

UTokyo CLIMATE ACTION 2024

ENGLISH



Index

02	Index	
03	Foreword	
04	Executive Summary	
06	1. About UTokyo Climate Action	
07	1.1. Background	
09	1.2. Vision	
11	1.3. Purpose and Targets to Achieve	
13	1.4. Organization Structure and Roles	
14	2. UTokyo GHG Inventory	
15	2.1. Standards	
15	Emission Sources	
16	Global Warming Potential	
17	2.2. Scope and Boundary	
17	Reporting Period, Organizational Boundary and Scope	
17	Other Boundaries and Exclusions	
18	2.3. Calculation Methodology	
18	Calculation Flow	
18	Emission Factors	
19	2.4. Improvement of Limitations and Data Gaps	
20	2.5. Inventory Results and Analysis	
20	Inventory Results for Scopes 1 and 2 (based on conventional calculation method)	
20	Impact of Data Gap Improvement on Scope 1 Calculations	
21	Market-based and Location-based Scope 2 Calculations	
21	Inventory Results for Scope 3 (based on conventional calculation method)	
21	Mass-based Calculation of Scope 3 Category 5 (Waste)	
23	2.6. Verification	
24	3. Reduction of GHG Emissions as a Business Entity	
25	3.1. Principles and Policy for Emission Reduction Measures	
26	3.2. Initiatives Related to Scopes 1 and 2	
26	GHG Emission Performance and Progress against Target	
26	Scope 1 and 2 Emission Reduction toward Achieving Target	
28	3.3. Initiatives Related to Scope 3	
28	Challenges that Hinder Calculation and Reduction of Scope 3 Emissions	
28	Initiatives Related to Calculation of Scope 3 Emissions	
29	Direction and System Development for Scope 3 Related Initiatives	
32	4. Social Contribution to Solving Climate Change	
33	4.1. Contribution through Initiatives and Research	
38	4.2. Human Resource Development to Tackle Climate Change	
38	4.2.1 Education Programs for New Students and Undergraduate Junior Division Students	
38	4.2.2 Education Programs for Undergraduate Senior Division Students and Graduate Students	
39	4.2.3 Programs to Train Advanced Specialized Human Resources	
39	4.2.4 Global Education Program	
40	4.2.5 Recurrent Education for Working Adults	
41	4.3. Co-creation and Collaboration with Stakeholders	
41	Student-led Activities and Collaboration with Students	
43	Collaboration with University of Tokyo Co-op	
43	Collaboration with Colleges Located in Bunkyo Ward	
43	Collaboration with the Local Community	
44	Social Collaboration with Businesses, etc. Related to GX	
45	Communication with UTokyo Members	
45	Information Communication to Society	

Foreword

Teruo Fujii

President

The University of Tokyo (UTokyo)



UTokyo Compass, the statement of the guiding principles of the University of Tokyo released in 2021, states that, as a university that serves the public good worldwide, we will mobilize knowledge from across all disciplines at our institution to seek solutions to global problems that confront human society. One of our main initiatives is the promotion of Green Transformation, for which we are pursuing activities at three levels: global, national, and university.

At the global level, in March 2024, we published the fourth edition of our GCS indicators for the year 2024 based on our Global Commons Stewardship (GCS) Framework, which calls for the transformation of socioeconomic systems to limit global warming to 1.5°C.

At the national level, in June 2023 the ETI-CGC, a platform for industry-academia collaboration launched in November 2021, released an interim report on scenarios for achieving net-zero emissions in Japan by 2050.

And at the university level, in addition to the energy-saving efforts conducted since 2008 through the Todai Sustainable Campus Project (TSCP), since 2021 the University of Tokyo has been participating in the international Race to Zero campaign launched by the United Nations Framework Convention on Climate Change to achieve carbon neutrality. As part of this initiative, we have been publishing UTokyo Climate Action (UTokyo CA) annually since 2022, with revisions each year. This document, UTokyo CA 2024, is the third edition.

UTokyo CA 2023, which we published last year, evaluated the outcomes of TSCP's activities and clearly showed that we must introduce much stronger measures to meet the goals of Race to Zero. In response to this, in UTokyo CA 2024, we verify the latest data through FY2023 and strive to show a clear route to achieving carbon neutrality in addition to tangible measures to be newly introduced.

In May 2024, we announced the update UTokyo Compass 2.0, which includes new plans. With this revision, we have defined our goals and measures for achieving carbon neutrality as an organization. The University of Tokyo will continue to play a leading role as a driving force behind the global Green Transformation by fostering individuals equipped with both deep specialized expertise and broad, cross-disciplinary vision to lead that transformation. We will keep working toward our goals through dialogue and collaboration with all stakeholders, both inside and outside the university.

Executive Summary

The University of Tokyo (UTokyo) promotes Green Transformation (GX) to address the global environmental crisis, placing a particular focus on “Carbon Neutral”, “Nature Positive”, and “Circular Economy” as its core commitments outlined in UTokyo Compass, the university’s guiding principles.

As part of our GX efforts, UTokyo joined the “Race to Zero” campaign in October 2021, in response to the call of the United Nations Framework Convention on Climate Change (UNFCCC). Following this, the initial UTokyo Climate Action (first UTokyo CA) was issued in October 2022 to set out mid-term targets to reduce the university’s Scope 1 and 2 CO₂ emissions against a 2013 baseline by 50% by 2030 and 75% by 2040, as interim steps to achieve carbon neutrality by 2050, and to lay out the systems and policy measures required to achieve this goal. The first UTokyo CA also includes Scope 3 inventory results, the university’s first attempt at calculating Scope 3 emissions, which represent the indirect emissions related to UTokyo’s activities other than its own energy use and set out mid-to-long-term targets for Scope 3. UTokyo CA 2023, published last year as the second issue of UTokyo Climate Action, analyzed our progress against the targets set in the initial issue and made clear that emission reduction measures need to be reinforced. It also contained an outline of a roadmap toward achieving our targets. This third issue, UTokyo CA 2024, aims to analyze progress based on the latest inventory results data and further substantiate measures laid out in UTokyo CA 2023. With regard to the calculation of emission data, we have made attempts at improving some of the challenges pointed out in the first and second editions of UTokyo CA, and have also presented a comparison with the previously used calculation methods.

Scope 1 and 2 emissions in fiscal 2023 (based on the same calculation method as previously employed) were reduced by 1.3% year on year and by 19.9% against the fiscal 2013 baseline. Factors thought to have contributed to emission reduction are TSCP activities including conversion of Hf lights to LED and operation rates of large-scale power-consuming equipment such as supercomputing systems. Starting from this issue, we have

included GHG emissions associated with the release of refrigerants and chemical substances to the atmosphere in Scope 1 emissions, while using location-based and market-based emission factors for the calculation of Scope 2 emissions on a trial basis. As a result, the former (emissions from refrigerants and chemicals) was 1,500 t in fiscal 2023 accounting for approximately 0.9% of the total of Scope 1 and 2 emissions. As for the latter, especially when using the market-based method, the result for Scope 2 emissions was reduced by approximately 13% compared to the previous calculation method, thanks to the introduction of “effectively renewable energy” electricity plan at Kashiwa II Campus. It was already pointed out in UTokyo CA 2023 (published last year) that additional reduction measures would be necessary if we were to achieve our 2030 reduction target. We are currently considering the implementation of Building Carbon Management to further reduce emissions and the reinforcement of organizational and funding capacities for utilizing offsite renewable energy sources to accelerate conversion to renewable energy. As the reduction targets for the fourth plan period (fiscal 2025 to 2029) of the cap-and-trade program based on the Tokyo Metropolitan Environmental Security Ordinance are more rigorous than for the previous plan periods, we are planning to develop a mix of measures tailored to meet the fourth plan period targets mandated by the program, while also achieving targets set in UTokyo CA.

As for Scope 3 emissions, which was estimated to account for over 70% of the total emissions of UTokyo according to the inventory results of the first issue of UTokyo CA, the UTokyo Climate Action Working Group formed in fiscal 2023 by LCA-related faculty members has conducted analysis of uncertainties associated with the inventory results obtained by the current calculation method. The Group also examined measures to refine calculation methods to better reflect reduction efforts as well as actual measures for reducing emissions. As a result of these efforts, the overall picture of measures to be implemented is becoming clear, but there are still difficult issues that need to be solved, such as linking Scope 3 emission data when updating the financial and accounting system, introduction of other

calculation systems, and cooperation with suppliers. This fiscal year, we have worked to introduce mass-based calculation of emissions from main waste treatment processes. As a result, it turned out that Scope 3 emissions for fiscal 2023 will increase by 0.3% when using mass-based calculation. Although this represents only a small percentage in the overall emissions, the results showed that we will be able to evaluate the effectiveness of such reduction measures as reducing the amount of waste generated, thorough sorting of waste, and changing waste treatment methods.

UTokyo's Climate Action aims not only to reduce GHG emissions caused by its own activities but also to contribute to carbon neutrality of society as a whole through research and education.

Particularly, taking leadership in driving green transformation in Japan and the world is an important mission for a university serving the public good. To give some examples of actions taken by UTokyo, the Center for Global Commons of the Institute for Future Initiatives has been taking a lead in building an international network of collaboration and a shared platform with leading Japanese companies.

Besides the many UTokyo departments and divisions committed to research and development of technologies and social systems essential to carbon neutrality, cross-departmental collaboration mechanisms have been set up including the Collaborative Research Organization for Comprehensive Energy Sciences, Center for Climate Solutions and LCA center for Future Strategy. The University of Tokyo Forests (UTF; forests owned by the university) newly established the Forest GX/DX Co-Creation Center in fiscal 2024 with an aim to create a UTokyo model for realizing a decarbonized society. This was done by building a platform to promote green investment in forests through co-creation with the industry and local communities as well as through cross-departmental collaboration.

We are also focusing efforts to enhance educational initiatives,

such as by expanding the Fostering Advanced Human Resources to Lead Green Transformation (SPRING GX) project launched in 2021 (participants increased from approximately 600 to 1,200), to provide everyone from newly enrolled students to working adults in various fields with opportunities to learn about green transformation. As part of such efforts, in fiscal 2024, we started providing literacy education for newly enrolled students and launched the Interdisciplinary Education Program on Sustainability and Comprehensive Energy Sciences Education Program targeted at undergraduate senior division students both in humanities and science courses (graduate students can also take them).

The ambitious targets set up by UTokyo will require the commitment of all students and staff from the university. To enhance collaboration with the students, who make up the largest part of UTokyo's membership, the GX Student Network (GXSN) was launched in 2023, led by members of student environmental organizations. GXSN is actively expanding its scope of activities by collaborating with other universities and launching new projects.

We are also strengthening collaboration with the local communities where our campuses are located. In March 2024, we entered into an agreement to promote collaboration on GX with Bunkyo Ward, where our Hongo Campus is located. In Kashiwa, where our Kashiwa Campus lies, we are enhancing GX initiatives in collaboration with Kashiwa City and other organizations involved in the vitalization of the city.

Going forward, UTokyo will promote emission reduction activities in cooperation with various stakeholders including external partners. Periodic reviews of UTokyo CA will be conducted every year to check progress and update actions.

UTokyo Climate Action 2024 updates the activities in the latter half of fiscal 2023 and the first half of fiscal 2024. GHG emissions data in this issue include data up to fiscal 2023.

About UTokyo Climate Action

Climate Change is undoubtedly one of the most pressing sustainability challenges that we currently face, and urgent action is imperative.

Given these circumstances, UTokyo has positioned Green Transformation (GX) as one of the pillars of its action plan.

At the same time, it has joined the “Race to Zero” campaign

in response the call of the United Nations Framework Convention on Climate Change (UNFCCC).

In October 2022, the GX Promotion Subcommittee, which coordinates activities related to GX,

drew up UTokyo Climate Action including the targets necessary

to achieve net zero greenhouse gas emissions from the university’s activities by 2050.

UTokyo CA will be updated on a yearly basis.

Background

The climate emergency urgently requires global and regional action. The Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) highlights the magnitude and severity of the coming challenges. According to the IPCC, the average global temperature has already increased by around 1°C compared to pre-industrial levels, with some regions warming faster. The IPCC report also found that Climate Change is clearly a human-induced phenomenon, which is already causing severe environmental and social impacts. In fact, the year 2023 saw record-breaking global temperatures with reports suggesting that global warming is increasing the frequency and exacerbating the severity of various natural disasters including heat waves, droughts, large-scale flooding, and wildfires.¹

The requirement for additional climate actions is evident, and rapid improvement is necessary. The IPCC states that aggressive measures to ensure that global cumulative GHG emissions will peak by 2040 will help mitigate climate impacts and avoid social and ecological catastrophes.

At a national/ international level, there is also a requirement to follow the Paris Agreement; a legally binding international treaty on Climate Change that was adopted by 196 parties at the COP21 in Paris on December 12, 2015, and came into effect on November 4, 2016. It aims to limit global warming to below 2°C, preferably 1.5°C, compared to pre-industrial times.

Countries must reach the global greenhouse gas emissions peak as soon as possible and achieve a climate-neutral world by mid-century.

Following the Paris Agreement, Japan's updated 2030 Paris Agreement target commits to a 46% reduction in emissions from 2013 levels, with "continued challenging efforts" toward a 50% reduction. It represents a significant step forward from the previous reduction target of 26%.

Along with the new Nationally Determined Contribution (NDC), the Japanese government in October 2021 also approved a new "Basic Energy Plan" that took an important step toward the achievement of the new 46% target. This plan includes revised electricity mix targets for 2030, such as those for 36-38% renewable energy (previously 22-24%), 20-22% nuclear (no change), 22% gas (previously 27%), and 19% coal (previously 26%).

As a global megacity, the Tokyo Metropolitan Government (TMG) declared its goal of becoming a "Zero Emission Tokyo" at the U20 Tokyo Mayors Summit in May 2019. TMG aims for net

zero CO₂ emissions by 2050, and intends to limit the increase in global average temperature to 1.5°C. TMG has also formulated the "Zero Emission Tokyo Strategy," which outlines a vision, specific measures, and a roadmap to realize this goal.

It comprehensively develops mitigation measures to halt Climate Change and adaptation measures to prepare for the impacts of Climate Change that have already begun to occur. It also fully integrates sustainable resource management into Climate Change policies to help reduce CO₂ emissions outside Tokyo. The following section discusses some initiatives toward system revisions that pertain to the Tokyo Metropolitan Environmental Security Ordinance. As a premise for establishing the ordinance, TMG recognized that actions to be taken till 2030 will be critical to the achievement of "Zero Emission Tokyo" by 2050. Based on this recognition, it announced "Carbon Half," a plan to halve greenhouse gas emissions by 2030. The plan includes the development of a cap-and-trade program that mandates large-scale business facilities in Tokyo to reduce their total CO₂ emissions and also allows them to achieve their reduction targets by the procurement of the excess emission reductions of other facilities through emissions trading.

In addition, the Tokyo Metropolitan Government Basic Environmental Plan was revised in September 2022 to set out specific targets and measures. At the same time, the "Basic Policy on Ordinance Revision to Halve Carbon Emissions (Carbon Half)²" was announced to lay out the direction of ordinance revisions.

Policy 1: Reinforce/enhance measures to reduce CO₂ emissions from new buildings (Green Building Program (a program requiring the submission of a Building Environmental Plan to large-scale buildings), mandatory operation of renewable energy equipment)

Policy 2: Further reinforce measures to reduce CO₂ emissions from existing buildings (reinforcement of cap-and-trade program for large scale facilities)

Policy 3: Advance measures to reduce CO₂ in urban development

Policy 4: Accelerate decarbonization of energy sources

Policy 5: Promote collaboration and cooperation in Carbon Half initiatives

Given these circumstances, the University of Tokyo (UTokyo) has positioned Green Transformation (GX) as one of the pillars

1 WMO, State of the Global Climate 2023
<https://library.wmo.int/records/item/68835-state-of-the-global-climate-2023>

2 For details on the "Basic Policy on Ordinance Revision to Halve Carbon Emissions (Carbon Half)" by the Tokyo Metropolitan Government, visit:
<https://www.metro.tokyo.lg.jp/tosei/hodohappyo/press/2022/09/09/13.html> (in Japanese)

of its action plan in the UTokyo Compass and established the GX Promotion Subcommittee in 2022 under the Future Society Initiative (renamed to UTokyo Compass Initiative in 2024) to promote GX. At the same time, UTokyo has responded to the call of the United Nations Framework Convention on Climate Change (UNFCCC) to become the first Japanese national University to join the “Race to Zero for Universities and Colleges” (hereinafter, “Race to Zero”) campaign that has pledged to reduce its greenhouse gas emissions to net zero by 2050.

