

# UTokyo CLIMATE ACTION 2023



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# 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 May 2022 we released our Global Commons Stewardship (GCS) Framework, which calls for the transformation of socioeconomic systems to limit global warming to 1.5°C and advocates behavioral change by proposing specific actions. In July 2023, we published the third edition of our GCS indicators for the year 2022.

At the national level, in June 2023 the ETI-CGC, a platform for industry-academia collaboration launched in November 2021 to chart pathways to reduce Japan's greenhouse gas emissions to net-zero, 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 Today Sustainable Campus Project (TSCP), in October 2021 we became the first national university in Japan to join the international Race to Zero campaign launched by the United Nations Framework Convention on Climate Change to achieve carbon neutrality.

The UTokyo Climate Action announced in October 2022 demonstrates our commitment to the requirements of that campaign, but the measures it describes must be reviewed and revised as necessary over time. Now, UTokyo Climate Action 2023 reviews our achievements to date and shows a more specific set of measures for achieving carbon neutrality.

The University of Tokyo aims to become a driving force behind a global Green Transformation by fostering individuals equipped with both deep specialized expertise and broad, cross-disciplinary vision to lead that transformation. We will continue to work 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 (UTokyo CA) was issued in October 2022 to set out mid-term targets to reduce the university’s Scope 1 and 2 CO<sub>2</sub> 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.

This second issue, Climate Action 2023, aims to analyze, based on the latest inventory results data, the progress made against the targets set in the first UTokyo CA and further clarify and substantiate future measures.

Scope 1 and 2 emissions in fiscal 2022 were reduced by 3.4% year on year and by 17.3% against the fiscal 2013 baseline. UTokyo has been promoting the Today Sustainable Campus Project (TSCP) since 2008 as an ongoing energy-saving effort to improve the efficiency of air conditioning and to convert more than 100,000 Hf lights on campus to LED. However, year on year emissions reduction in fiscal 2022 was small, partly due to increase of emissions in some departments and divisions as a result of the lifting of COVID-19 related activity restrictions.

Ongoing efforts to reduce Scope 1 and 2 emissions toward 2030 include the introduction of renewable energy

by installing solar power facilities on campus as well as continuous implementation of current energy-saving measures. However, we will need to introduce additional measures in order to achieve our reduction targets for 2030. We are introducing new energy-saving initiatives such as promotion of data-driven behavioral change utilizing technologies and are also considering the use of off-site renewable energy facilities.

As for Scope 3 emissions, this emission category is estimated to account for over 70% of the total emissions of UTokyo according to the inventory results of the first UTokyo CA. The current estimates, however, are based on financial data and premised on some unverified assumptions, so we need to further refine them to be able to understand the true amount of emissions. Going forward, we will put in place a system to utilize more detailed financial data, while devising ways to capture the amount of products and services consumed. We will also consider such measures as identifying high-spend purchase items and targeting them for reduction.

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.

UTokyo was one of the first universities in the world to tackle the issue of sustainability, for example, by creating the Alliance for Global Sustainability (AGS) in 1994 together with the Massachusetts Institute of Technology (MIT) and two other overseas universities. Today, it continues to play a leadership role to drive social change in Japan and the world, such as by building a network of collaboration around the Center for Global Commons of the Institute for Future Initiatives.

Besides the many UTokyo departments and divisions committed to research and development of technologies and social systems essential to carbon neutrality, cross-sectoral 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 newly established in 2023. The University of Tokyo Forests (UTF; forests owned by the university) will be enhanced not only as a place for research and education but also as a means for carbon absorption, sequestration, and utilization.

We are also focusing efforts on the development of human resources to lead global green transformation through such initiatives as the Fostering Advanced Human Resources to Lead Green Transformation (SPRING GX) project adopted in 2021 and literacy education programs for undergraduate students to be launched in 2024.

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, a GX student network has been launched, led by members of student environmental organizations. It will provide a platform to facilitate the activities conventionally assumed by student organizations and to actively participate in UTokyo's Climate Actions.

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

# 1

## 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 to 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 the 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.

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 implemented 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, Tokyo declared its goal of

becoming a "Zero Emission Tokyo" at the U20 Tokyo Mayors Summit in May 2019. Tokyo aims for net zero CO<sub>2</sub> emissions by 2050, and intends to limit the increase in global average temperature to 1.5°C. The Tokyo Metropolitan Government 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 CO<sub>2</sub> emissions outside Tokyo. The following section discusses some initiatives toward system revisions that pertain to the Tokyo Metropolitan Environmental Security Ordinance. As a premise, the Tokyo Metropolitan Government 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 CO<sub>2</sub> 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)<sup>1</sup>" was announced to lay out the direction of ordinance revisions.

1 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)

- Policy 1: Reinforce/enhance measures to reduce CO<sub>2</sub> 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 CO<sub>2</sub> emissions from existing buildings (reinforcement of cap-and-trade program for large scale facilities)
- Policy 3: Advance measures to reduce CO<sub>2</sub> 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 of its action plan in the UTokyo Compass and established the GX Promotion Subcommittee in 2022 under the Future Society Initiative 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.



