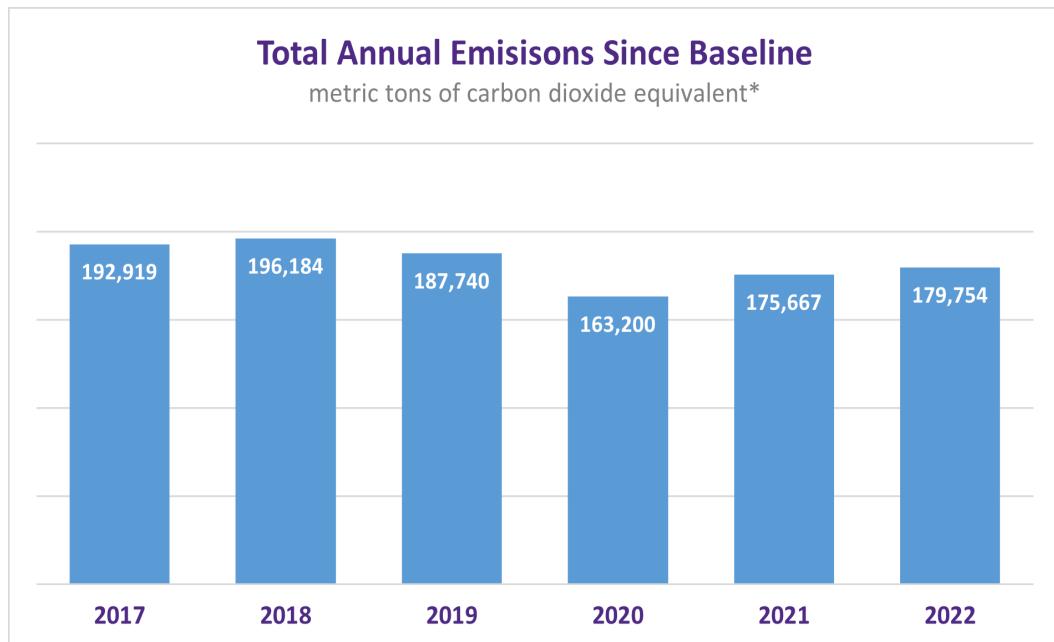
The University's Built Environment strategy focuses on energy and water efficiency in existing buildings and grounds, renewable energy use, and sustainability in new construction and building renovations.

Northwestern has two main U.S. campuses: a 240-acre campus in Evanston, Illinois, and a 25-acre campus in Chicago, Illinois. The University owns and operates 220+ buildings, totaling over 16 million square feet between both campuses. In accordance with Northwestern's Strategic Sustainability Plan, we aim to:

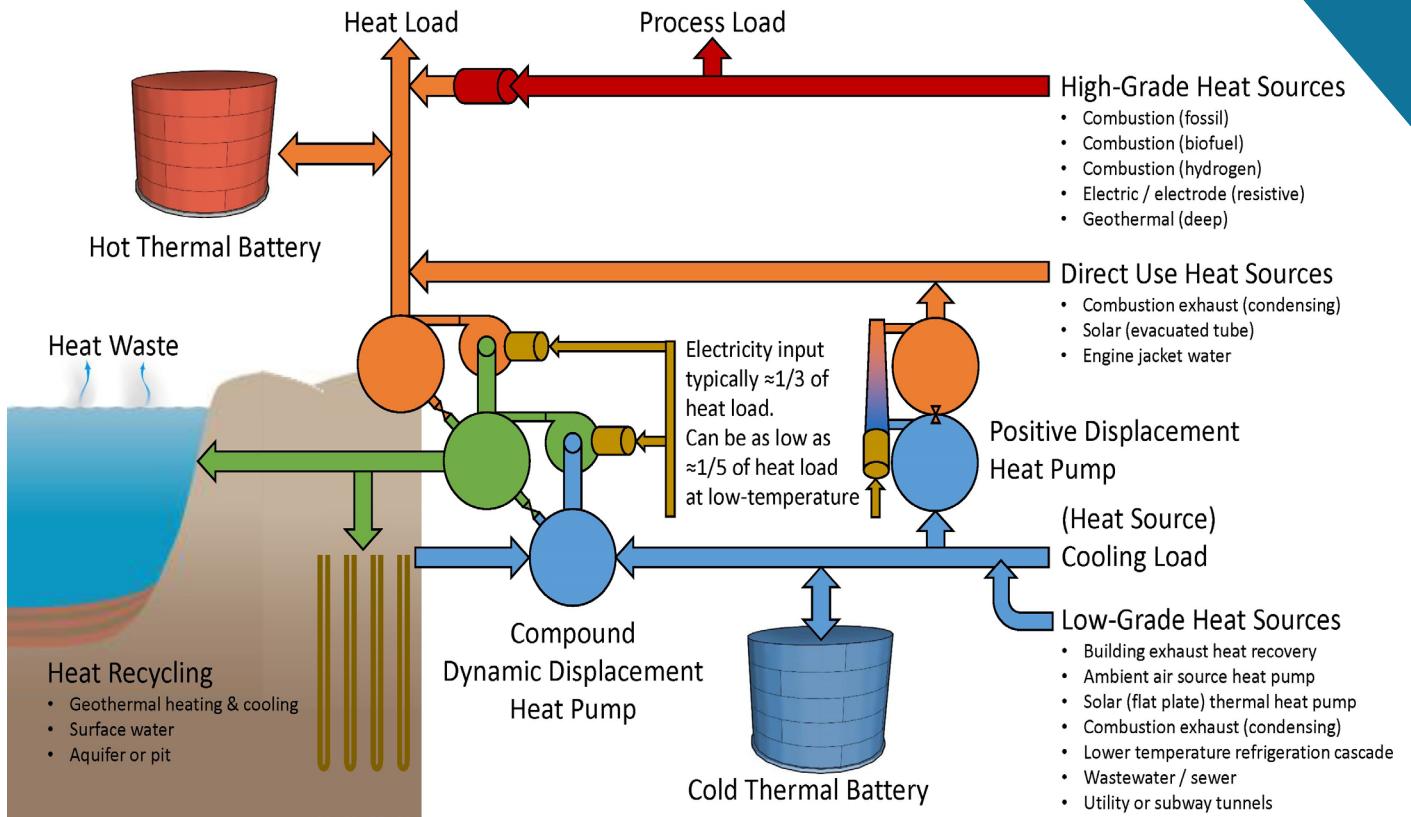
- Reduce energy use intensity by 20 percent by the end of fiscal year 2020 compared to a 2010 baseline
- Reduce our Scope 1 and 2 greenhouse gas (GHG) emissions by 30 percent by 2030 compared to a 2012 baseline

## MAKING PROGRESS

Through ambitious energy conservation initiatives, Northwestern achieved significant improvements in energy efficiency in recent years, including a 17% reduction in building energy use intensity (kBtu/ft<sup>2</sup>) from a 2010 baseline and a 15.7% reduction in greenhouse gas emissions since 2012 - more comparable to pre-pandemic levels.



\*Scope 1 and 2 emissions only



- The suite of possible options considered under the Energy Infrastructure Master Plan.

## **Spotlight:** **Energy Infrastructure Master Plan (IMP)**

In FY22, Northwestern kicked off an Energy Infrastructure Master Planning effort, which evaluated the suite of thermal energy production, distribution, and consumption technologies to modernize the Central Utility Plant (CUP) and district energy system while meeting or increasing standards for resilience, sustainability, and serviceability, and maximizing cost-effectiveness.

The IMP provides a roadmap for 50-80% reduction in on-site (Scope 1) GHG emissions from the CUP. Achieving carbon neutrality will require purchasing carbon offsets, but this reliance will decrease over time as CUP emissions are reduced. The recommended roadmap will result in a significant increase in resilience (better interchangeability between natural gas and electrical energy sources) and serviceability (heating hot water distribution is safer and easier to maintain and service than steam).