Mission of UTokyo

The University of Tokyo (UTokyo) aims to be a world-class platform for research and education that contributes to human knowledge in partnership with other leading global universities. At the same time, UTokyo aims to nurture global leaders with a strong sense of public responsibility and a pioneering spirit, and those who possess both a deep specialty and extensive knowledge. It aims to expand the boundaries of human knowledge in partnership with society.

UTokyo's Commitment to Climate Change

Climate Change is undoubtedly one of the most pervasive sustainability challenges that we currently face. The IPCC's recent Sixth Assessment Report has clearly articulated that the scale of recent changes in the climate system as a whole has been unprecedented and more rapid than previously predicted. In the past five decades the change in air temperature has been more rapid than at any other such period in the last two thousand years; sea level rise has also increasingly accelerated during the last century, faster than at any point in the last several thousands of years. We do not know how much longer our planet and our societies can withstand the grave consequences of global warming. Thus, urgent action is imperative.

Green Transformation (GX)

The guiding principles of UTokyo in the UTokyo Compass, which was made public on September 30, 2021, stated that UTokyo has positioned Green Transformation (GX) as one of the pillars of its action plan.

UTokyo's GX aims to reform the social and economic system to a regenerative one that will not exceed the planetary boundaries, while ensuring an equitable transition, as a means to realize a sustainable and inclusive society where everyone can live happily and with dignity. It places a particular focus on carbon neutrality, nature positivity³, and circular economy as the most important pillars of the initiative. (see Figure 1)

UTokyo is now accelerating specific initiatives, such as the formulation of a roadmap for UTokyo as a business entity to achieve net zero greenhouse gas emissions, and collaboration with the local communities where its campuses are located. The University of Tokyo (UTokyo) aims to be a world-class platform for research and education that contributes to the promotion of

GX through such initiatives as creating knowledge foundation and leading international GX, presenting a future society model by achieving a carbon neutral campus, partnering with businesses, municipalities, other universities and the civil society, and nurturing global leaders.

UTokyo Climate Action is positioned as the core initiative for achieving carbon neutrality among the three pillars of GX. The three pillars, however, are closely interrelated with each other. For instance, measures to fight climate change could become a tradeoff for biodiversity. Paying due consideration to such interrelations, UTokyo will lead an international green transformation informed by scientific expertise that mobilizes the comprehensive knowledge generated in UTokyo.

Specifically, it aims to develop mechanisms for the better management of stable global systems as the shared property of all humankind (global commons), through the Global Commons Stewardship Initiative, an international collaborative project. Moreover, it aims to convene the Energy Transitions Initiative - Center for Global Commons (ETI-CGC) as an industry-academia collaborative platform to discuss pathways and policies for Japan to achieve decarbonization (net zero greenhouse gas emissions) by the middle of this century, and contribute to the transformation of Japanese society from a scholarly perspective.

UTokyo also aims to decarbonize the activities of its entire organization. Specifically, based on a roadmap toward the goal of halving the university's effective CO₂ emissions by 2030 as against the 2013 figure, we will clarify and implement the systems and policy measures required to achieve this goal. UTokyo will also collaborate with the international society as a participating institution in the international "Race to Zero" campaign that promotes action to reach effectively zero greenhouse gas emissions by 2050.

With respect to education, in addition to graduate-level programs for developing advanced human resources such as the Graduate Program in Sustainability Science Global Leadership Initiative (GPSS-GLI) and Fostering Advanced Human Resources to Lead Green Transformation (SPRING GX), we are focusing efforts to enhance GX literacy education for all students and have started providing literacy education for newly enrolled students as well as a university-wide GX education program for undergraduate students in this fiscal year.

With respect to partnership and co-creation, we will promote activities involving various campus members including faculty, staff, and students and work on green transformation initiatives with local governments, residents, businesses, and whole communities in the areas home to UTokyo's campuses and

³ To halt and reverse the loss of biodiversity and place it on the path to recovery



Figure 1 Conceptual Diagram of UTokyo Green Transformation

facilities, which occupy approximately 0.1% of Japan's total land mass. As part of such efforts, in March 2024, we entered into an agreement to promote collaboration on green transformation with Bunkyo Ward, Tokyo, where our Hongo campus is located. In Kashiwa too, we have launched local-level initiatives for promoting decarbonization under the leadership of the Urban

Design Center Kashiwa-no-ha (UDCK), a base for collaboration between the public and private sectors, as well as academia including UTokyo. We will continue to disseminate models of community collaboration toward green transformation to serve as reference points for other universities and communities.

Purpose and Targets to Achieve

Table 1 GHG Targets for the Japanese Government and Tokyo Metropolitan Government

Milestone	Japanese Government ⁴			Tokyo Metropolitan Government ⁵		
	Target	Baseline	Target year	Target	Baseline	Target year
1	46%	2013	By 2030	50%	2000	By 2030
2	100%	2013	By 2050	100%	2000	By 2050

The purpose of UTokyo Climate Action (CA) is to visualize and embody the roadmap to Net Zero GHG emissions. It is an operational planning document that embodies UTokyo's vision and should be continuously revised and updated by implementing the PDCA cycle and verifying the results of the actions.

The purpose of UTokyo CA is to:

- Anticipate and respond to future national and international regulations related to climate change
- Reduce UTokyo's greenhouse gas (GHG) emissions to effectively net zero
- Promote GHG emissions reductions in other universities, surrounding municipalities and businesses
- Implement a circular economy model in UTokyo context
- Further improve the quality of education and research by taking action on Climate Change
- Keep providing research results that contribute globally to the achievement of carbon neutrality

The implementation of UTokyo CA not only aims to achieve the GHG emissions reduction targets but also considers the reduction of the medium- to long-term operational costs associated with climate change mitigation, so that the pathway towards meeting the goals set up in the Paris Agreement can be a financially sustainable one.

The scope of UTokyo CA includes emission reductions through renewable energy supply, efficiency improvement, green procurement, and some other Scope 3 category (e.g., business travel, waste, etc.) reduction actions. It includes buildings and assets which the university has operational control over. Some climate actions are already underway, while others require further data collection and analysis, and discussions with various

stakeholders.

In developing UTokyo CA in connection with the university's participation in the "Race to Zero" campaign, the GX Promotion Subcommittee referred to and reviewed the timelines for GHG reduction developed by the Japanese government and the Tokyo Metropolitan Government (see Table 1) as well as climate action plans of several peer universities, to set the targets for UTokyo.

To make the work to achieve carbon neutrality more manageable, the UTokyo CA implementation process is divided into 3 phases. A summary of the GHG reduction targets associated with each phase is provided below (Table 2). These phases are designed to complement each other, with the earlier phases designed to lay the groundwork for the more ambitious projects in the later phases. They also include actions for reducing Scope 3 emissions.

While steadily implementing the Scope 1 and 2 emissions reduction actions defined in UTokyo CA, we are currently deepening discussions on actions for mitigating and adapting to climate change. Actions for reducing Scope 3 emissions are also being considered as they will require the engagement of other parties outside of UTokyo. However, in order to develop concrete actions to reduce Scope 3 emissions and to predict the quantitative effects of such actions, many barriers need to be overcome, including constraints of available data, diversity of the education and research of university members, and lack of mechanisms for involving product and service suppliers. Therefore, reduction plans for Scope 3 emissions will be developed in a phased manner starting this year.

UTokyo CA was first revised in 2023 and will continue to be revised every year for the purpose of ensuring that the GHG emissions reduction targets will be met by reviewing the effects

⁴ Prime Ministers' Office of Japan, 47th Global Warming Prevention Headquarters
https://japan.kantei.go.jp/99_suga/actions/202109/_00007.html

⁵ Zero Emission Tokyo Strategy
https://www.kankyo.metro.tokyo.lg.jp/en/about_us/zero_emission_tokyo/strategy.html

Table 2 UTokyo Reduction Targets by Scope and Phase

Phase	Baseline	Reduction Target (Scope 1,2)	Reduction Target (Scope 3)	Target year
Phase 1	2013	50%	25%	By 2030
Phase 2	2013	75%	50%	By 2040
Phase 3	2013	100%	75%	By 2050

Table 3 GHG reduction targets specified in TSCP and the Tokyo Metropolitan Environmental Security Ordinance

TSCP CO ₂ reduction targets	Reduction targets specified in the Tokyo Metropolitan Environmental Security Ordinance ⁶
TSCP 2023: 18% reduction by 2023 against fiscal 2017	Halve emissions in the fourth plan period (fiscal 2025-2029) compared to the baseline level (average of 3 consecutive years up to 2010)
TSCP 2030: 50% reduction by 2030 against baseline (2006)	

of all the climate actions implemented in each phase and reflecting the results to improve or devise additional actions.

UTokyo also maintains the GHG reduction targets set by the University of Tokyo Sustainable Campus Project (TSCP), which started its activities in 2008, as well as the targets shown in Table 3 (targets based on the mandatory reduction targets as specified in the Tokyo Metropolitan Environmental Security Ordinance). Although these targets differ from the targets set out in UTokyo CA in terms of baseline years and electricity emissions factors, UTokyo will formulate a roadmap of actions to reduce GHG emissions toward 2030 to meet both the reduction targets specified in the Tokyo Metropolitan Environmental Security Ordinance and UTokyo CA targets. For more details, please refer to Section 3.2 below.

Progress on the targets set by TSCP is reported in the annual UTokyo Environmental Report: <https://www.u-tokyo.ac.jp/ja/about/actions/public05.html> (in Japanese)

⁶ Revised as of October 13, 2023

https://www.kankyo.metro.tokyo.lg.jp/climate/large_scale/overview/4th_overview/outline.html (in Japanese)

Organization Structure and Roles

UTokyo CA is developed and updated by the GX Promotion Subcommittee. Figure 2 shows the organizational structure and respective roles of the GX Promotion Subcommittee, its taskforces and other cooperating taskforces. The GX Promotion Subcommittee meets to discuss and decide on various issues related to the promotion of green transformation. Since fiscal 2023, UTokyo Climate Action Working Group (UTokyo CA-WG) responsible for updating UTokyo CA, has taken on more detailed discussions of the contents to be updated.

During fiscal 2024, UTokyo CA WG comprised of LCA-related faculty members met generally on a monthly basis to discuss how to address Scope 3 emissions and to examine contents to be updated in UTokyo CA. The final draft of UTokyo CA 2024 was reviewed by the GX Promotion Subcommittee before its publication.

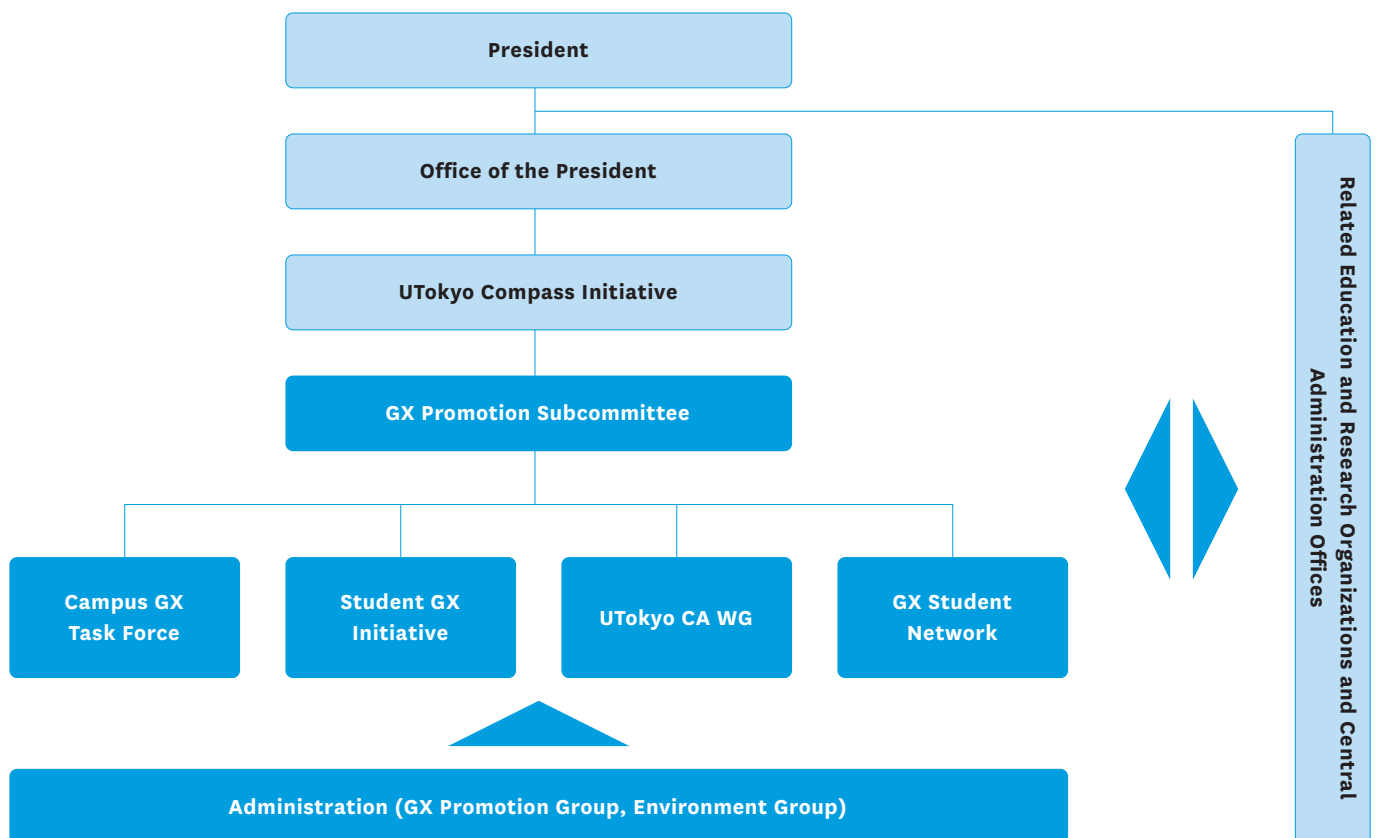


Figure 2 Organizational Structure of GX Promotion

UTokyo GHG Inventory

UTokyo prepares a GHG inventory and publishes the results every year as a participating institution in the Race to Zero campaign.

UTokyo CA 2024 contains the results of the university's GHG inventory up to fiscal 2023.

In order to accurately assess the amount of GHG reduction, it is essential to refine the calculation methods, and hence improvement of data collection techniques is also important.

Such efforts we make to improve our calculation approach are also reported in yearly updated issues of UTokyo CA.

Standards

The University of Tokyo (UTokyo) GHG inventory is compiled in alignment (where applicable) with the GHG Protocol⁷. UTokyo adopts the operational control approach to assess its GHG emissions.

Emission Sources

The GHG protocol classifies GHG emissions according to the following three scopes

Scope1

This scope represents on-site direct GHG emissions mainly from fuel consumption. GHG emitted as a result of fuel consumption on UTokyo's various locations and use of vehicles falls under this category. In the case of UTokyo, GHG from the consumption of town gas and heavy fuel oil accounts for most of its Scope 1 emissions.

Scope2

UTokyo's emissions under this scope represent on-site electricity consumption.