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# Vision

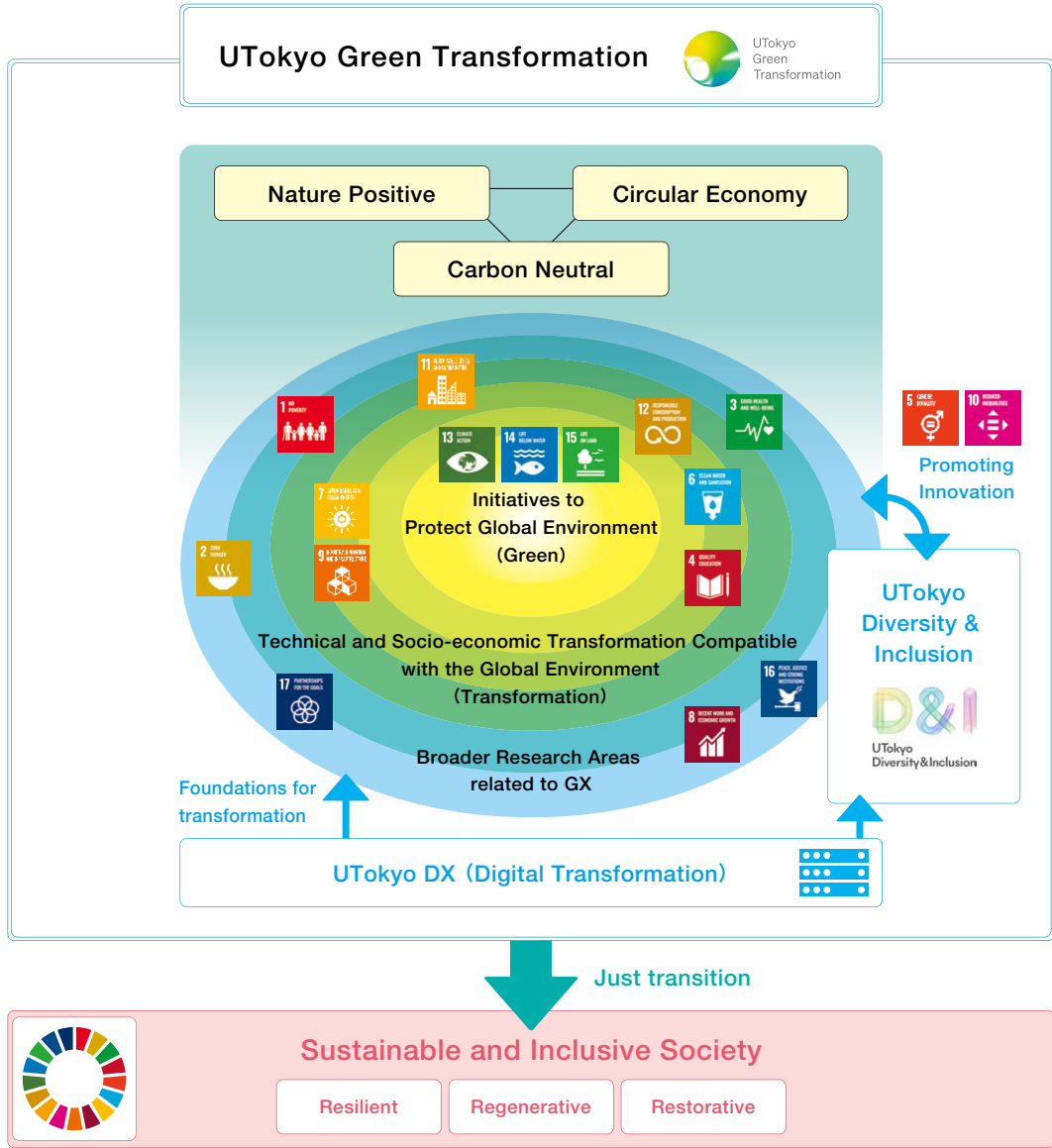


Figure 1 Conceptual Diagram of UTokyo Green Transformation

## 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

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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)

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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 transform, while ensuring a just transition, socio-economic systems into regenerative ones within the boundaries of natural systems as a means to realize a sustainable and inclusive society in which everyone can live happily and with dignity. Among other things, we consider "Carbon Neutral", "Nature Positive<sup>2</sup>", and "Circular Economy" to be the most important pillars of our actions. (see Figure 1)

Going forward, UTokyo will accelerate 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, UTokyo will strengthen and steadily implement the Global Commons Stewardship Initiative, an international collaborative project that aims to develop mechanisms for the better management of stable global systems as the shared property of all humankind (Global Commons). 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, a roadmap toward the goal of halving the university's effective GHG emissions in Scopes 1 and 2 by 2030 as against the 2013 figure will be formulated, and the systems and policy measures required to achieve this goal will be clarified. UTokyo will also collaborate with international society and participate in the international "Race to Zero" campaign as an institution that promotes action to reach net zero greenhouse gas emissions by 2050.

With respect to education, in addition to graduate-level programs for developing advanced human

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

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 will be focusing efforts to enhance GX literacy education for all students through a new cross-sectoral GX education program for undergraduate students to be launched next 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 facilities, which occupy approximately 0.1% of Japan's total land mass. Specifically, we will collaborate on green transformation with local government authorities, and provide support to the development of decarbonization action plans. We will also 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 <sup>3</sup>			Tokyo Metropolitan Government <sup>4</sup>		
	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 the UTokyo CA is to:

- Anticipate and respond to future national and international regulations related to climate change
- Reduce green house gas (GHG) emissions from UTokyo's campuses to 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 the 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 the 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 the 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<sup>3</sup> and the Tokyo Metropolitan Government<sup>4</sup> (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 the UTokyo CA,

<sup>3</sup> Prime Ministers' Office of Japan, 47th Global Warming Prevention Headquarters

[https://japan.kantei.go.jp/99\\_suga/actions/202109/\\_00007.html](https://japan.kantei.go.jp/99_suga/actions/202109/_00007.html)

<sup>4</sup> Zero Emission Tokyo Strategy

[https://www.kankyo.metro.tokyo.lg.jp/en/about\\_us/zero\\_emission\\_tokyo/strategy.html](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

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 in fiscal 2024.