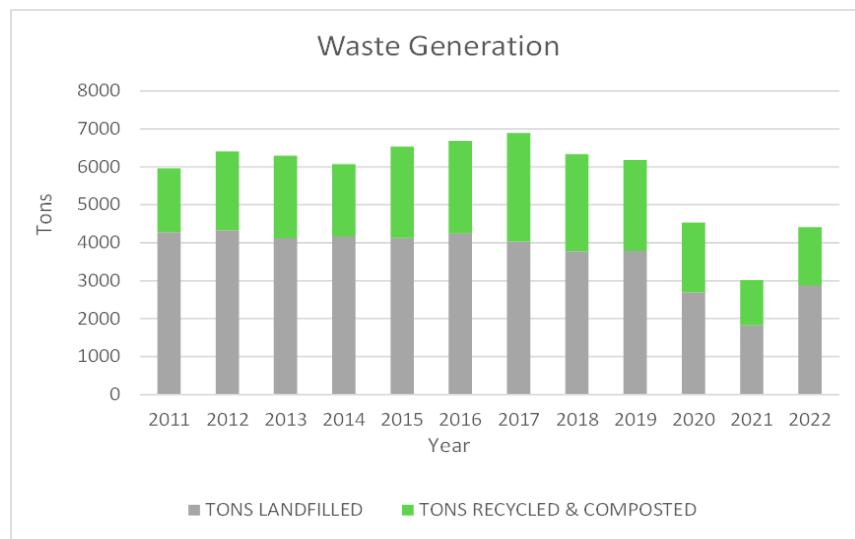
### **THE PLAN INCLUDES A RECOMMENDED PHASED IMPLEMENTATION ROADMAP TO:**

- Replace all steam distribution with heating hot water distribution
- Expand the Central Utility Plant (CUP) and modernize all generation equipment
- Develop capacity for simultaneous electric heating and cooling through heat pumps
- Balance thermal exchange with Lake Michigan to increase system efficiency

# Resource Conservation

Protecting and regenerating natural resources are important components of sustainability. A significant portion of Northwestern's daily operations involves the purchase and consumption of goods and the production of waste. Northwestern takes a comprehensive approach to resource conservation with a focus on conserving resources in addition to reducing and diverting waste. Reusables are promoted when possible, new opportunities for composting are explored, and education for clean recycling collections is prioritized. As people return to campus, waste generation is on the rise again, though still well below our baseline and pre-pandemic years.

sustainNU champions waste reduction, encouraging our campus community to avoid waste, opt for reusable and durable items, and recycle whenever possible.



## Spotlight: Repair and Reuse Fair

As a way to support increased awareness of resource conservation, sustainNU planned a Repair and Reuse Fair during Earth Month 2022. This event showcased campus and local organizations that focus on lending, repairing, and reusing. Attendees learned about the local repair cafes, tool-sharing libraries, and basic sewing tips to help make your wardrobe last.



# Transportation

Northwestern's campuses are hubs of activity, with people moving throughout, between, to, and from the Chicago and Evanston campus every day. The cumulative effect of travel associated with the University has a significant impact on Scope 3 carbon emissions.<sup>1</sup> To mitigate this impact, Northwestern supports safe, environmentally efficient modes of transportation and the infrastructure required for their use. sustainNU's transportation strategy focuses on advocating for public transportation utilization, effective and accessible active transportation options (e.g., walking, biking, scootering), and electric vehicle use.

## SUPPORTING ELECTRIC VEHICLES

In FY2022, Northwestern's 8 dual port charging stations dispensed over 71,700 kWh, allowing drivers to travel ~215,100 miles.<sup>2</sup> Greenhouse gas savings from the avoided vehicle fuel combustion were equivalent to nearly 60 metric tons of CO<sub>2</sub>, the amount of CO<sub>2</sub> sequestered by over 223 acres of U.S. forest in one year.

## DIVVY CAMPUS BIKE SHARE

Northwestern hosts Divvy bike share stations to provide access to bikes for the university community. There are three Divvy Bike Share Stations on campus, which connect to stations across Evanston and Chicago. The stations on the Northwestern campus supported over 30,000 trips across campus and in the community in FY2022. Wildcard holders can access discounted annual Divvy memberships through the Wildcard Advantage program. The Divvy for Everyone (D4E) program offers a further discounted rate for individuals with financial need.



## SPOTLIGHT: EDUCATION

Northwestern's League of American Bicyclist's League Cycling Instructor (LCI) hosted a hands-on course in the spring of 2022 to teach participants how to navigate by bike confidently and safely. The course covered rules of the road (for bicyclists and motorists driving near them), how to communicate on the road as a cyclist, and how to safely navigate streets and paths. In addition to bike safety, participants learned bike maintenance tips and how to properly fit and adjust a helmet.