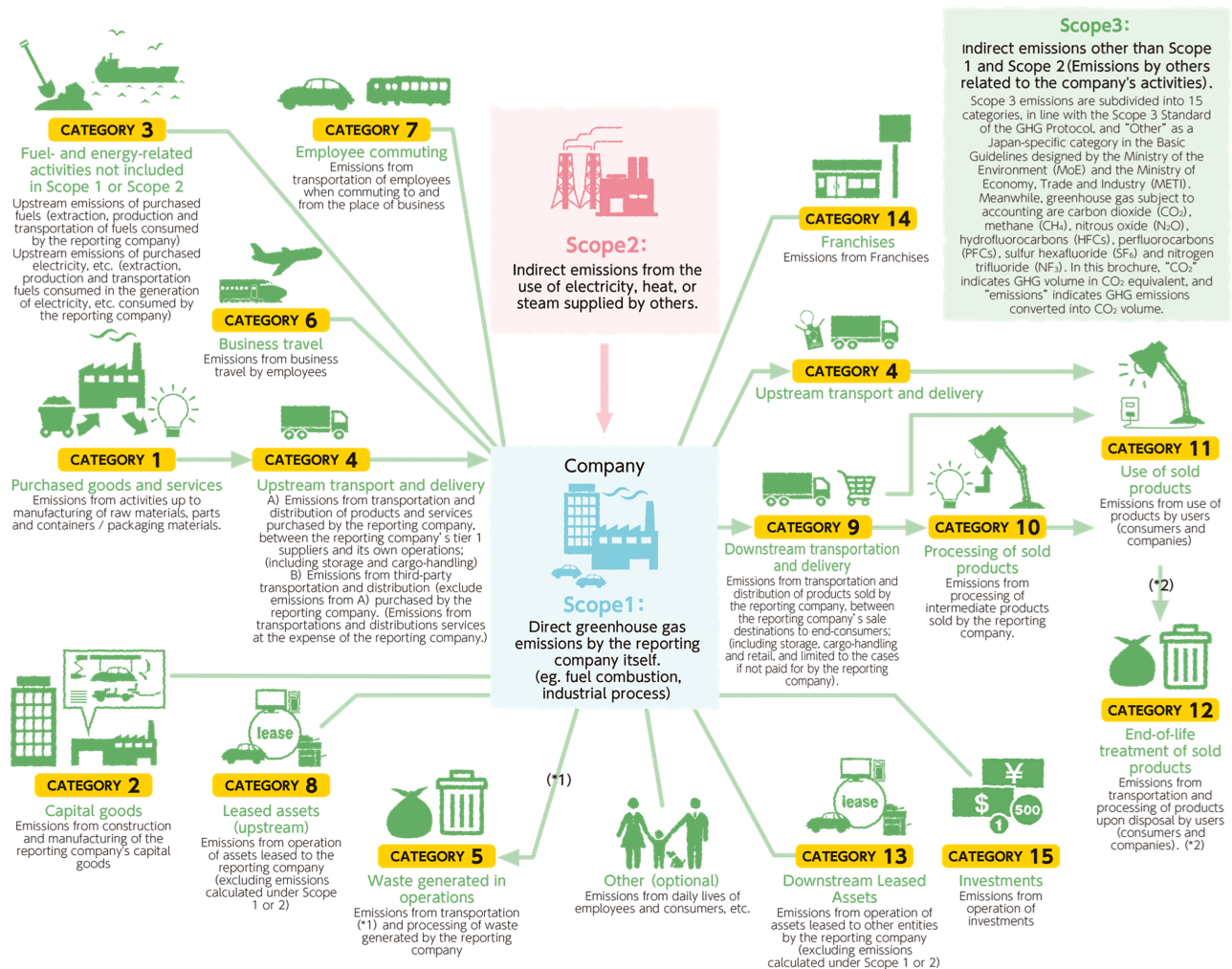


Figure 3 Schematic diagram of Scope 1, 2 and 3 emissions in the value chain⁸

7 WRI WBCSD, Greenhouse Gas Protocol A Corporate Accounting and Reporting Standard REVISED EDITION

<https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf>

8 MOE website: Green Value Chain Platform

https://www.env.go.jp/earth/ondanka/supply_chain/gvc/en/supply_chain.html

■ Scope3

This scope represents emissions that are induced by UTokyo's activities and occur either upstream or downstream. Emission sources are typically not owned or controlled by UTokyo. Scope 3 emissions refer to those emissions that are not included in Scope 1 or 2, and occur in the supply chain of purchased goods and services, infrastructure acquired by UTokyo, business travels, staff and student commuting, waste treatment, other fuel- and energy-related activities (such as, mining, refining and transport of energy), and so on.

Figure 3 shown below is an image created by the Ministry of the Environment (MOE) based on the GHG protocol to illustrate the sources of the three scopes and the 15 categories under Scope 3, as well as their relations in the supply chain.

Global Warming Potential

Global warming potential values from IPCC 2021 GWP 100a (see Table 4) were used, in principle, to obtain the greenhouse effect for different substances.

Table 4 IPCC 2021 100-year global warming potentials (CO₂ conversion factors) of main GHGs⁹

Table 4
IPCC 2021 GWP 100-years of major substances relative to CO₂ ⁹

Greenhouse Gas	Chemical Formula	100-Year GWP
Carbon dioxide	CO ₂	1
Methane (fossil)	CH ₄	29.8
Methane (biogenic)	CH ₄	27
Nitrous oxide	N ₂ O	273
Hydrofluorocarbons (HFCs)	Various	Various
Perfluorocarbons(PFCs)	Various	Various
Sulfur hexafluoride	SF ₆	24300

⁹ IPCC, Climate Change 2021: The Physical Science Basis. Working Group I Contribution to the IPCC Sixth Assessment Report
<https://www.ipcc.ch/report/ar6/wg1/>

Scope and Boundary

Reporting Period, Organizational Boundary and Scope

As of September 2024, UTokyo has 48 domestic locations, and 27 overseas locations¹⁰. There are five main campuses in Japan: Hongo, Komaba 1, Komaba 2, Shirokanedai, and Kashiwa, with Hongo being the largest campus that also includes a university hospital. Due to the lack of detailed data necessary for calculating the GHG emissions from all of UTokyo's sites and facilities, GHG emissions related to UTokyo's activities are currently reported as indicated in Table 5.

Financial information used to assess the GHG inventory for Scope 3 emissions covers all funds that are managed by UTokyo's budget.

Other Boundaries and Exclusions

Of the items that were not included in our GHG inventory up to last fiscal year, we have started to calculate the following items this year.

- Refrigerant leakage from air conditioning
- Chemical substances used in experiments that are directly released to the atmosphere

The following items are still not included in the calculation, as relevant information on their emissions is still lacking. We will keep examining their inclusion in future assessments.

- Emissions associated with student commuting
- Emissions associated with students attending online classes and staff working remotely at home
- Emissions associated with some activities as an educational and research institution including investments made by UTokyo

Table 5
Fiscal Years and Scopes that are covered
(*a) It is estimated that scope 1,2 emissions are included in scope 3 emissions.

FY/ Locations	5 Main Campuses	Other domestic locations	Overseas locations
2006	Scope1, 2, 3	-	Scope3 (*a)
2007	Scope1, 2, 3	-	Scope3 (*a)
2008	Scope1, 2, 3	-	Scope3 (*a)
2009	Scope1, 2, 3	Scope1, 2, 3	Scope3 (*a)
2010	Scope1, 2, 3	Scope1, 2, 3	Scope3 (*a)
2011	Scope1, 2, 3	Scope1, 2, 3	Scope3 (*a)
2012	Scope1, 2, 3	Scope1, 2, 3	Scope3 (*a)
2013	Scope1, 2, 3	Scope1, 2, 3	Scope3 (*a)
2014	Scope1, 2, 3	Scope1, 2, 3	Scope3 (*a)
2015	Scope1, 2, 3	Scope1, 2, 3	Scope3 (*a)
2016	Scope1, 2, 3	Scope1, 2, 3	Scope3 (*a)
2017	Scope1, 2, 3	Scope1, 2, 3	Scope3 (*a)
2018	Scope1, 2, 3	Scope1, 2, 3	Scope3 (*a)
2019	Scope1, 2, 3	Scope1, 2, 3	Scope3 (*a)
2020	Scope1, 2, 3	Scope1, 2, 3	Scope3 (*a)
2021	Scope1, 2, 3	Scope1, 2, 3	Scope3 (*a)
2022	Scope1, 2, 3	Scope1, 2, 3	Scope3 (*a)
2023	Scope1, 2, 3	Scope1, 2, 3	Scope3 (*a)

¹⁰ Domestic and overseas sites operated by UTokyo (in Japanese)

<https://www.u-tokyo.ac.jp/ja/about/campus-guide/national.html>

https://www.u-tokyo.ac.jp/ja/intl-activities/overseas-offices/list_of_overseas_offices.html

Calculation Methodology

Calculation Flow

GHG emissions were calculated by multiplying activity data by the emission factor associated with the activity in question.

Figure 4 below roughly outlines the flow of GHG emissions calculation.

Emission Factors

- Scope 1 emissions factors are applied by obtaining them from

the “Greenhouse Gas Emissions Calculation, Reporting, and Disclosure System.”¹¹

- Scope 2 emissions factors are applied by obtaining the yearly basic emission factors announced by TEPCO¹². In fiscal 2023, we started using new calculation methods that use location-based and market-based emission factors. (See Section 2.4.)
- Scope 3 emission factors were mostly obtained from LCA database IDEA Ver. 3.3¹³, with some supplemented by referring to the emission factors of Green Value Chain Platform¹⁴.

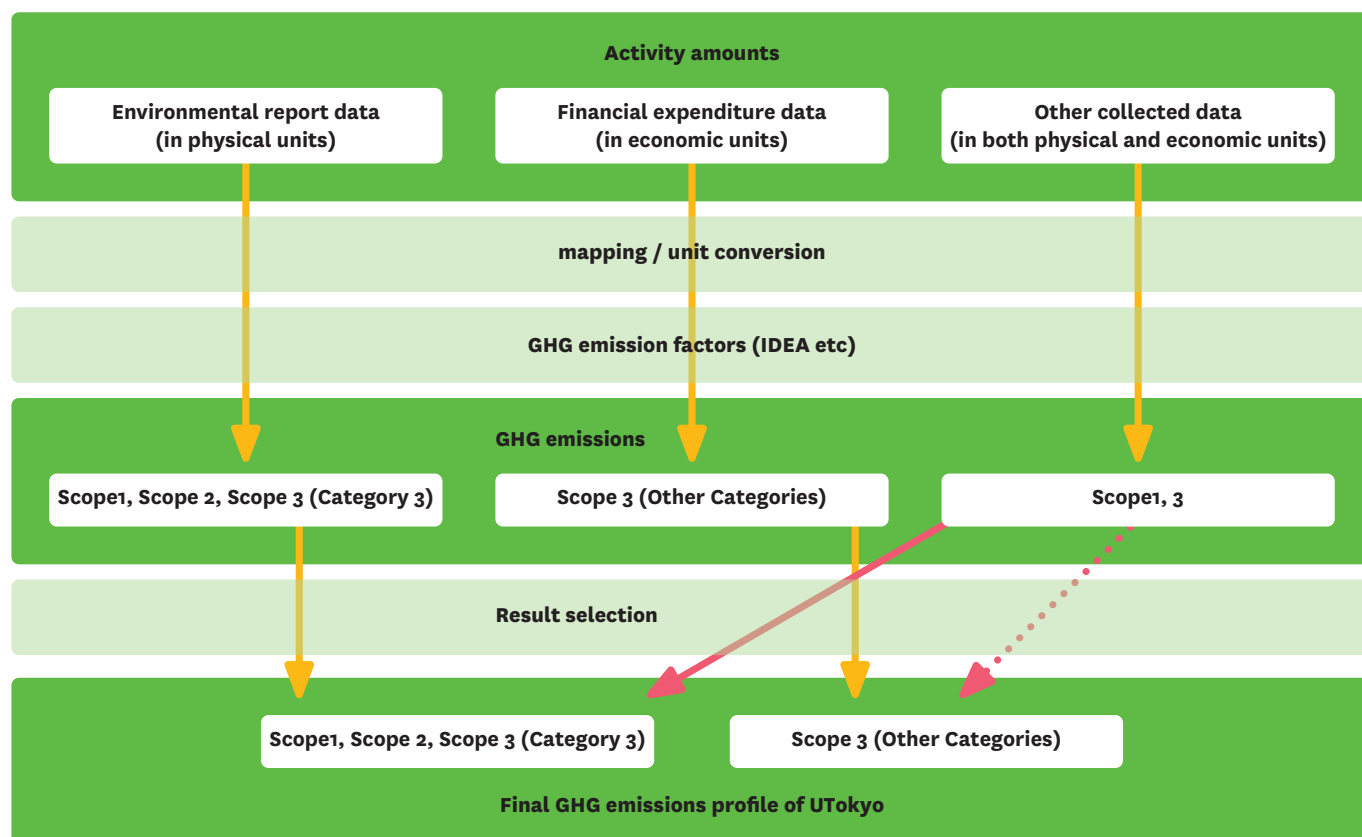


Figure 4 GHG emissions calculation flow

11 Ministry of the Environment (MOE), List of Emissions Factors
<https://ghg-santeikohyo.env.go.jp/calc> (in Japanese)

12 TEPCO, Transition of CO₂ Emission Factors, etc.
<https://www.tepco.co.jp/ep/company/warming/keisuu> (in Japanese)

13 LCI database IDEA Ver. 3.3 (April 15, 2023)
 Research Laboratory for IDEA, Research Institute of Science for Safety and Sustainability (RISS), National Institute of Advanced Industrial Science and Technology (AIST)

14 Ministry of the Environment (MOE) and Ministry of Economy, Trade and Industry (Green Value Chain Platform Emission Intensity Database Ver 3.1)
https://www.env.go.jp/earth/ondanka/supply_chain/gvc/estimate.html#no04 (in Japanese)

Improvement of Limitations and Data Gaps

Due to problems pertaining to data collection, the current calculation method has various limitations. We are currently trying to eliminate these limitations starting from where we can.

- For Scope 1 emissions, we started calculation of the impact of the direct release of chemical substances (air conditioner refrigerants, solvents used in experiments, etc.) into the atmosphere this fiscal year. For air conditioner refrigerants, we used the leakage amount reported under the Act on Rational Use and Proper Management of Fluorocarbons; for the atmospheric release of methylene chloride, chloroform, and other chemical substances used in experiments, we used the emission data collected under the PRTR Act and applied the global warming potential values from IPCC 2021 GWP 100a. Due to limitations in data collection, the following data gaps still exist in the Scope 1 GHG emissions data. We will continue to explore ways for improvement.
 - ▶ Fuel consumption data of vehicles owned by UTokyo are only available for vehicles registered in the Tokyo metropolitan area. Therefore, fuel consumption of vehicles registered in other prefectures is not included.
 - ▶ Fuel usage data for overseas sites are not included.
- From the viewpoint of ensuring consistency and continuity, up to last fiscal year, Scope 2 GHG emissions were calculated using the basic emission factors announced by TEPCO for the relevant year as the carbon intensity of electricity. Although UTokyo's five major campuses are located within TEPCO's service area, we are consuming large amounts of electricity at sites outside of TEPCO's service area, too. Also, "100% effectively renewable energy" options have been introduced at Kashiwa II Campus. Considering these facts, in fiscal 2023, we have added market-based calculations using different emission factors by regional grids and power options. We also conducted location-based calculation to allow comparison. By comparing the results of these three calculation methods, we will verify whether we can ensure continuity and validity by using these methods. We used the most recent electricity emission factors available for the calculation of emissions for fiscal 2023. Specifically, we used the preliminary FY2023 basic emission factors announced by TEPCO, and as location-based factors, we used MOE's FY2022 figures. As market-based factors, we used the latest preliminary figures announced by power companies including TEPCO. For some companies that do not announce preliminary figures, we applied MOE's FY2022 figures.
- Up to last fiscal year, emissions for Scope 3 Category 3 were calculated from the ratio of direct GHG emissions (combustion of fossil fuel) and indirect emissions (fuel procurement and transmission loss) derived from electricity and fuel datasets in IDEA Ver. 3.1. This year, however, IDEA Ver 3.3 provides separate carbon intensity figures for Scope 2 and Scope 3 Category 3, so we used the figures provided by IDEA.
- The calculation of each Scope 3 item has been mainly conducted using the spend-based method. In other words, financial data is classified and aggregated by account title, and emissions are calculated by using the GHG emission factor that is considered most applicable to the relevant account title. However, in some cases, the granularity of these account titles is much coarser than that of the IDEA emissions factors, and there may be many candidates of GHG emission factors that could be applied to an account title. This is an uncertainty factor that may be affecting the calculation of GHG emissions. We considered breaking down account titles with large spending into smaller items as a means for future improvement, but this has proved difficult to manually calculate. So, we are now examining use of further segmented items in conjunction with the update of the financial and accounting system planned in fiscal 2026, as well as assignment of more appropriate emission factors. For Scope 3 Category 5 (waste), it was ascertained that the financial data used for calculation of emissions from main waste treatment processes can be replaced by volume data by cross-checking waste treatment data and financial data. We will do mass-based calculations as much as possible from this fiscal year to more precisely measure the effects of reduction measures. For this fiscal year, we used mass-based calculations for general and industrial waste (daily-life waste) from Hongo Campus and laboratory waste¹⁵ from UTokyo as a whole.
- For Scope 3 emissions, secondary data such as LCA databases are currently used to calculate the GHG emissions of purchased goods and services, which are only a proxy for the actual emissions that occur in the UTokyo supply chain. Going forward, UTokyo will engage its supply chain stakeholders to obtain physical data as much as possible and shift to calculating GHG emissions data from primary data reported by suppliers in place of secondary data.