UTokyo CA will be revised every year for the purpose of ensuring that the GHG emissions reduction targets will be met by reviewing the effects of all the climate actions

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

UTokyo also maintains GHG reduction targets set by the University of Tokyo Sustainable Campus Project (TSCP) since 2008 and targets specified in the Tokyo Metropolitan Environmental Security Ordinance shown in Table 3. Measures for reducing emissions are common to all of these targets, but the baseline year differs from that of the targets set out in UTokyo CA. The electricity emission factors are also different as they are based on the standards adopted by the Japanese government and the Tokyo Metropolitan Government. Progress on these targets is reported in the annual UTokyo Environmental Report: <https://www.u-tokyo.ac.jp/ja/about/actions/public05.html> (in Japanese)

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

TSCP CO <sub>2</sub> reduction targets	Reduction targets specified in the Tokyo Metropolitan Environmental Security Ordinance <sup>5</sup>
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)	

<sup>5</sup> Revised as of October 13, 2023

[https://www.kankyo.metro.tokyo.lg.jp/climate/large\\_scale/overview/4th\\_overview/outline.html](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 every month to discuss and decide on various issues related to the promotion of green transformation. Upon formulating UTokyo CA 2023, UTokyo Climate

Action Working Group (UTokyo CA-WG), a new working group responsible for updating UTokyo CA, was established to engage in detailed discussions of the contents to be updated. UTokyo CA-WG met three times from August to October 2023 to discuss the contents to be updated in UTokyo CA, after which UTokyo CA 2023, this document, was finalized and reviewed by the GX Promotion Subcommittee.

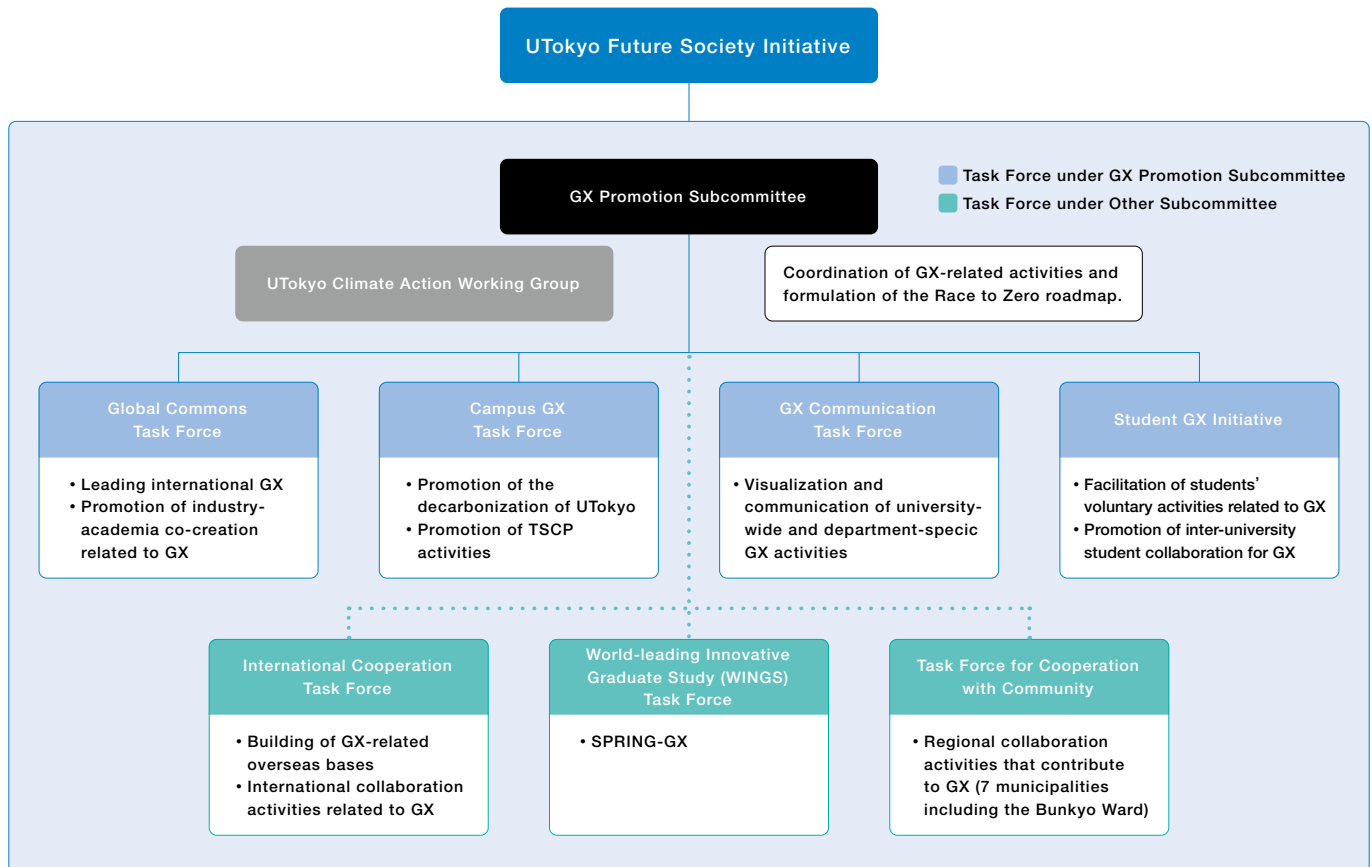


Figure 2 Organizational Structure of GX and CA promotion

# 2

## **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.

# Calculation of UTokyo GHG Inventory

## 1. Standards

The University of Tokyo (UTokyo) GHG inventory is compiled in alignment (where applicable) with the GHG Protocol<sup>6</sup>. 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.

### ■ Scope 1

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.

### ■ Scope 2

UTokyo's emissions under this scope represent on-site electricity consumption and is calculated using the emission factors of Tokyo Electric Power Company (TEPCO).