<sup>1</sup> These are the indirect supply chain emissions from other sources of energy used in Northwestern's campus operations and cover a wide array of areas, including but not limited to procurement, commuting, and the collection and disposal of waste produced on campus.

<sup>2</sup> Calculated using an estimated 3 miles per kWh for electric vehicles

# Communications and Engagement

Educating our community and encouraging sustainable behaviors is critical to our success. The 2021-2022 academic year saw a return to more in-person events. sustainNU was able to participate in events held during Wildcat Welcome and throughout the year. For Earth Month, in addition to the Repair and Reuse Fair, a campus Soundwalk was conducted. Soundwalks focus on listening to our surroundings. A walk around campus gave attendees the chance to pause and listen to the sounds of nature, and those that are human made, considering how these impact our experience of the natural world. The annual Arbor Day tree planting brought the campus community together, learning how our Grounds crew decides where and what trees to plant and gave volunteers the experience of contributing to our landscape development. A second tree planting in partnership with the City of Evanston supported planting trees in Centennial Park.



## SPOTLIGHT

A highlight of our communications is the sustainability module included in the mandatory new employee orientation. More than 1,100 faculty and staff took this training in FY2022. This onboarding is one of the first introductions employees have to campus culture, and it helps individuals understand how they can incorporate sustainability initiatives into their daily activities.

# Experiential Learning

Northwestern strives to support direct experiential learning that enables students to engage with the physical environment, address global environmental issues, and grow as leaders in sustainability. We are committed to providing experiences that not only educate our students about sustainability, but also empower them to be sustainability leaders equipped to solve critical environmental and social challenges.

## ***Quote from Greg Kozak, sustainNU Director***

“We are excited to provide this opportunity to emerging sustainability professionals and support carbon reduction projects on campus. We believe these internships will enable the next generation of energy leaders, and we are committed to providing an innovative, direct learning experience for these talented students.”



## **Spotlight:**

### **Northwestern Sustainability Fellowship**

#### **Winter 2022 - Project Green Bus - Phase 3**

Fellows: Alexis Olson (Kellogg '23), Jennifer Coronel (MSES '22), JJ Sarsfield (MSES '22), Nick Hieb (MSES '22), Roberto Valdes Sanchez Navarro (MEAS '22)

Client: Susan Mudd - Environmental Law and Policy Center; Evanston/Skokie School District 65

Faculty Advisor(s): Brian Tolliver, Holly Benz

The project aimed to develop a plan for electric school bus monetization through vehicle-to-grid (V2G) technology, to characterize V2G profitability, and to understand key stakeholders in its implementation. The team found that electric school buses are the optimal V2G vehicle as they have a large battery capacity and the potential for a very large fleet size. In addition, they operate on a consistent schedule, having both a daily and yearly dwell. There are a variety of stakeholders in electric school buses from the schools, bus operators, bus providers, utility companies, and V2G charging, to the federal government. The team established that V2G technology has an economic potential of up to \$185,000 over the 12-year life of a school bus. Finally, the project concluded that federal and state policies are advancing V2G enablement, but markets are not yet established to unlock the full potential of V2G.

#### **Winter 2022 - Equitable Eating - Phase 1**

Fellows: Annika Hsu (MSES '22), Asia Lustig (MSES '22), Kayla Grayson (Kellogg '22), Alison Polite (MSES '22), Amy Wu (Kellogg '22), Ankur Seth (MSES '22)

Client: Tim Kollar - Top Box Foods

Faculty Advisor(s): Dave Donnan

The project set out to build a local sourcing strategy and implementation plan for Top Box Foods that centers hyper-local produce while maintaining scale, affordability, and reliability for its customers. The team identified three potential solutions for local sourcing which includes wholesaler sourcing, partnerships with local controlled environment farms (e.g. Gotham Greens, MightyVine) to build at-scale partnerships, and coalition building among Chicagoland farms to scale up Top Box Foods existing hyper-local food base. The team laid out recommendations in phases over a multi-year period. In the short-term, the projects suggests Top Box should prioritize sourcing for Food-as-Medicine and then Foodshare needs and in the long-term, Top Box should develop a coalition of farm partners to drive demand, increase reliability and variety of local produce offerings year round.