¹⁵ General and industrial waste: Combustible waste, plastics, glass bottles, cans, PET bottles, metal, ceramics, glass, etc.

Laboratory waste: Waste liquids containing cyanogen, fluorine, or phosphates, waste acids, waste alkali, organic waste liquids, oil, heavy metal waste liquids, solid waste, etc.

Inventory Results and Analysis

Figure 5 shows UTokyo's Scope 1, 2, and 3 inventory results of GHG emissions for the stated reporting period. Figure 5 shows calculation results based on the same methods and scopes as previous issues from the viewpoint of continuity. The impacts of Improvement of Data Gaps described in Section 2.4. above are included in the Inventory Results and Analysis below.

Inventory Results for Scopes 1 and 2 (based on conventional calculation method)

Scope 1 and 2 emissions in fiscal 2023 (the newest data) were approx. 160,000 MTCO₂e, representing a 1.3% reduction from fiscal 2022 and 19.9% reduction from fiscal 2013. There were concerns about the potential increase in emissions in fiscal 2023 following the lifting of restrictions associated with COVID-19. However, despite a 1.5% rise in TEPCO's basic emission factor from the previous year, we were able to achieve emission reduction, thanks to the 2.7% reduction of electricity consumption, which accounts for 93% of the total of Scope 1 and 2 emissions. Changes in electricity consumption in the main

campuses compared to the previous year were: down 0.7% in Hongo, up 0.4% in Komaba, and down 13.4% in Kashiwa. The decline in the operation rate of the supercomputer in Kashiwa Campus seems to have had a significant impact on power consumption. The ongoing conversion of Hf lights to LED implemented as part of TSCP measures is estimated to have had an emission reduction effect of approximately 1000 MTCO₂e.

Impact of Data Gap Improvement on Scope 1 Calculations

As described in Section 2.4. above, we have calculated the GHG emissions associated with the leakage of air conditioner refrigerants and release of chemical substances into the atmosphere from lab experiments and included them in Scope 1 emissions in this year's UTokyo CA. (Table 6)

The calculation results showed that, while GHG emissions from leakage of air conditioner refrigerants vary by year, they were far from negligible: ranging from approximately 1,200 to 2,100 MTCO₂e in the recent 5 years. (The figures for fiscal 2023



Figure 5 UTokyo Scope1,2,3 GHG calculation results with projections to the future

Table 6
GHG emissions due to atmospheric release of air conditioner refrigerants and chemical substances¹⁶ (MTCO₂e)

GHG emission type/fiscal year	2019	2020	2021	2022	2023
Air conditioner refrigerants	1,458	2,072	1,303	1,212	1,458
Chemical substances	No data available	39	51	20	31

were equivalent to approximately 13% of Scope 1 emissions and approximately 0.9% of the total of Scope 1 and 2 emissions.) As for GHG emissions attributable to the release of chemical substances into the atmosphere, their impact on the total amount of emissions is thought to be minimal even though the calculation results involve uncertainty.

Because legal regulations on leakage of air conditioner refrigerants did not start until 2015, no data are available for the baseline year of 2013. It is therefore difficult to include the figures in the assessment of progress toward our 2030 reduction target. Nonetheless, we will continue to track and analyze changes in emissions from refrigerants as the use of R-32 refrigerant with relatively low global warming potential is increasing in recent years.

Market-based and Location-based Scope 2 Calculations

As described in Section 2.4. above, Scope 2 emissions for fiscal 2023 calculations using market- and location-based emission factors were conducted in addition to the conventional calculation methods. Particularly, as the “effectively renewable energy” electricity plan (plan using “Non-Fossil Certificates with Renewable Energy Attributes”) has been applied in Kashiwa II Campus since December 2022, the results will widely differ between market-based and conventional calculation methods.

The inventory results of each of the calculation methods are shown in Table 7 below.

When using the market-based method, the emission calculation results will be largely reduced. This is because emissions from

Table 7
Scope 2 emissions based on different calculation methods (emission factors) (unit: 10,000 MTCO₂e)

Calculation method	Scope 2 emissions	Difference with conventional method
Previously used calculation method	14.8	—
Location-based method	14.0	-0.8(-5.6%)
Market-based method	12.7	-2.1(-14.3%)

Kashiwa II Campus, which accounts for approximately 6% of UTokyo’s total electricity consumption, will be counted as zero, in addition to the fact that the adjusted emission factor of TEPCO (main electricity supplier) is smaller than the basic emission factor. On the other hand, although the “effectively renewable energy” plans provided by power companies are recommended in the Tokyo Metropolitan Environmental Security Ordinance as an effective means of emission reduction, there is room for discussion regarding additionality. Furthermore, achieving a carbon neutral society requires reduction of the emission factor of the entire power grid of society to zero. We will keep examining whether to increase the choice of “effectively renewable energy” plans based on the use of renewable energy in the whole society and the relevant policies of central and local governments.

Inventory Results for Scope 3 (based on conventional calculation method)

Scope 3 emissions for fiscal 2023 (including Category 3) was approximately 464,000 MTCO₂e, representing an increase by 4.8% (approximately 21,000 MTCO₂e) from fiscal 2022. The largest factor contributing to this increase was Category 6 emissions associated with business travels, which made drastic increase in fiscal 2022 and continued to grow into fiscal 2023 by approximately 17,000 MTCO₂e (33% from fiscal 2022), due to the easing of COVID-19 related travel restrictions. In addition, Category 1 emissions from purchased goods and services increased by 3.3% from fiscal 2022. However, this figure may have been affected by the rise of consumer price index, which also increased by 2.9% during the same period. (The impact of

¹⁶ Air conditioner refrigerants: R-410A, R-22, R-407C, R-134a, R-32, etc. Chemical substances: tetrachloromethane, chloroform, dichloromethane, 1,2-dichloroethane, etc.

price rises is not taken into consideration in the calculation for fiscal 2023.)

Mass-based Calculation of Scope 3 Category 5 (Waste)

For fiscal 2023, as described in Section 2.4. above, we examined mass-based calculations for Category 5 emissions from waste treatment. We chose Category 5 (waste) for applying mass-based calculation because waste treatment requires measures to mitigate environmental impact other than GHG emissions and waste volume can be relatively easily obtained in Scope 3 activities compared to other categories. For this fiscal year, we chose to apply mass-based calculations to general and industrial waste (daily-life waste) from Hongo Campus and laboratory waste from UTokyo as a whole due to the conditions of the data collection system.

Specifically, mass-based calculations were conducted by assigning the applicable IDEA product code for the four phases of collection/transport, intermediate treatment, recycling, and final disposal, according to waste type and treatment flow. To assess the impact of introducing mass-based calculations, we compared the results obtained by this method with the results of the previously used method by subtracting corresponding processing costs from the financial and accounting data. The inventory results are shown in Table 8.

The treatment costs of the waste for which we collected actual mass data were included in the account title that was calculated as Category 1 when using the previous method. Therefore, the mass-based GHG emissions were added to Category 5 emissions, while the cost-based GHG emissions were subtracted from Category 1 emissions. By replacing the previous cost-based calculations with mass-based calculations, the calculated amounts of emissions from waste increased by more than ten folds. However, these increases represent only 0.3% of the total Scope 3 emissions excluding Category 3, energy-related activities. Therefore, the impact on the total amount of Scope 3 emissions is thought to be minimal.

Table 8

Impact of using mass-based calculations on calculation results for waste treatment (unit of emissions: MTCO₂e)
<General and industrial waste (daily-life waste) from Hongo Campus>

Fiscal year	Mass-based GHG emissions	Cost-based GHG emissions	Difference in calculation results	Difference in results / Total of Scope 3 emissions
2019	910	82	829	0.20%
2020	666	55	611	0.17%
2021	766	64	702	0.18%
2022	764	83	681	0.17%
2023	753	88	665	0.16%

<Laboratory waste from UTokyo as a whole>

Fiscal year	Mass-based GHG emissions	Spend-based GHG emissions	Difference in calculation results	Difference in results / Total of Scope 3 emissions
2019	465	33	433	0.10%
2020	397	32	365	0.10%
2021	505	33	472	0.12%
2022	502	49	453	0.11%
2023	463	41	422	0.10%

(The total of Scope 3 emissions excludes Category 3 (energy-related activities))

Verification

UTokyo plans to conduct verification of the type of data used, calculation methods, and visualization and interpretation of the calculation results, through consultation with UTokyo's experts in areas such as LCA, energy demands of buildings, energy systems, and climate and society. The objective of this verification is not only to increase the coverage, accuracy, and consistency of the assessment, but to ensure that necessary insights and tracking information can be obtained to assist each climate action and UTokyo CA targets. UTokyo CA WG mentioned above also assumes a similar role in verification.

Although the GHG emissions profile of UTokyo is not currently verified by an external or third-party, the university will report its initiatives (mainly around Scope 3 calculations) at EcoBalance 2024, a biennial international conference to be held in November 2024. This can be deemed as part of our verification activities to obtain valuable opinions and information from external perspectives by disclosing UTokyo's activities to experts from within and outside of Japan.

3

Reduction of GHG Emissions as a Business Entity

UTokyo's campus, with its faculty, staff, and students totaling approximately 40,000 members, forms a whole town-like community encompassing not only classrooms, offices, laboratories and other educational facilities but also life-related facilities including shops, cafeterias, and even a hospital. The main objective of UTokyo's efforts to reduce GHG emissions as a business entity is to contribute to carbon neutrality of cities and society as a whole, by returning the fruits of its efforts obtained on campus, a living laboratory, to society.

Principles and Policy for Emission Reduction Measures

UTokyo Climate Action must be developed in a manner so as not to compromise the effectiveness of the university's research and education activities as a research-driven comprehensive university. Therefore, we will not deter such activities by limiting the use of facilities and equipment; at the same time, we will spare no effort to eliminate waste. The comfort and usefulness of the environment will not be compromised, but improved. As a general rule, approaches to reduce GHG emissions will be considered in the priority order of Avoid, Reduce, Substitute, Switch to on-site¹⁷ renewable sources, Switch to off-site¹⁷ renewable sources, Sequester, and Offset.

A mechanism will be developed to consult the faculty, staff,

and students of UTokyo no matter what measure is considered and implemented, to collect input from university members and enable their active participation in the decision process. Adoption of climate actions will be finalized through the use of existing discussion bodies and other means.

Since fiscal 2024, UTokyo GX Promotion Subcommittee and its Campus GX Task Force have been discussing policies and strategies for accelerating actions to achieve UTokyo CA targets. They have formulated a draft policy that encompasses the development of organizational structures, systematized rules and norms for emission reduction, as well as specific reduction strategies for each Scope (Table 9 below).

Table 9 Campus GX Policy towards the achievement of UTokyo Climate Action targets

Policy		Strategy
Development of structures for reducing Scope 1-3 emissions		<ul style="list-style-type: none"> • Enhancement of organizational structures • Systematization of rules and norms; formulation of action guidelines
Initiatives to address Scopes 1 and 2	Reduction of energy demand	<ul style="list-style-type: none"> • Raising awareness of each member of UTokyo by sharing and recognizing good practices • Improving the operation of research equipment at each office and laboratory • Introduction of data driven and AI-based energy management systems (i.e. Building Carbon Management) to existing facilities • Application of ZEB design and Building Carbon Management to newly built facilities
	Measures on the energy supply side	<ul style="list-style-type: none"> • On-site solar power generation • Demonstration and implementation of research findings related to renewable power generation on campus • Procurement of renewable energy
Initiatives to address Scopes 3		<ul style="list-style-type: none"> • Improving activity data collection methods through updating of the financial and accounting system and other opportunities • Encouraging behavioral change of each UTokyo member

¹⁷ On-site: Renewable energy generation facilities are located on the premises of the energy consumer.

Off-site: Renewable energy generation facilities are located off the premises of the energy consumer.

Initiatives Related to Scopes 1 and 2

GHG Emission Performance and Progress against Target

Since TSCP was first launched in 2008, UTokyo has been promoting the upgrade of energy-saving equipment and behavior towards the goal of achieving a low carbon campus, positioning the reduction of Scope 1 and 2 GHG emissions as top priority. As shown above, we were able to reduce fiscal 2023 emissions by approximately 20% against the baseline year of 2013 as a result. We need to further accelerate reduction actions in order to achieve our 2030 target. (Fig. 6)

At the same time, campuses located within Tokyo (Hongo, Komaba I, Komaba II, and Shirokane campuses) are subject to the application of the cap-and-trade (C&T) program under the Tokyo Metropolitan Environmental Security Ordinance. Therefore, these campuses need to meet the mandatory GHG reduction targets set by the Tokyo Metropolitan Government (TMG). The mandatory GHG reduction targets set for the fourth plan period (2025-2029) are much higher than those for the previous plan periods. (Fig. 7)

How the targets are set and emissions are calculated under the TMG's C&T program are quite different from that of UTokyo CA. For example, the emission reduction counted against the target is limited to that from the four campuses located in Tokyo (i.e., Hongo, Komaba I, Komaba II, and Shirokane), which together

accounts for three fourths of UTokyo's total emissions; the mandatory reduction is limited to energy-related CO₂ emissions; the baseline year and target year are set differently; and the emission factors used (especially for electricity) are different.

Both targets, however, share the same goal of promoting climate actions and many of the emission reduction measures should be effective for both programs.

To achieve both targets at the same time, UTokyo GX Promotion Subcommittee and its Campus GX Task Force have been examining measures to accelerate GHG reduction from the two approaches of reducing energy demand and increasing supply of renewable energy based on the policies set out in Table 9 above.

Scope 1 and 2 Emission Reduction toward Achieving Target

As set forth in the Principles in Section 3.1. above, the most prioritized approaches to reduce Scope 1 and 2 GHG emissions are to avoid and reduce energy demand. So far, we have implemented various measures through TSCP, including increasing energy efficiency of air-conditioning and lighting equipment, visualizing electricity use, and promoting behavioral changes based on various guidelines, which have produced certain results. However, as noted earlier, we will

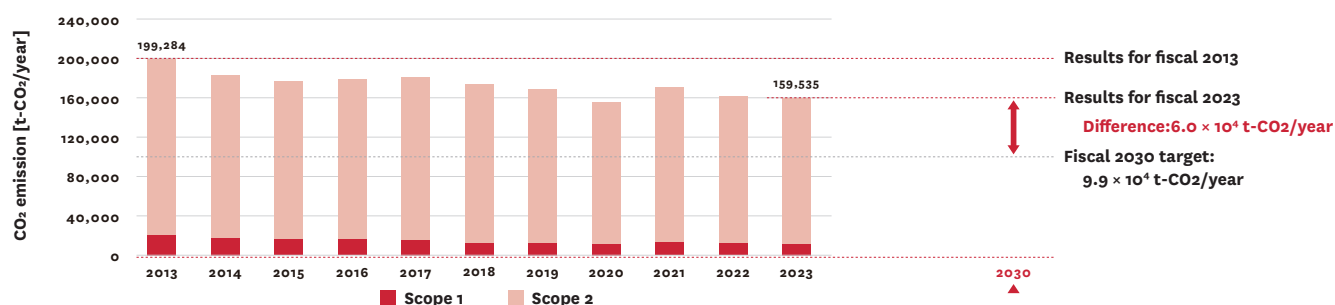


Figure 6 Progress toward UTokyo Climate Action target

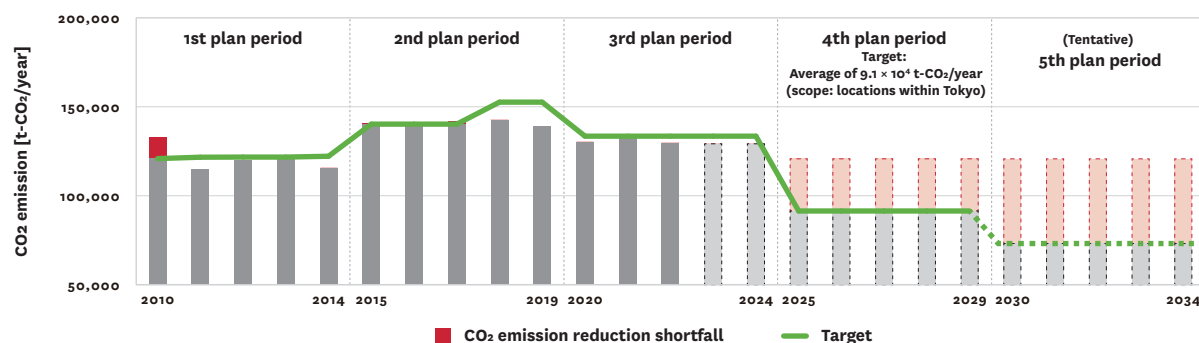


Figure 7 Progress toward targets set by Tokyo Metropolitan Environmental Security Ordinance (cap-and-trade program)

need to accelerate reduction actions if we are to meet both the mandatory targets under the TMG's C&T program and UTokyo CA targets.