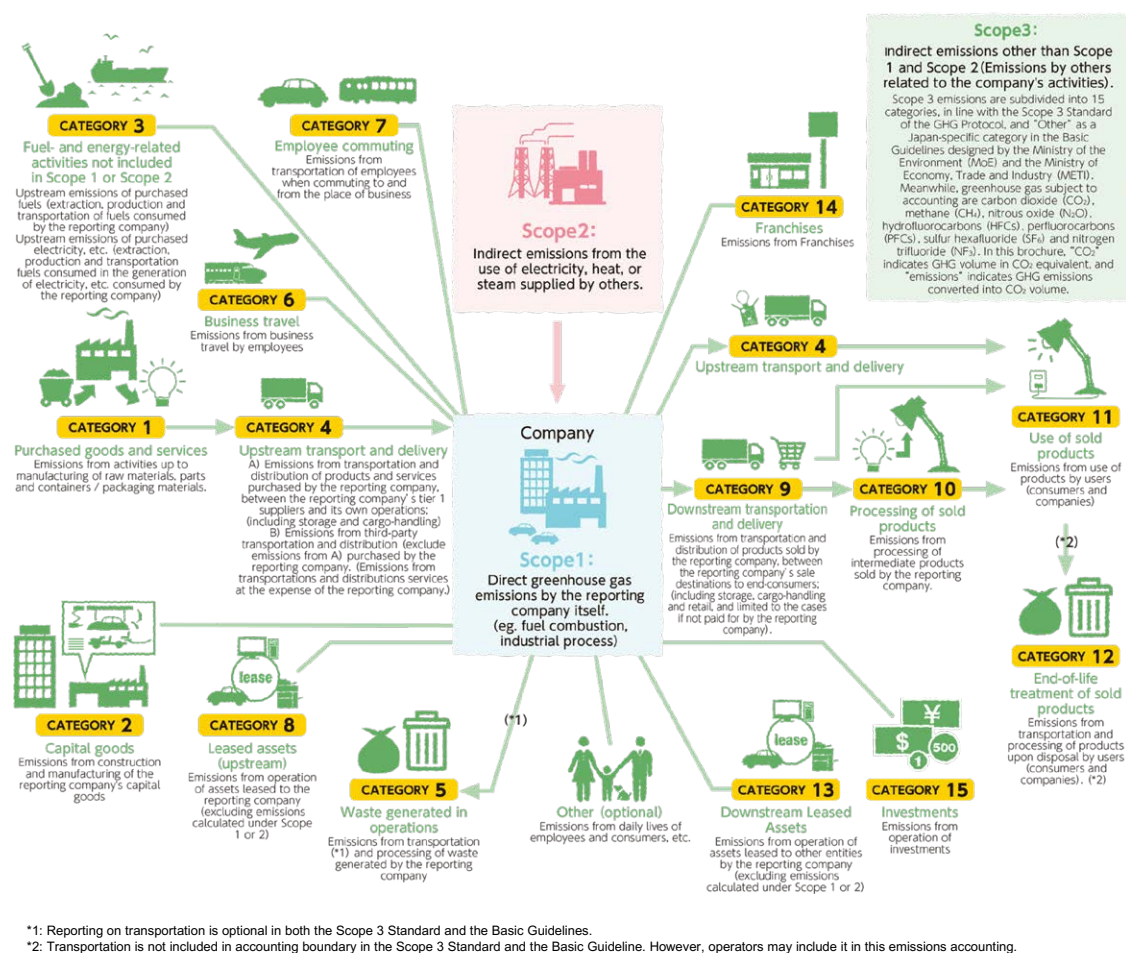


Figure 3 Schematic diagram of Scope 1, 2 and 3 emissions in the value chain<sup>7</sup>

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

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

7 MOE website : Green Value Chain Platform

[https://www.env.go.jp/earth/ondanka/supply\\_chain/gvc/en/supply\\_chain.html](https://www.env.go.jp/earth/ondanka/supply_chain/gvc/en/supply_chain.html)



### ■ Scope 3

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 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 value 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 GWP 100-years of major substances relative to CO<sub>2</sub><sup>8</sup>

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

<sup>8</sup> 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/>

## 2. Scope and Boundary

### Reporting Period, Organizational Boundary and Scope

As of September 2023, the University of Tokyo (UTokyo) has 51 domestic locations, and 31 overseas locations<sup>9</sup>. 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

The current GHG inventory does not include the following items due to lack of data; however, the GX Promotion Subcommittee will work with relevant stakeholders to increase coverage and accuracy in future assessments.

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

<sup>9</sup> 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](https://www.u-tokyo.ac.jp/ja/intl-activities/overseas-offices/list_of_overseas_offices.html)

### 3. 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.”<sup>10</sup>
- Scope 2 emissions factors are applied by obtaining the yearly basic emissions factors announced by TEPCO<sup>11</sup>.
- Scope 3 emissions factors were obtained mainly from the LCA database IDEA Ver. 3.3 and Ver. 3.1<sup>12</sup>.