## **Summer 2022 – Project Lithium Battery**

Fellows: Alexa Keane (MSES '23), Chris Marquez (MEAS '23), Dinit Srivastava (MSES '23),  
Shawn Fu (MSES '23)

Client: Qiang Dai, Jeff Spangenberger - Argonne National Laboratory

Faculty Advisor(s): Mark Lillie, Holly Benz

The project set out to develop an analysis of EverBatt, a battery recycling model, and provide research and development recommendations relating to the lifecycle of lithium-ion batteries including their extraction, reuse, and recyclability. Regarding the EverBatt model, the team proposed the incorporation of critical mineral supply chain data into the model, the monetization of recycling impacts to provide high-quality ESG information, and the development of data visualization tools in EverBatt to be utilized by individual recyclers and policymakers. To further LIB research, the team recommended a comprehensive analysis of LIBs using the U.N. Sustainable Development Goals framework, the implementation of Impact-Weighted Accounts Framework to monetize social impacts of lithium-ion batteries, and the creation of a small-scale cost evaluation with the EverBatt model.

## **Summer 2022 – Project Equitable Eating – Phase 2**

Fellows: Lily Walker (MSES '23), Winnie Guerra (MSES '23), Yihui Fang (MSES '23), Meher Yeda (Medill '23)

Client: Tim Kollar, Connor DeLoach - Top Box Foods

Faculty Advisor(s): Dave Donnan, Holly Benz

The project sought to provide strategic planning to aid Top Box Foods in sourcing and distributing local produce in the Chicagoland area and to understand sources of hyper-local produce in Chicago. The team concluded that sourcing local produce and distributing to communities are two distinctly different operations. Sourcing produce requires building and maintaining relationships with small farms and coordinating with seasonality while distribution requires direct work in communities. These conclusions led the team to suggest three short-term strategies and one long term. In the short-term, the team recommended partnering with local food aggregators such as The Common Market to handle the logistics of aggregation allowing Top Box to focus on community partnerships, they also pushed for the identification of funding sources to offset higher costs and building out educational materials on locally sourced foods to inform on their importance. The project concluded with the long-term strategy of developing relationships with controlled-environmental agriculture and expanding urban farming capabilities to look at creating an urban Top Box Farm.

# Looking Ahead to 2023

With 2022 behind us, we look to pursue an even more ambitious agenda in 2023, ensuring that sustainability is integrated into our operations, educational engagement activities, and community endeavors.

Shown below is a non-exhaustive list of several key initiatives that Northwestern intends to implement in the coming year.

Program Area	Initiative	Sustainability Benefit
Transportation and Mobility	Downtown EV charger installations	<ul style="list-style-type: none"><li>Strengthens accessibility to low-carbon, alternative modes of transportation for students, faculty, staff, and visitors</li></ul>
Water and Ecology	Evanston campus smart water meters installations	<ul style="list-style-type: none"><li>Allows for real-time tracking of water usage and pipeline leaks across campus resulting in utility savings</li></ul>
Buildings and Infrastructure	Biking and pedestrian infrastructure gap analysis	<ul style="list-style-type: none"><li>Identifies gaps between new forms of non-vehicular transportation needs and existing campus infrastructure and services</li><li>Supports University endeavors to create a safe, secure, equitable, and sustainable campus circulation network</li></ul>
Buildings and Infrastructure	Design & Construction (D&C) guidelines update for new facilities and major retrofits	<ul style="list-style-type: none"><li>Brings University D&amp;C standards in line with industry standards and best practices</li><li>Equips Facilities team to adopt best practices for sustainable construction to conserve resources, reduce energy use, and improve occupant wellbeing</li></ul>
Energy and Emissions	Renewable energy procurement strategy development and adoption	<ul style="list-style-type: none"><li>Provides blueprint to meet University's renewable energy commitments</li><li>Potential to eliminate 40% of carbon emissions once executed</li></ul>





# Acknowledgements

We sincerely thank the students, faculty, and staff who support the sustainability efforts of Northwestern University. No achievements are accomplished alone, and the entire Northwestern community has a role to play in reaching the goals outlined in our Strategic Sustainability Plan.

## sustainNU Staff



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### STAY CONNECTED

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