As a measure to control the demand side, we are now planning to introduce Building Carbon Management in buildings in Hongo Campus that consume large amounts of energy. Specifically, the idea is to optimize energy use by analyzing equipment operational data, which will be collected through sensors attached to each equipment (particularly air-conditioners) in each room and facility, then visualized and stored in a cloud environment. AI will be utilized in the operation of the carbon management system to accelerate the optimization process. The system will be introduced on a trial basis to Faculty of Engineering Bldg. 10 of UTokyo, which is now undergoing renovations, to clarify its cost-benefit performance.

On the other hand, use of energy cannot be avoided in research and education activities of a university, and therefore measures on the supply side, in other words, introduction of renewable energy also needs to be promoted to achieve carbon neutrality. Onsite solar power generation facilities installed in the Phase I installation have been operating since April 2024. Based on their power generation performance in April, they are expected to contribute an annual emission reduction of approximately 600 MTCO₂e. Phase II installation of onsite solar power generation facilities is currently being carried out, but their emission reduction effect will also be limited, estimated at approximately 800 MTCO₂e per annum, due to lack of space on campus available for installing generation facilities. We are therefore considering the introduction of offsite renewable energy. An alternative option is to start using “effectively renewable energy” with Non-Fossil Certificates, as was the case in Kashiwa II Campus.

We are considering the implementation of these measures in time for the fourth plan period (2025-2029) of the TMG's C&T program. The system enhancement and funding necessary for the implementation are planned to be in place by the end of fiscal 2024.

The plan is to implement these measures intensively in the first three years (2025-2027) of the fourth plan period, but the effects are not expected to manifest until 2027 or later, as it will take certain time for designing and installing the rather large-scale equipment.

To deal with this issue, we conducted a simulation to see how much reduction will be necessary to achieve the targets. We assumed that we would reduce energy consumption at the current pace up to fiscal 2026 and then the pace would accelerate starting in 2027, when new measures will be implemented. An example of the simulated results is shown in Figure 8. While the simulation results below entail uncertainties associated with various assumptions on the introduction of

renewable energy and future grid emission factors, the results suggest that UTokyo will be able to meet the mandatory targets under Tokyo C&T program if it achieves approximately 20% reduction in electricity consumption by 2029 against fiscal 2023. The results also showed a possibility of simultaneously achieving the 2030 targets in UTokyo CA.

We believe this level of reduction in energy consumption is not impossible in view of past case examples of Building Carbon Management. Needless to say, we need to ensure target achievement by continuing other efforts as well, such as update of air-conditioning equipment and LED conversion of lighting equipment, combined with behavioral changes to save energy in everyday research and education activities.

It is also necessary to introduce offsite renewable energy options with additional benefit in a planned manner.

However, future reduction performance is uncertain as it will be largely affected by external factors such as electricity emission factors. We will therefore need to monitor the emission results every year and respond in a flexible manner through the introduction of “effectively renewable energy” options and other means. In implementing UTokyo CA next fiscal year and on, we will strive to flexibly balance various reduction measures and report on our progress, by verifying the uncertainties and actual emission results.

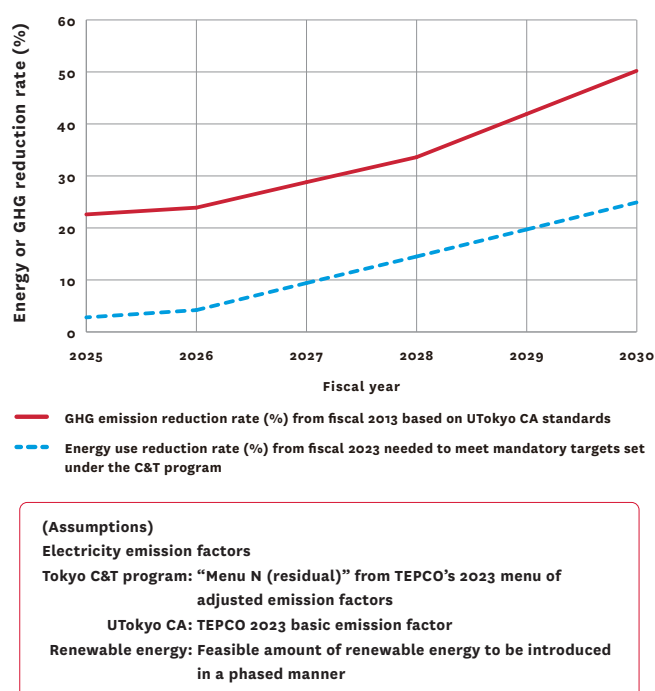


Figure 8
Example of simulation results of the relationship between energy use reduction rate and GHG reduction rate

Initiatives Related to Scope 3

Challenges that Hinder Calculation and Reduction of Scope 3 Emissions

According to the inventory results shown in Section 2.5 above, Scope 3 emissions account for over 70% of the total emissions of UTokyo. It has been identified that in recent years consumption demand mainly in developed countries accounts for much of GHG emissions overseas¹⁸. It is extremely important from the viewpoint of reducing the planet's overall environmental burden to measure and take action to reduce Scope 3 emissions.

However, the measurement (calculation) and reduction of Scope 3 GHG emissions which represent indirect emissions from various activities of the organization involve difficult challenges. It can be regarded that establishing a methodology for the measurement and reduction of Scope 3 emissions is in itself a climate action.

Efforts related to Scope 3 emissions involve the following challenges related to the measurement of GHG emissions, planning of reduction actions, and evaluation of the reduction effect of the actions implemented:

(1) Measuring UTokyo's Activities

The range of activities pursued by a university is extremely diverse from procurement to consumption of food and drinks, acquisition of assets, construction, waste disposal, and commuting and traveling, most of which involve indirect GHG emissions. All of these activities need to be categorized, measured, and linked to emission amounts, but digitalization of data is indispensable to grasp and organize such huge amounts of activities. The amount of activities can be expressed by the financial expenses associated with that activity or the actual physical amount (purchased, consumed, wasted, or distance traveled, etc.), but the latter is higher in accuracy. UTokyo at present uses physical amounts to measure waste, but for other items, it uses financial expenditure data for each account title as the indicator of activity volume.

(2) Calculating emissions

Emissions are calculated by multiplying activity data by an appropriate emission factor, which can be found in publicly available LCA databases. The same method is used for current calculations of Scope 3 emissions, but there are problems inherent to this method because it is based on expenditure data. For example, the calculation results are affected by price rises that are irrelevant to the amount of emissions, and change in purchase behavior to reduce environmental impact

may on the contrary be falsely evaluated as an increase in emissions due to increased cost. It is therefore vital to use physical data instead of financial data to express the amount of activities. Even if that becomes possible, as long as we use secondary data obtained from LCA databases and other sources as emission factors, it is difficult to reflect, in a timely manner, the effect of our emission reduction efforts in the inventory results. Therefore, in order to be able to measure the reduction effect, emissions data obtained through an actual life cycle assessment (LCA) of the activity in question will be necessary. The cooperation of the entire value chain related to the activity is essential to conduct an LCA based on actual activity data, which constitutes a barrier to carrying out the measurement.

(3) Reducing emissions

Approaches to reducing emissions can be largely divided in two: reducing the activity itself or reducing the emission factor associated with the activity. The most important means related to the former approach is eliminating ineffective activities, since the major premise of UTokyo's climate actions is not to compromise the effectiveness of the university's research and education activities. The latter includes measures to mindfully select products and means with low emission factors and to reduce the emission factor in cooperation with value chain stakeholders. In any case except for eliminating simple inefficiencies, it is essential that the emissions associated with each activity are clarified, individual members become aware of the emissions related to the activities he or she is engaged in, and as a result change their behaviors.

Initiatives Related to Calculation of Scope 3 Emissions

UTokyo CA WG comprised of LCA-related faculty members described in Section 1.4 above is responsible for updating Climate Action, but it also addresses various issues related to Scope 3 emissions. The following issues were addressed in the period from the latter half of fiscal 2023 to the first half of fiscal 2024.

(1) Category 1 (purchased goods and services): Review of purchase items with large spending

Category 1 shares the largest part of Scope 3 emissions, accounting for 63% of Scope 3 and 46% of the total emissions from UTokyo according to fiscal 2022 inventory results. We

¹⁸ <https://cgic.ifi.u-tokyo.ac.jp/en/topics/gcsic2022-2/>

conducted a review of purchase items listed in the financial and accounting data with a large spending and large share of emissions. The results suggested that some of the high-priced items (for example, orphan drugs) may be unduly driving up the emission calculation results. Furthermore, this suggests that by identifying the products and suppliers (manufacturers) of such high-priced purchase items, we may be able to reflect emission reduction efforts made by such manufacturers in the calculation of Scope 3 emissions. Although the present granularity of our financial and accounting data does not allow for more detailed review, we will work to further improve the accuracy of the emission calculations and evaluation of the effects of reduction efforts by reflecting the findings of this review when updating the financial and accounting system.

(2) Category 5 (waste generated in operations): Introduction of mass-based calculations

As explained in Section 2.5 above, we are considering replacing financial data with mass data with regard to waste data collected from across the university (fiscal 2019-2023). This will enable eliminating the impact of the rise of waste treatment costs and reflecting the difference in treatment processes according to the type of waste. This year, we calculated emissions from waste treatment by applying the IDEA emission factor closest to that of the treatment process used for each type of waste. Although some treatment processes that were given their own account title code had already been included in Category 5, but those waste treatment processes, for which we used volume data this year, used to be processed under account titles related to maintenance management and thus included in Category 1. This is another point that can be improved by replacing with volume data. At present, we do not have a system in place for collecting data on general and industrial waste from places other than Hongo and special waste such as infectious waste, and therefore we cannot conduct mass-based calculations for these items. We will work to enable collection of their data.

(3) Category 6 (business travel): Difficulties of calculation due to travel distance and other factors

Based on case studies of other universities, it is thought that emissions from air travel account for the dominant share of this category. It is therefore important, particularly for air travel, to calculate emissions according to travel distance and seat class from the perspectives of both improved accuracy and evaluation of the effect of reduction efforts. To avoid underestimation arising from the limitations in data collection, we currently assume that all applicable business trips were made by air and use emission factors accordingly for travel expenses in the financial and accounting data. To improve the inventory accuracy, we will examine the use of

business travel management systems other than those based on finance and accounting. We will also examine the need to review the systems.

Direction and System Development for Scope 3 Related Initiatives

(1) Improving calculation accuracy and evaluation

The data necessary to measure UTokyo's activities are dispersed across various organizations within the university. For example, Category 1 'Purchased Goods and Services' and Category 2 'Capital Goods' account for the majority of UTokyo's Scope 3 emissions, but at present, the only centrally managed data to measure such activities are financial data. The current financial and accounting data are designed for the sole purpose of accounting processing and thus not suited for the calculation of GHG emissions (for instance financial data cannot be categorized by individual item). As long as we continue to categorize data at the granularity of account titles, misclassification problems will occur such as the one mentioned earlier where waste treatment costs that should have been included in Category 5 were included under account titles related to maintenance management and thus categorized in Category 1. However, vast numbers of purchase items and suppliers are related, particularly to Scope 1 and 2 emissions. It is therefore difficult to immediately replace the spend-based method that utilizes financial and accounting data with mass-based methods. Requirements will be defined prior to the update of the financial and accounting system planned in 2026. Discussions will take place on the functions necessary to deal with the calculation of Scope 3 emissions. If, along with the system update, it becomes possible to identify accounting items with a granularity similar to the items of LCA databases, the emission calculation accuracy can be greatly improved. And if the amount spent on a purchase item can be broken down by different manufacturers of that item (the current system is capable of breaking down by supplier, but suppliers are mostly distributors and it is difficult to track down to the manufacturer), the GHG emission reduction efforts made by the manufacturers can be reflected in the spend-based calculation of Scope 3 emissions. The next phase of improving calculation accuracy is to replace financial data with volume data, as is already being introduced for part of Category 5 emissions. This phase will require a new system for managing GHG emissions that will work in conjunction with different systems and databases that currently store various activity data. This may also require updating of current systems and databases and digitalization of activity information that are still processed using paper

documents to enable consistent management. In addition, given that replacement with mass-based calculations need to be implemented in a phased manner, it will be necessary to prevent duplication of accounts by linking the new GHG emissions management system and the financial and accounting system.

(2) Activities toward reducing Scope 3 emissions

Measures to be taken in order to reduce Scope 3 emissions vary by category.

Category 1 (purchased goods and services) and Category 2 (capital goods) emissions can be reduced by eliminating the purchase of unnecessary things, especially reducing the purchase of goods (for example, by promoting paperless operations and reusing equipment). For Category 2 in particular, shared use of large laboratory equipment can be effective. These reduction efforts must be based on the major premise that they do not compromise the effectiveness of the university's research and education activities. Supplier engagement is another important activity for reducing emissions of this category. If we are able to obtain information on the carbon footprint of goods and services we purchase from suppliers, we will be able to promote positive purchase behavior such as selecting products with lower carbon footprint and evaluate the supplier's emission reduction

efforts as Scope 3 emission reduction. Especially for products that emit GHG during use, however, it is important to assess reduction from the entire product lifecycle from an LCA perspective.

Although Category 5 (waste generated in operations) emissions only share a small percentage of the total GHG emissions of the university, we consider it an important subject to raise the awareness of UTokyo members on reducing environmental burden and promoting circular economy. Specific actions to reduce Category 5 emissions include avoiding the generation of waste as much as possible and selecting approaches with the least environmental burden to process unavoidable waste. Such approaches include promoting recycling of waste such as plastics. Sorting waste such as separating combustible trash and plastics is also an important factor particularly for daily-life waste. We are planning to evaluate the environmental burden reduction effect of thorough sorting of waste and use the results in awareness raising activities.

For reducing Category 6 (business travel) emissions, behavioral change is key. To encourage positive behavioral change, we believe it is necessary to inform UTokyo members about ways to reduce travel-related GHG emission. Establishing travel policies or guidelines for that purpose has

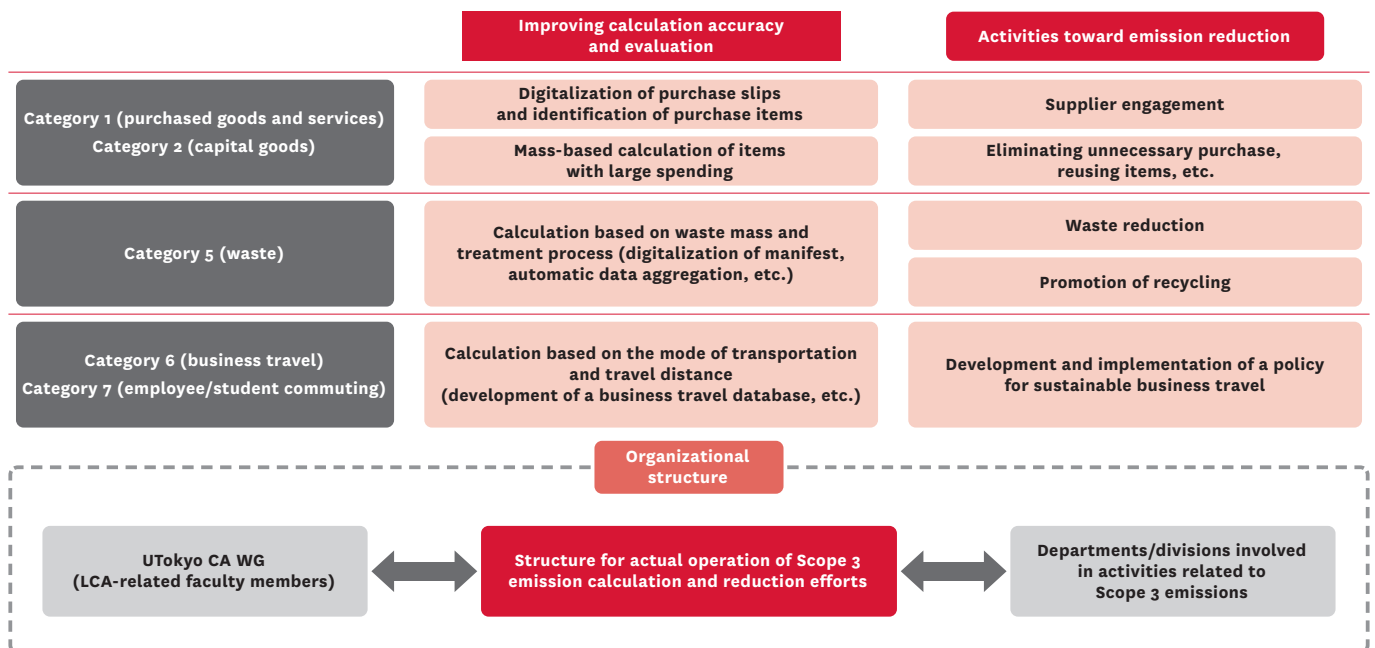


Figure 9 Main initiatives and structure related to Scope 3 emission calculation and reduction efforts

already become a common practice in overseas universities. Such policies and guidelines encourage members to choose railways and other land transportation modes as much as possible, to stringently select the members and reduce the number of travelers, to plan an efficient schedule by combining multiple travel purposes into one trip, and to examine the possibility of online meetings. We are also considering participation in carbon offset programs offered by airlines, although this may be difficult to incorporate into our reduction measures right away.