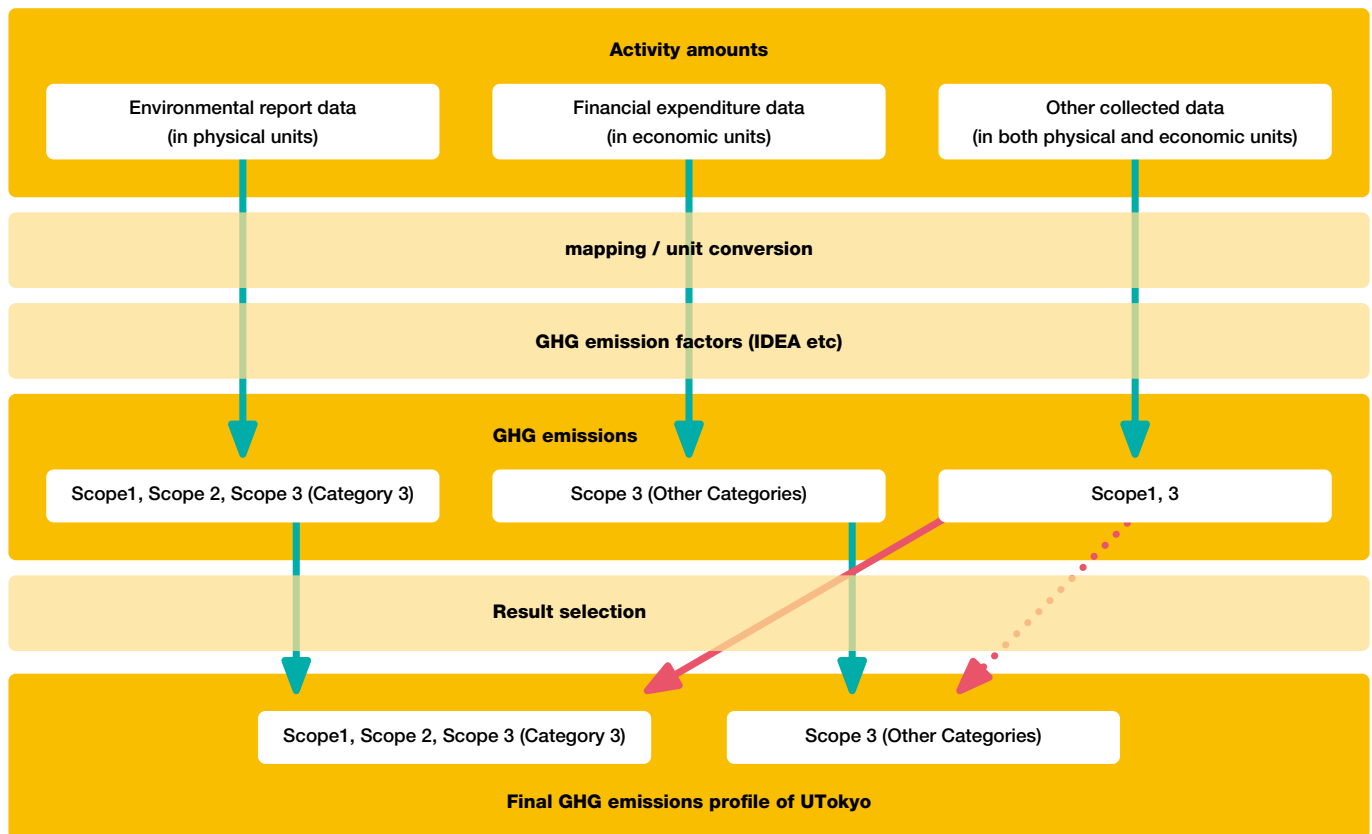


Figure 4 GHG emissions calculation flow

10 Ministry of the Environment (MOE), List of Emissions Factors

<https://ghg-santeikohyo.env.go.jp/calc> (in Japanese)

11 TEPCO, Transition of CO<sub>2</sub> Emission Factors, etc.

<https://www.tepco.co.jp/ep/company/warming/keisuu> (in Japanese)

12 LCI database IDEA Ver. 3.3 (2023/04/15), IDEA Ver.3.1 (2021/07/15)

Research Laboratory for IDEA, Research Institute of Science for Safety and Sustainability (RISS), National Institute of Advanced Industrial Science and Technology (AIST)

## 4. Limitations

- Due to limitations in data collection, the following data gaps exist in the Scope 1 GHG emissions data at present. The lack of data will be remedied going forward to improve the accuracy of the Scope 1 emissions data.
  - ▶ 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.
  - ▶ The impact of the leakage of chemical substances (CFCs, methylene chloride, chloroform, etc.) into the atmosphere is not included.
  - ▶ Fuel usage data for overseas sites are not included.
- Scope 2 GHG emissions were calculated using the basic emission factors announced by TEPCO for the relevant year as the carbon intensity of electricity. The reason for using TEPCO's emission factors is the consistency and continuity of these emission factors. UTokyo's five major campuses are located within TEPCO's service area, but Scope 2 emissions for sites outside of TEPCO's service area are also currently calculated using TEPCO's emissions factors. Going forward, the calculation method for Scope 2 GHG emissions will be reviewed to consider using regional grid- and menu-specific emission factors for each site and term. Additionally, if valid emission factors become available, in terms of both continuity and validity, location-based and market-based reporting will be considered.
- Emissions for Scope 3 Category 3 were calculated from the ratio of direct emissions (combustion of fossil fuel) and indirect emissions (fuel procurement and transmission loss) derived from electricity and fuel datasets in IDEA Ver. 3.1. There is a certain degree of uncertainty with regard to electricity, because the direct/indirect ratio was calculated for the power mix of TEPCO in 2015 and applied to the years up to 2022 due to data limitation.
- 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 were 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. Future improvement measures may include breaking down account titles with large spending into smaller items when calculating emissions and assigning more appropriate emission factors.
- 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.

## 5. Inventory Results and Analysis

Figure 5 shows UTokyo's Scope 1, 2, and 3 inventory results of GHG emissions for the stated reporting period.

Scope 1 and 2 emissions in fiscal 2022 were 165,000 MTCO<sub>2</sub>e representing a 3.4% reduction from fiscal 2021 and 17.3% reduction from fiscal 2013. The breakdown of these reductions are estimated as follows.

### (1) Reduction attributable to energy-saving activities

(including TSCP)

- Upgrade and improvement of air conditioning equipment
- Introduction of LED lighting
- Others (e.g., operational improvement of air conditioning and lighting at the university hospital)

### (2) Changes attributable to fluctuations in activity volume

- Fluctuations in activity volume (e.g., suspended supercomputing services in Kashiwa Campus for upgrade of the supercomputer)

In fiscal 2022, emissions increased from fiscal 2021 in many departments and divisions as a result of the lifting of COVID-19 related activity restrictions. Thanks to emission reduction by energy-saving activities, overall emissions decreased year on year although by a small margin. It must be noted, however, that the emissions data over the few years up to fiscal 2022 include uncertainties, as much of the impact of the pandemic is not eliminated until fiscal 2023.

Scope 3 emissions for fiscal 2022 increased by 5.0% (approx. 20,000 MTCO<sub>2</sub>e) from fiscal 2021. Much of this increase is attributable to the sharp increase of Category 6 emissions associated with business travels from approx. 11,000 MTCO<sub>2</sub>e in fiscal 2021 to approx. 50,000 MTCO<sub>2</sub>e in fiscal 2022 due to the easing of COVID-19 related travel restrictions. Another factor that may be affecting the calculation results is the increase of commodity prices. UTokyo has continued to adopt the spend-based method for calculating GHG emissions, which is based on financial data for respective account titles. The calculation results may have been affected by

the rise of consumer price index from 101.8 in 2021 to 105.1 in 2022 (baseline 2015) and thus include a certain level of uncertainty. (The impact of price rises is not taken into consideration in the calculation for fiscal 2022.)