As for Category 7 (employee/student commuting), emissions associated with faculty and staff commuting are currently assessed using the spend-based method based on the amount of commuting allowances paid. A separate survey will be required to measure emissions related to student commuting. Driving for commuting is not a common practice at UTokyo, except at some remote campuses, but we need to first conduct a survey on the actual status of commuting. Then, we will take actions such as encouraging behavioral change to members to reduce GHG emissions or evaluating the impact of remote working on GHG emissions.

(3) Structure of Scope 3 emission calculation and reduction efforts

Figure 9 shows the main structure of Scope 3 emission calculation and reduction efforts. Almost all activities that take place in the university is a source of Scope 3 emissions, which therefore involve a wide range of departments and divisions. Initiatives related to Scope 3 are developed by UTokyo CA WG comprised of LCA-related faculty members, but these initiatives are limited in scope at present, because working level structures to carry out the actual operations are not in place yet. Organizational structures to carry out the actual operations of Scope 3 initiatives in collaboration with UTokyo CA WG and related departments/divisions will be built as part of the university-wide organizational enhancement efforts set out in Table 9, Section 3.1. above.

4

Social Contribution to Solving Climate Change

The most important mission of UTokyo is to contribute to human knowledge and to serve the public interest of the world as a world-class platform for research and education. UTokyo Climate Action is not only about achieving carbon neutrality as a business operator, but initiatives from the three perspectives of “knowledge,” “people,” and “place” which are the Basic Principles of UTokyo Compass are also an important aspect of our Climate Action.

Knowledge We will take leadership in driving green transformation (GX) in Japan and the world through its initiatives and create fundamental academic knowledge to drive GX.

People We will foster human resources to lead GX of the world through education in various levels from literacy education to advanced specialized education.

Place We will contribute to promoting GX in society through collaboration and co-creation with both internal and external stakeholders.

Contribution through Initiatives and Research

UTokyo will, as a world-class research university, contribute to the promotion of GX through such initiatives as leading international GX, creating knowledge foundation and presenting a future society model by achieving a carbon neutral campus. Furthermore, UTokyo will consider quantitatively evaluating its GHG reduction contribution¹⁹ made through knowledge creation to clarify its contribution as a university in the global fight against climate change.

Initiative for global socioeconomic system transformation —UTokyo Center for Global Commons

A transformation of the global socioeconomic system is necessary to limit global warming to below 1.5°C compared to pre-industrial revolution levels, which will require cross-national high-level discussions. The Center for Global Commons (CGC) leads green transformation in Japan and the world, leveraging the international network maintained by UTokyo to pursue initiatives aimed at solving global challenges. The following are some of its main initiatives:

- (1) Release of the Planet Positive Chemicals report (September 2022) to provide a blueprint for the future of the chemical industry including the pathway to reach net zero.

<https://cgc.ifi.u-tokyo.ac.jp/en/topics/planet-positive-chemicals/>

The report was produced through a joint research between CGC and Systemiq, a UK company advocating for system change. The chemicals industry must dramatically transform operations to achieve net zero and avoid global warming. The report warns that the chemical industry must end its dependency on fossil materials and become a planet-positive force by embracing a more circular, low GHG emissions operating model. It specifically identifies the need for radical conversions in both the supply and demand of chemical products and provides a blueprint for the future of the chemical industry.

- (2) Climate Change and Japan's Vision for the Energy System: Release of Net Zero Japan 2050 —Summary for Business Leaders— (June 2023)

<https://cgc.ifi.u-tokyo.ac.jp/en/research-en/eti-cgc-en/>

The Energy Transitions Initiative - Center for Global Commons (ETI-CGC) launched in November 2021 as an industry-academia collaborative platform conducted a scenario analysis for achieving the targets agreed in the Paris Agreement, and released

Net Zero Japan 2050 –Summary for Business Leaders– based on an interim report of the analysis. Taking into consideration the situations in Japan, the report quantitatively lays out a scenario for Japan to achieve net zero CO₂ emissions by 2050 by introducing renewable energy sources and combining multiple scientifically proven measures such as promoting electrification. In December 2023, a seminar building on the recommendations of this report was held with the participation of diverse stakeholders including international experts and UTokyo students at the Japan Pavilion of the 28th United Nations Climate Change Conference (COP28) in Dubai, United Arab Emirates.



Scene from the seminar at COP28

¹⁹ Recently an increasing number of organizations are working to calculate their emission reduction contribution, which is sometimes referred to as "Scope 4" in an analogy to Scope 1, 2, and 3 emissions from the supply chain.

(3) Release of Global Commons Stewardship (GCS) Index 2024 (4th edition) (March 2024)

https://cgc.ifi.u-tokyo.ac.jp/en/topics/gcsi_2024/

GCS Index is the world's first index for environmental impact of each country. It was prepared to provide information useful for policy priorities and investment decisions to safeguard the global environment under the leadership of CGC since 2020, in cooperation with UN Sustainable Development Solutions Network (SDSN), SYSTEMIQ, the Potsdam Institute for Climate Impact Research (PIK), the World Resources Institute (WRI), and the Yale Center for Environmental Law & Policy. It identifies domestic and international spillover impacts of each country's economic activities on the Global Commons (i.e., a stable and resilient earth system which consists of, for instance, the climate system, the land biosphere, and oceans) and supply chains responsible for such impacts. GCS Index 2024 is its fourth edition that presents the most recent data of domestic impacts and transboundary spillovers on the Global Commons, expanding its coverage to 154 countries across the world. Emphasizing the importance of concerted actions in addressing the global environment issues, GCS Index aims to enhance initiatives at both global and country levels to protect the Global Commons. CGC held three events in December 2023 at the COP28 venue mentioned above in Section (2) including a session on GCS Index. The events provided opportunities for experts from each field and other stakeholders to make profound discussions on GCS

indexes, while improving the international presence of UTokyo in its GX promotion activities and enhancing its network building.

Unravelling the co-evolution of climate, ecosystems and human societies

—Center for Climate Solutions

<https://utccs.u-tokyo.ac.jp/en/>

The issue of climate change or global warming is now beyond the realm of natural science. A transformative science is required that encompasses a variety of approaches, including understanding and predicting climate change and assessing its impact on ecosystems, designing future social systems, bridging social gaps as represented by climate justice, and changing behavior towards carbon neutrality.

At the UTokyo Center for Climate Solutions (UTCCS) established in July 2022 with the participation of 13 collaborating departments and institutions across both natural and social sciences including the Atmosphere & Ocean Research Institute and Graduate School of Engineering, three research divisions corresponding to the IPCC's sectional structure, namely Division for Earth System Change, Division for Climate Impact on Ecological System, and Division for Human System Response engage in research activities, based on scientific evidence, in search of social systems that will enable mankind to overcome climate change.

Based on the findings of these research activities, Kiko hendo

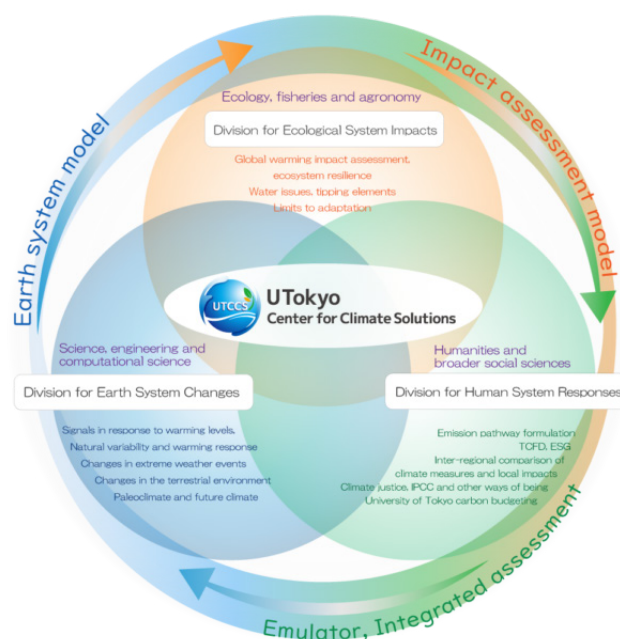


Figure 10 Organizational structure and research themes of UTokyo Center for Climate Solutions

to shakai (Climate Change and Society: A Primer on Global Warming Issues) was published from the University of Tokyo Press in July 2024. The book gives systematic and simple explanation on subjects ranging from the fundamentals of climate change to climate solutions and sustainable development.

Furthermore, a new program led by UTCCS, Interdisciplinary Education Program on Sustainability, was launched in fiscal 2024. (Refer to Section 4.2. below.)

**To achieve a carbon neutral society through energy systems
—Collaborative Research Organization for Comprehensive Energy Sciences**

<https://www.croces.t.u-tokyo.ac.jp/>

Issues related to energy have a significant impact on our daily lives. For example, now that making efforts to realize a carbon neutral society has become a legal responsibility, while we need to significantly increase the use of renewable energy, a wide range of scientific research on fossil fuel and nuclear power, as well as battery cells, hydrogen, and forest absorption of carbon dioxide (CO₂), is needed. The pursuit of solutions to energy issues not only requires deep understanding of technologies and legal and economic systems but essentially leads to philosophy and social ethics.

The Collaborative Research Organization for Comprehensive Energy Sciences (CROCES), established in July 2021 with the participation of 10 departments from both liberal arts and natural

science, pursues wide ranging research and development as well as design of energy policies and systems under the following five themes: “analyses and syntheses of total energy systems” “Innovative renewable energy and storage technologies” “Innovative energy conversion, transportation, utilization and CO₂ reduction” “Energy policy, energy economics and management of global resources” and “Innovative materials and energy management to improve human comfort and health.”

CROCES has established the Energy Transformation (EX) Workshop to promote discussions to realize a carbon neutral society through collaboration between UTokyo’s faculty members and businesses. As of July 2024, the workshop is operated with a membership of 31 companies and 1 association.

In 2024, CROCES launched the Comprehensive Energy Sciences Education Program as a cross-faculty program. (Refer to Section 4.2. below.)

Building our future strategy now with advanced scientific technologies and preemptive LCA

—UTokyo LCA Center for Future Strategy (UTLCA)

<https://utccs.u-tokyo.ac.jp/en/>

Drastic transformations of technologies and systems, such as transition to carbon neutrality and circular economy, are required to build a sustainable society. Various innovative and advanced scientific technologies are currently under research and development. These technologies need to be quantitatively

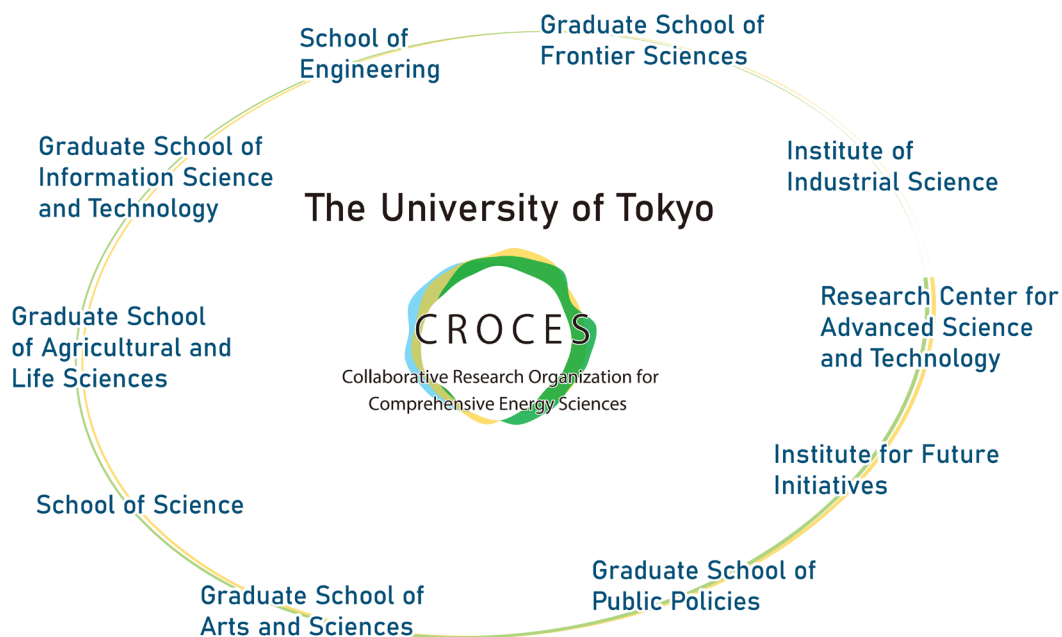


Figure 11 Organizational structure of Collaborative Research Organization for Comprehensive Energy Sciences

assessed, while they are still in the development phase, for the effects they will have on society and the environment over their entire lifecycle when applied in future society, to clarify the required performance and other requirements and provide feedback to research and development.

The UTokyo LCA Center for Future Strategy (UTLCA) established in April 2023 brings together researchers in advanced science and technology and lifecycle assessment (LCA) experts from 10 UTokyo departments to evolve conventional LCA for assessing technologies in the present society into preemptive LCA that contributes to designing future society. It aims to build new theories that go beyond conventional disciplinary distinction through the establishment of standardized methods to assess innovative technologies and research on integrated design of social systems with enhanced collaboration between consumption and production.

The Pre-emptive LCA Social Cooperation Research Department, centered on the Future Scenario Subcommittee and Resource Recycling Subcommittee, is now exploring visions for the future society in collaboration with 16 participating companies across materials, machinery, automotive, venous and other industries (as of September 2024), to establish preemptive LCA and put it into practice.

Forest resources contributing to carbon neutrality

The University of Tokyo Forests (UTF) affiliated to the Graduate School of Agricultural and Life Sciences and Forest GX/DX Co-Creation Center

The University of Tokyo Forests (UTF) <https://www.uf.a.u-tokyo.ac.jp/english/>

Forest GX/DX Co-Creation Center (FGDC) <https://fgdc.uf.a.u-tokyo.ac.jp/english>

As an example of carbon sequestration at UTokyo, efforts leveraging the forests used for research and education are discussed below.