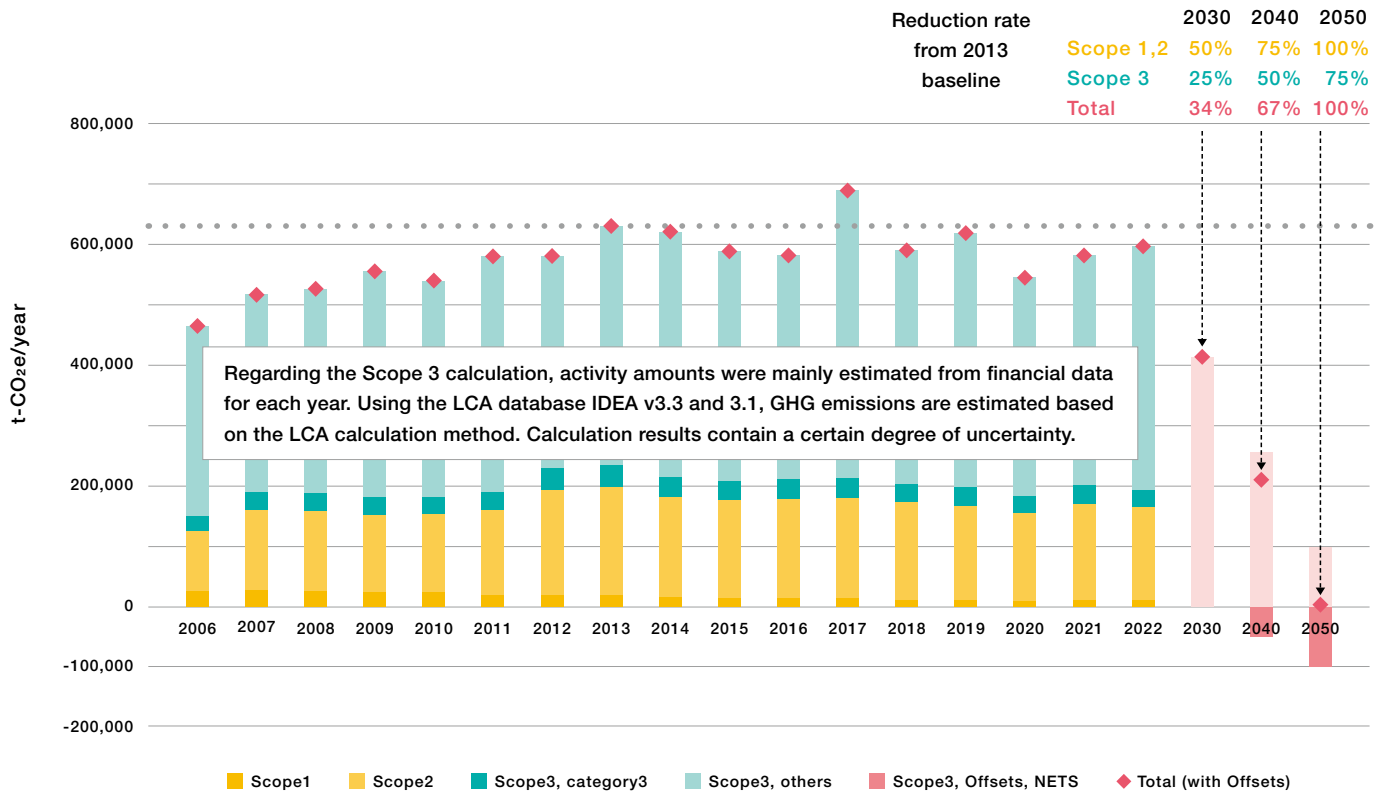


Figure 5 UTokyo Scope1,2,3 GHG calculation results with projections to the future

## 6. Verification

The University of Tokyo (UTokyo) does not currently pursue external third-party verification of its GHG emissions profile, but will rather undergo internal verification of the type of data used, calculation method, and visualization and interpretation of the calculation results, through consultation with UTokyo's experts in areas such as LCA, buildings' energy demand, 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.



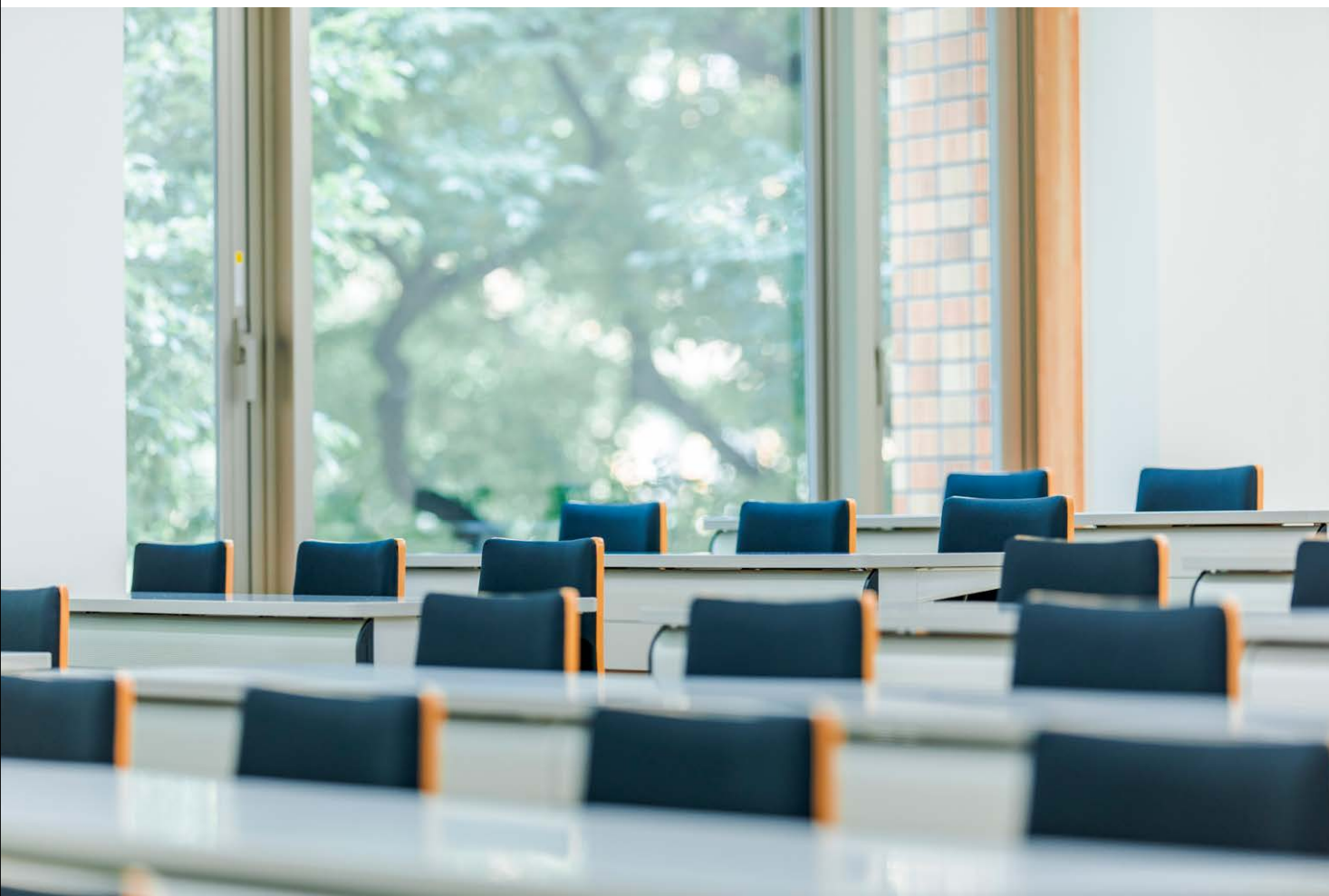
# Emissions Reduction Roadmap and Actions

## 1. Major Premise

The 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-site<sup>13</sup> renewable sources, Switch to off-site<sup>13</sup> 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.



<sup>13</sup> 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.



## 2. Scopes 1 and 2

### CO<sub>2</sub> Emissions to Date and Current Status

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 CO<sub>2</sub> emissions as top priority.

One of the factors that affect CO<sub>2</sub> emissions is the emission factor of the electricity we purchase. The effectiveness of our energy-saving actions can be

assessed by examining the changes in CO<sub>2</sub> emissions obtained by using the same CO<sub>2</sub> emission factor as the baseline year of 2013, but the result has remained mostly flat. Another factor that affects changes in CO<sub>2</sub> emissions is the total floor area of campus buildings. Assessment of changes in the amount of emissions per floor area found that there has been an average reduction of 1.7% per year (obtained from fiscal 2022 results compared to fiscal 2013), which can be interpreted as the effect of TSCP and other measures (see Figure 6).

Figure 7 shows the changes in total floor area and the basic emission factor of electricity supply since 2013.

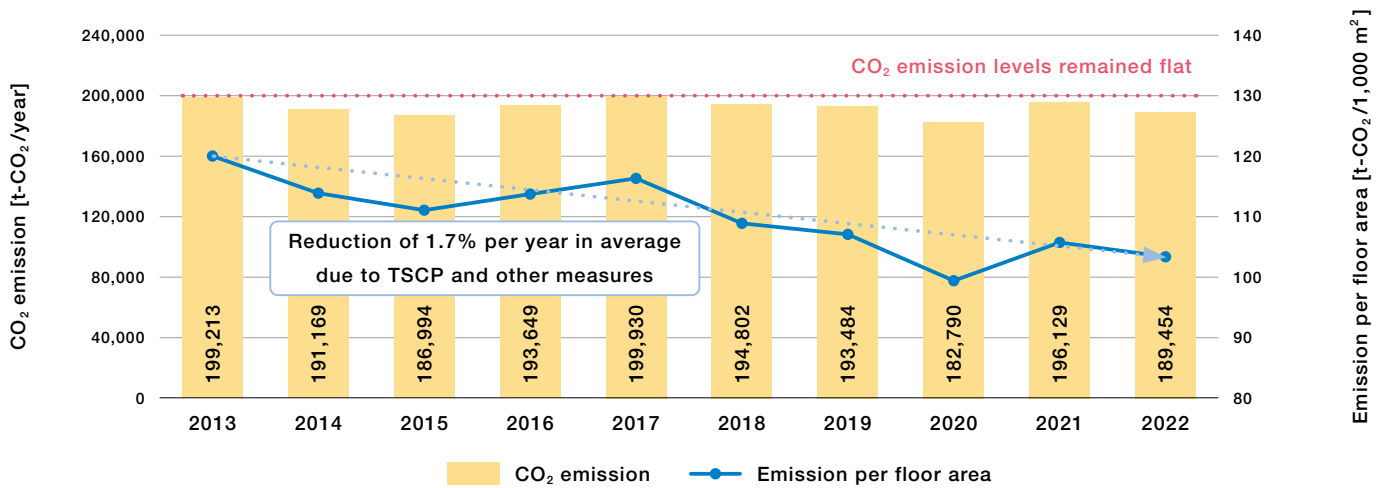


Figure 6 Changes in CO<sub>2</sub> emissions calculated using the same basic emissions factors as the baseline year of 2013