The University of Tokyo Forests (UTF) affiliated to the Graduate School of Agricultural and Life Sciences, UTokyo manage seven forests that spread across a total area of approximately 31,000 ha (land area) in various parts of Japan as fields for practical research and education on forests and forestry and educate graduate school students through cooperative courses established in the Department of Forest Science and the Department of Ecosystem Studies. UTF is on a mission to be “forests to bridge science and the public.” Utilizing its strengths, such as the accumulation of long-term data that spans over 100 years and the practice of education and research in collaboration with the local community, UTF contributes to the green

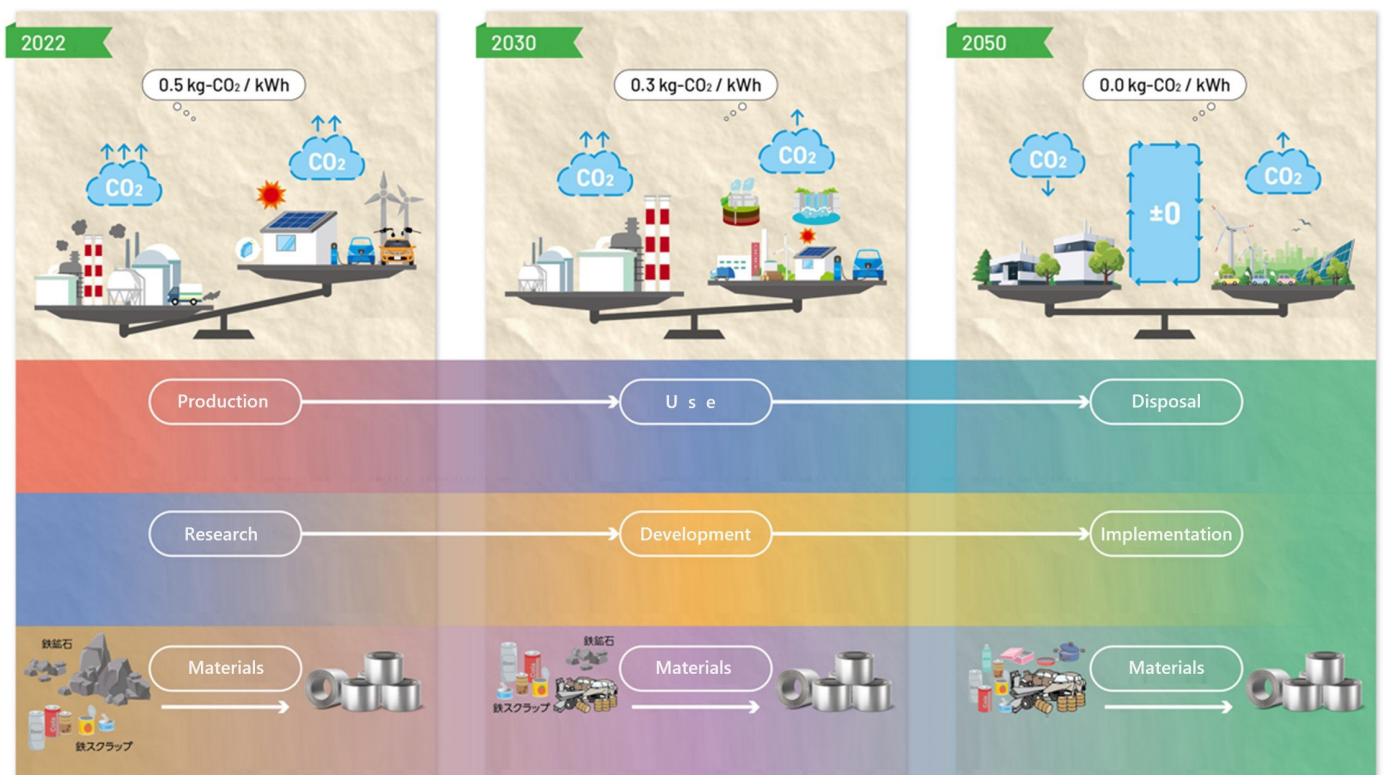


Figure 12 Relationship between changes in society toward carbon neutrality in 2050 and product lifecycle and social implementation of new technologies

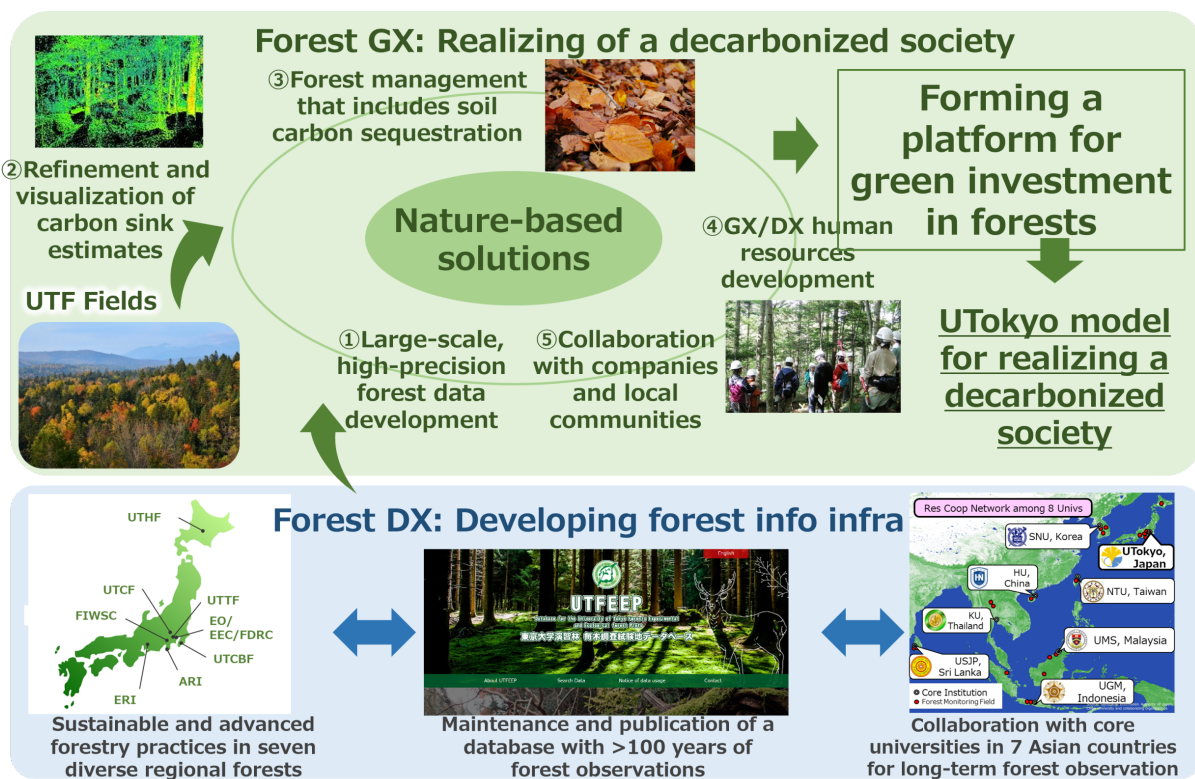


Figure 13 Function of GX/DX Co-creation Center

transformation of UTokyo through research on sustainable timber production and other efforts.

At UTF, the former Field Data Research Center was reorganized and evolved into the Forest GX/DX Co-Creation Center (FGDC) in April 2024. Focused on forest resources, which cover two thirds of the land of Japan, FGDC works under the mission of creating a UTokyo model for realizing a decarbonized society. The center aims to form a platform to encourage green investment in forests through cross-departmental collaborative research in development of high-accuracy large-scale forest data and co-creation with the industry and society. FGDC is currently developing and implementing nature-based solutions to address the following 5 issues toward the conversion of socioeconomic systems necessary to realize a decarbonized society.

- (1) Development of large-scale, high precision forest data
- (2) Refinement and visualization of forest sink estimates
- (3) Development of techniques for forest management that includes soil carbon sequestration
- (4) Development of human resources for forest GX/DX
- (5) Co-creation with companies, local governments, and local communities toward developing regional decarbonization plans

In addition, it aims to advance collaboration with other universities in Asia to form an Asian research center for forest GX/DX in the future.

Research projects that contribute to the UN's 17 Sustainable Development Goals (SDGs)

—UTokyo Compass Initiative SDGs Project

<https://www.u-tokyo.ac.jp/adm/uci/en/projects/sdgs/index.php>

The Utokyo Compass Initiative SDGs Project lists research projects at UTokyo that contribute to the United Nations' 17 Sustainable Development Goals, with the aim of promoting synergies between research activities and ensuring the social impact of value created by these projects. The number of registered projects as of September 1, 2024 is 197.

Human Resource Development to Tackle Climate Change

UTokyo believes it has been entrusted by society with the mission to develop human resources who will take on leadership roles in a variety of fields both within Japan and around the world. This includes education on responding to climate change and driving green transformation. UTokyo will develop human resources that will lead global green transformation by developing and enhancing educational programs at all levels and fields: from literacy education for new undergraduate students to programs to develop advanced and specialized human resources, as well as recurrent education for working adults.

1. Education Programs for New Students and Undergraduate Junior Division Students

University-wide sustainability (GX) literacy education

<https://www.youtube.com/watch?v=B-KILRUcgAM>

This is a new educational program launched in fiscal 2024 targeting at newly enrolled undergraduate students at UTokyo. It aims to share basic knowledge on green transformation, especially climate change issues. A video to introduce learning opportunities in the relevant fields has been released.

Academic Frontier Lecture Series on Climate and Society

<https://utccs.u-tokyo.ac.jp/lecture/> (in Japanese)

This is a lecture series conducted since fiscal 2022 for undergraduate junior division students in an omnibus format. It consists of lectures given by frontline researchers of the Center for Climate Solutions. This lecture series will be held as a general course for undergraduate junior division students (elective course) titled “Climate Change and Society” from fiscal 2025

2. Education programs for undergraduate senior division students and graduate students

Common Undergraduate and Graduate Courses Related to GX

<https://www.u-tokyo.ac.jp/ja/students/special-activities/kyotsu-jugyo-kamoku.html> (in Japanese)

UTokyo provides a portfolio of courses/classes based on the idea that students should take a wide range of courses without

being bound to their field of study. Starting from fiscal 2023, we made all GX related courses offered in different departments more easily recognized (“visualized”) as common courses.

University-wide educational programs

UTokyo offers university-wide educational programs to connect the knowledge of different fields to solve emerging challenges. university-wide educational programs bundle the contents of lectures and exercises from multiple educational departments and offer them in line with a given theme. Students can take these courses on top of the courses in the curriculum given by their own department. The following two programs have been offered since fiscal 2024. Although both programs are designed for undergraduate senior division students, graduate students can also participate in the program. A certificate will be conferred upon completion of a certain number of credits

<Interdisciplinary Education Program on Sustainability>

<https://utccs.u-tokyo.ac.jp/program/>

Mainly run by the Center for Climate Solution, this program is designed to provide comprehensive and systematic knowledge in sustainability to those who will pursue their career in different fields after graduation. Specific themes addressed in the course include interactions between the environment, economy, and society; knowledge on technologies and systems necessary for delivering GX; and philosophy, ethics, and culture appropriate for a sustainable society.

<Comprehensive Energy Sciences Education Program>

<https://www.croces.t.u-tokyo.ac.jp/education/> (in Japanese)

This is a program run mainly by the Collaborative Research Organization for Comprehensive Energy Sciences beyond existing disciplinary boundaries. It aims to develop human resources who own basic knowledge in techniques and principles about energy, and can therefore propose and implement solutions from a broad

perspective based on relevant legal and economic systems as well as philosophy and ethics.

University-wide graduate educational programs

<Interdisciplinary Education Program on Ocean Science and Policy>

<https://www.oa.u-tokyo.ac.jp/education/program/index.html>

Whether the issue is about marine resources or measures to fight global warming, solving the various problems facing oceans today requires a broad perspective and profound expertise across the areas of science and humanities. Run by the UTokyo Ocean Alliance, this program is a field-work based interdisciplinary education program covering both science and humanity fields. It is designed to develop human resources with a broad knowledge about oceans.

One Earth Guardians Development Program

<https://www.one-earth-g.a.u-tokyo.ac.jp/en/>

This is an educational program offered by the Graduate School of Agricultural and Life Sciences, Faculty of Agriculture, aimed at developing One Earth Guardians, who will take actions to secure the future of the Earth for the next 100 years as a place where all living beings, including humans, coexist in harmony. It is run with the participation of many supporters from within UTokyo and supporting companies, foundations, and institutions as a forum for co-creation.

3. Programs to Develop Advanced Specialized Human Resources

World-leading Innovative Graduate Study Program

This is a master's-doctoral (or bachelor-master's-doctoral) degree program created through collaboration among the university's graduate schools and research institutes, in order to create doctorate-level researchers who contribute their high-level research abilities and expertise to human society.

<World-leading Innovative Graduate Study Program Co-designing Future Society (WINGS-CFS)>

<https://cfs.t.u-tokyo.ac.jp/>

This program is designed to develop human resources

capable of “co-designing future society,” in other words, highly knowledgeable professionals who can envision the ideal future, co-create with stakeholders to realize innovation, and realize social implementation of such innovation.

<World-leading Innovative Graduate Study Program of the Sustainable Agriculture Education Program>

<https://utsaep.wixsite.com/site>

To meet the challenge to increase the productivity of agriculture, forestry and fisheries in the face of climate change while minimizing the environmental impact on a global scale, this program provides an education integrating agricultural science and advanced information science, with a goal to produce skilled scientists who are indispensable today.

<World-leading Innovative Graduate Study Program in Proactive Environmental Studies (WINGS-PES)>

<https://wings-pes.edu.k.u-tokyo.ac.jp/en/>

Taking advantage of the multi-disciplinary characteristics unique to the Graduate School of Frontier Sciences (GSFS) and also benefiting from the location in the Kashiwa Campus, which is ideally suited for the promotion of educational and research exchange with world-leading research centers, this program aims to develop “Environmental Knowledge Professionals” who can anticipate future issues and clearly show the direction the global society should move toward, by taking proactive approaches based on prediction technologies.

Fostering Advanced Human Resources to Lead Green Transformation (SPRING GX) project

https://www.cis-trans.jp/spring_gx/index-e.html

The project has been accepted as a program for the Support for Pioneering Research Initiated by Next Generation (SPRING) of the Japan Science and Technology Agency (JST) from autumn, 2021 (hereafter “SPRING GX”). Doctoral students (including those in four-year programs) from all schools of UTokyo participate in this project. By investing all available assets of UTokyo, the SPRING GX aims to produce globally competent researchers who will contribute to the large-scale realization of a GX across all fields. This program initially began with the participation of approximately 600 students, but following JST's second open call for students, the new SPRING GX program was started in April 2024 with 1,154 participants.

4. Global Education Program

PEAK International Program on Environmental Sciences

<https://peak.c.u-tokyo.ac.jp/courses/es/index.html>

Programs in English at Komaba (PEAK) are undergraduate courses taught entirely in English. In the International Program on Environmental Sciences course, students study a wide range of fields related to environmental systems and earth science.

Global Education for Innovation and Leadership (GLP-GEFI)

<https://www.glp.u-tokyo.ac.jp/gefi/>

This is a special transdisciplinary educational program taught in English for qualified students selected from undergraduate senior division students and includes sustainability as a component of the program.

Global Liberal Arts Courses

<https://globe.u-tokyo.ac.jp/en/globalliberalarts.html>

Established in 2023, these courses offer opportunities for all undergraduate senior division students and graduate students to study in English about transdisciplinary topics relating to the sustainable development goals or SDGs.

The UTokyo Graduate Program in Sustainability Science - Global Leadership Initiative (GPSS-GLI)

<https://www.sustainability.k.u-tokyo.ac.jp/>

These all-English programs organized by the Sustainable Society Design Center of GSFS attract students with diverse nationalities, cultures, and skill sets from around the world. They were designed to provide education centered around practical exercises where students collaborate on specific sustainability issues and experience the entire process from the identification of the key problems, to the understanding of the complex structure and different perspectives of various stakeholders, and the proposal of solutions. As a pioneering graduate program that confers a doctor's degree in sustainability science, GPSS-GLI may be considered a world leading educational program in the field.

5. Recurrent Education for Working Adults

<https://www.k.u-tokyo.ac.jp/en/gfs/center/sustainable/>

The Sustainable Society Design Center offers three education programs targeted at young to middle-aged working adults. Among them, the Sustainable Finance School aims to deepen students' understanding of global challenges that form the backdrop to sustainable finance, help acquire basic scientific knowledge of sustainability and finance, and at the same time cultivate knowledge, skills, ideas, and management and coordination abilities necessary for practicing sustainable finance. Other examples include the Smart City School aimed at creating leaders who will build smart cities and deliver the digital transformation of cities and regions, as well as the System Design School, where the theory and practice of planning/exploring technological systems and business transformation are learned through a system design approach.

Dialogue, Collaboration and Co-creation with Stakeholders

UTokyo will exercise ingenuity to fully and comprehensively utilize its resources as a university and become the starting point of a bridge with society through creative dialogue. To contribute to the green transformation of society as a whole, UTokyo will promote dialogue and co-creation with all stakeholders, both internally (with faculty, staff, and students) and externally (with citizens, businesses, governments, other institutions, etc.).

Student-led Activities and Collaboration with Students

<Establishment of the UTokyo GX Student Network (GXSN)>

<https://www.utokyo-gxsn.org/?lang=en>

Various sustainability activities are actively carried out by the students of UTokyo. In July 2015, the TSCP Student Committee was established as part of the TSCP, and in the summer of 2021, an umbrella group called the UTokyo Sustainable Network (UTSN) was formed, led by members of four student environmental organizations. To strengthen support from the university administration to these student activities, the TSCP Student Committee was integrated with UTSN in June 2023 to newly

form the GX Student Network (GXSN) as a student organization officially recognized by the university administration. It continues to vigorously implement activities in cooperation with the GX Student Initiative affiliated under the GX Promotion Subcommittee, the UTokyo GX Promotion Group and TSCP Team of the UTokyo Environmental Group. GXSN enjoys a diverse membership from undergraduate freshmen to graduate students including not only Japanese but international students.

History of student organizations up to the establishment of GXSN

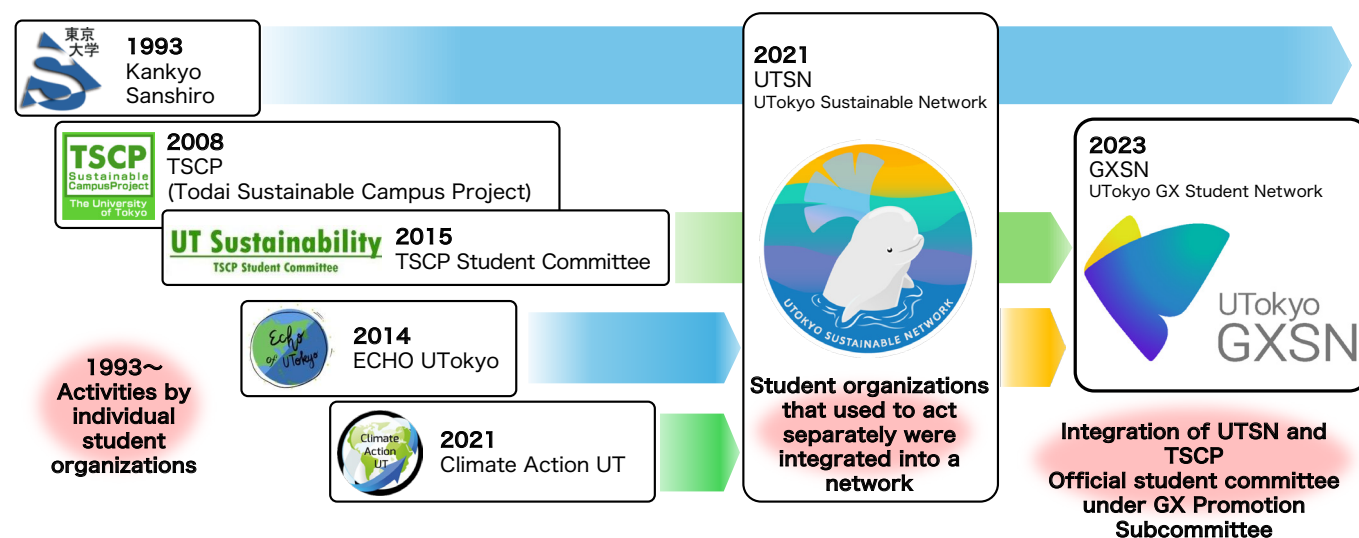


Figure 14 History up to the establishment of GXSN

Activities of GXSN

As of September 2024, GXSN runs eight projects, each is operated independently with its own activity goal.
(<https://www.utokyo-gxsn.org/projects>)

Sustainability Week 2024

<https://www.utokyo-gxsn.org/2024-sustainability-week?lang=en>

Following fiscal 2023, Sustainability Week 2024 was held in April 2024 for the second time. Although the event was held by UTokyo alone in fiscal 2023, Sustainability Week 2024 was jointly held together with the University of Tsukuba, Ochanomizu University, and Tokyo University of Agriculture and Technology. The main events of the week were Sustainability Talks. Each day, some faculty members from one of the four universities gave a speech. In addition, a variety of events and projects were held during the week including a project in collaboration with the university coop cafeteria, an inter-university exchange event, a climate tech event with entrepreneurs as guests, and BioBlitz, a field biology survey in Ueno Park.



Sustainability Talks
Inter-university exchange event

Water Server Project

<https://www.utokyo-gxsn.org/water-server?lang=en>

The aim of this project is to reduce the use of disposable drink containers and plastic straws, raise students' environmental awareness, encourage the shift to a more sustainable lifestyle, and also to enhance the welfare and convenience of the university community. Water refill spots with water dispensers were made on the Komaba I Campus in spring 2023, which is now being expanded to Hongo and other campuses. To learn the effects of installation of water fountains and dispensers, the water consumptions to the equipment are measured in the project. The total water supply at Komaba I Campus amounted to approximately 170,000 liters in fiscal 2023.

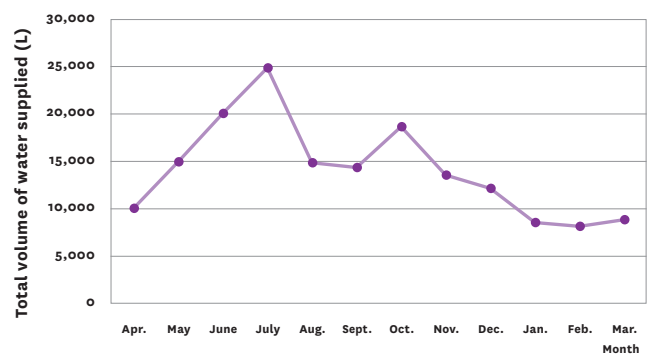


Fig. 15 Volume of water supplied by the water dispensers on Komaba I Campus

Activities as on-campus jobs by students

In fiscal 2023, five graduate students were employed for on-campus jobs. They worked for intra-university communication to raise awareness of the university members on green transformation. To report their achievements, they published a



University public relations magazine
“Discover GX in UTokyo!”

university PR magazine “Discover GX in UTokyo!” They planned the magazine, collected information, and reported on green transformation from the four perspectives of research and education, industry-academia collaboration, extracurricular activities, and on-campus initiatives.
(<https://www.u-tokyo.ac.jp/content/400240676.pdf>)
(in Japanese)

Collaboration with University of Tokyo Co-op

<https://www.utcoop.or.jp/news/co-cfp/> (in Japanese)

University of Tokyo Co-op implements various initiatives on food in collaboration with UTokyo laboratories and GXSN. In January 2024, as an event to think about the relationship between our choice of food and CO₂ emissions, the co-op cafeteria served rice bowls topped with oil sardine directly shipped from Choshi (a fishing port in Chiba Prefecture near Tokyo) with a carbon footprint label. The carbon footprint value was calculated with the cooperation of the Graduate School of Agricultural and Life Sciences.

Collaboration with Other Universities in Bunkyo Ward

On November 22, 2023, universities located in Bunkyo Ward held an event to share information on their activities and exchange opinions on sustainability initiatives for the second time following the previous year. The event was held at a meeting room in Bunkyo Civic Center. In addition to the five universities that participated last time (Ochanomizu University, Toyo University, Japan Women’s University, Nihon Pharmaceutical University and UTokyo) Chuo University newly joined to share their initiatives and Juntendo University and Atomi University also participated as observers.

At the event, Mr. Hironobu Narisawa, Mayor of Bunkyo, gave an address as in the previous year. In addition to a report on initiatives from the university, five GXSN students and a staff member of UTokyo Co-op made a presentation to report their activities.

Collaboration with the Local Community

<Signing of an agreement with Bunkyo Ward>

https://www.u-tokyo.ac.jp/focus/ja/press/z1313_00012.html (in Japanese)

On March 29, 2024, UTokyo signed a collaboration agreement for green transformation with Bunkyo Ward.

In April 2022, Bunkyo Ward declared to become a “Zero

Carbon City” by 2050. Toward this goal of net zero carbon dioxide emissions, Bunkyo Ward is faced with the pressing need to reduce emissions from the private business and household sectors, which account for 80% of the total emissions from the ward. Bunkyo Ward and UTokyo have cooperated in various GX-related initiatives. The signing of the agreement will further boost collaboration in addressing carbon neutrality, biodiversity, circular economy and other issues toward promoting the green transformation of Bunkyo Ward. By applying the findings of our academic research, we can contribute to solving issues facing the local community and accelerate the GX initiatives.



Ceremony to sign an agreement with Bunkyo Ward

<Decarbonization strategic initiatives in Kashiwa>

<https://www.udck.jp/> (in Japanese)

Urban Design Center Kashiwa-no-ha (UDCK) is a voluntary association jointly operated by eight organizations including UTokyo, Kashiwa City, Chiba University, and Mitsui Fudosan, which are directly involved in the local community development of Kashiwa-no-ha. In fiscal 2023, UDCK established a Decarbonization Working Group and embarked on the formulation of Kashiwa-no-ha Decarbonization Strategy (draft). The draft strategy set out a reduction goal of “52% reduction against Business as Usual (BAU) emissions by 2030” along with a set of measures to achieve that target and associated target figures. There are no other examples in Japan that have clearly set a decarbonization target and have implemented initiatives at the district level in an area like Kashiwa-no-ha, where local development is expected to continue with increasing BAU emissions.

<Program on Open Innovation Platforms for Industry-academia Co-creation (COI-NEXT)>

<https://coinext.ifi.u-tokyo.ac.jp/en/index.html>

Through this program, a research center has been established in the Institute for Future Initiatives. It aims to develop and implement a Co-JUNKAN platform, where technology, knowledge, and human resources can be organically integrated and circulated in a partnership among private, academic, and local community sectors towards Beyond Zero Carbon. Various entities including universities, research institutions, businesses, and local governments are participating in the program.

Social Collaboration with Businesses, etc. Related to GX

Collaboration with the private and other sectors is indispensable for the social implementation of knowledge created by academic institutions. UTokyo collaborates with the private sector in various ways in the field of green transformation.

As mentioned in Section 4.1 above, ETI-CGC, an industry-academia collaborative platform led by the Center for Global Commons (CGC) is now working with 12 representative Japanese companies from various industries to create a scenario for Japan to achieve net zero CO₂ emissions by 2050. The Collaborative

Research Organization for Comprehensive Energy Sciences (CROCES) and UTokyo LCA Center for Future Strategy (UTLCA) are also advancing social collaboration to practically apply their research results in society.

<H-UTokyo Lab.>

<https://www.ht-lab.ducr.u-tokyo.ac.jp/en/>

Since 2016, H-UTokyo Lab. has been publishing proposals to realize a carbon-neutral, sustainable society. Proposals stated in the past six editions have been widely conveyed to and cited by government agencies, energy business operators and other energy-related businesses, as well as the general public.

Proposals by H-UTokyo Lab. can be characterized for integrating the following four approaches while considering the relationship and influence between their respective factors: “quantitative assessment,” or a quantitative approach to carbon neutrality to identify the issues that need to be addressed; “institutional and policy proposals” to help energy operators involved in power systems and energy consumers including industry operators develop a sustainable operation; “integrated transition” minimize the changes of not only energy use but in urban and rural living, as well as climate change and the change in the natural environment; and “social implementation in local communities” to verify the means for and effects of resident participation in energy systems in each local community.

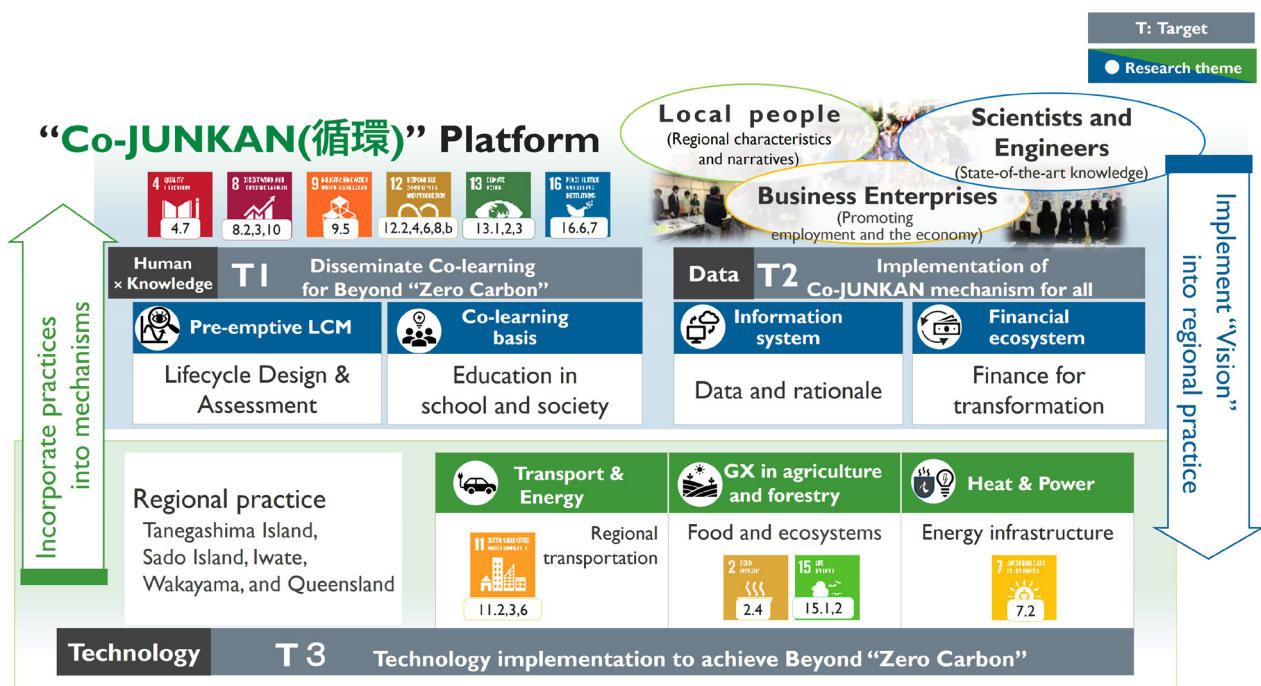


Figure 16 Conceptual diagram of “Co-JUNKAN” platform

<Collaboration with Microsoft Corporation>

https://www.u-tokyo.ac.jp/focus/en/articles/z1701_00013.html

In August 2023, UTokyo signed a Strategic MOU with Microsoft to promote green transformation (GX), diversity and inclusion (D&I), and AI research. For promoting GX, Microsoft is exploring ways to support the UTokyo's efforts to achieve zero GHG emissions through the use of its technologies. UTokyo will provide student programs to nurture GX talent—people who understand what GX entails and can lead activities aimed at achieving GX.

Communication with UTokyo Members

<Internal awards>

The Business Reform Promotion WG solicits operational reform ideas and departmental best practices from faculty and staff members and shares them across the university. Ideas and practices with good potential for improvement are promoted for university-wide adoption with the cooperation of related departments. Those that have proved to be particularly effective are given the UTokyo President's Award of Business Transformation and other awards. One of the focus themes for this award in fiscal 2024 is "Operational efforts in consideration of DX, D&I, and GX."

For students, we have the University of Tokyo President's Award for Students offered to individuals and organizations that enhance the honor of the University and whose particularly remarkable achievements in the fields of academic research, extracurricular activities, or social activities serve to inspire

other students. In 2022, a student who founded a deep-tech startup to tackle energy issues won the prize.

We are also considering the launch of a new GX-related awards system to keep promoting these efforts by university members across the entire university.

Information Communication to Society

<Fiscal 2023 Homecoming Day>

https://www.u-tokyo.ac.jp/adm/hcd/event/2023_event_005.html (in Japanese)

The Homecoming Day is an open-to-public event held each year on the third Saturday of October to let people know more about the university. In 2002, all the alumni associations of UTokyo got together and launched the 1st Homecoming Day. Since the incorporation of UTokyo in 2004, the university has hosted the annual event. On October 21, 2023, the 22nd Homecoming Day was held under the theme of green transformation (GX) with many GX-related exhibits and events (including those by student organizations).

<UTokyo Green Transformation Fund>

<https://utf.u-tokyo.ac.jp/project/pjt165> (in Japanese)

The UTokyo GX Fund was newly established in fiscal 2023, for the purposes to promote UTokyo CA, support student activities, enhance the function to communicate information on the university's GX-related activities, and to send a delegation to the UN Climate Change Conference (COP).

About the GX logo



UTokyo
Green
Transformation

The logo visually expresses green transformation by showing how the color green emerges from the yellow and light-blue ginkgo leaves — the symbol of UTokyo — as they rotate and blend in color. It also aims to reflect UTokyo's active approach to GX in how the ginkgo leaves transform themselves while maintaining their original form.



UTokyo
Green
Transformation