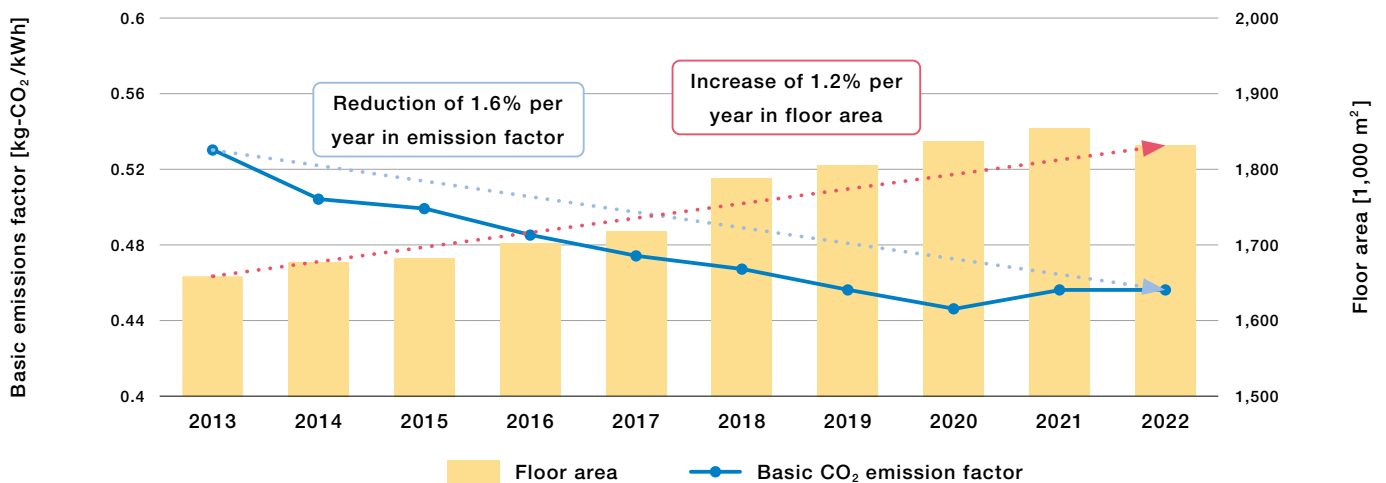


Figure 7 Changes in total floor area and electricity CO<sub>2</sub> emission factors

When fiscal 2022 results are compared to 2013, the basic emission factor has decreased by 1.6% per year, whereas total floor area has increased by 1.2% per year. This means that the effects of TSCP measures would have reduced more CO<sub>2</sub> emissions, if it were not for the offsetting increase by the growth in floor area.

Figure 8 shows Scope 1 and 2 emissions since 2013. Assuming there was no increase in floor area, current CO<sub>2</sub>

emissions would have been further reduced (the effect of floor area increase<sup>14</sup> was equivalent to 28,000 t-CO<sub>2</sub> and 17% in 2022).

Promotion of energy-saving measures is not enough to further reduce CO<sub>2</sub> emissions while ensuring the university's research and education activities to the maximum extent, and therefore it is important to build systems and mechanisms to promote all kinds of measures.

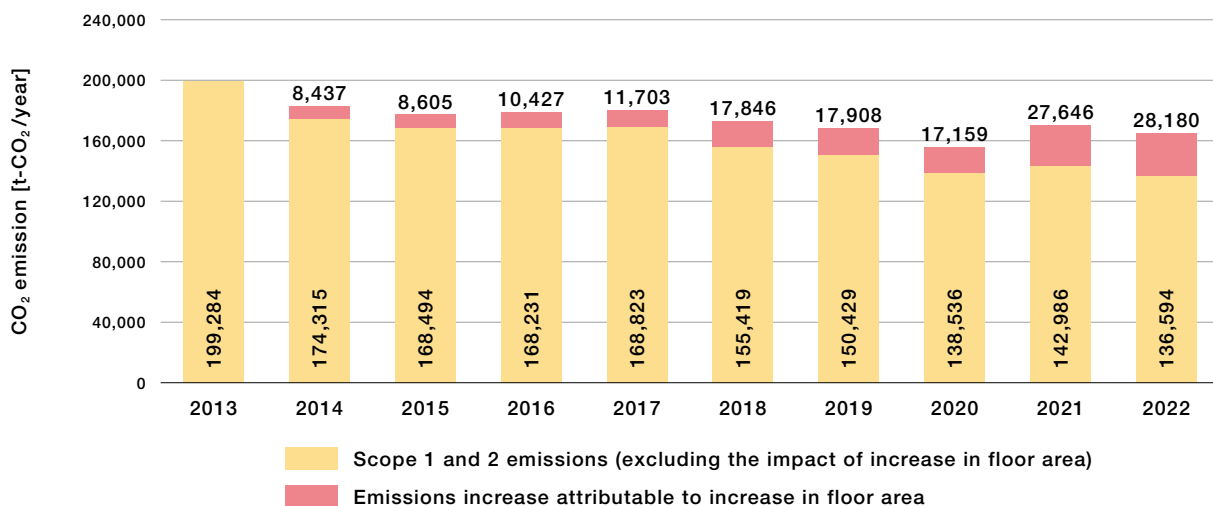


Figure 8 Changes in Scope 1 and 2 CO<sub>2</sub> emissions (the respective electricity emission factor of the year is applied)

### Reduction Scenario and Roadmap

In developing the scenario towards future emission reduction, based on the emission results from 2013 (the baseline year) up to 2022, we estimated the effects of increase in floor area and decrease in CO<sub>2</sub> emission factor on the emission level in 2030, which induced the Business as Usual (BAU) emission level. Then, we

estimated the effects as of 2030 of energy-saving actions and other measures that should be steadily implemented based on past performance, and for measures where quantitative estimation is difficult due to substantial uncertainties at present, the target values were identified by back-casting from the overall reduction target (see Figure 9). Based on this scenario, a roadmap for future advancements was developed (see Figure 10).

14 The emissions attributable to increase in floor area were calculated as CO<sub>2</sub> emissions from new buildings constructed since 2013.

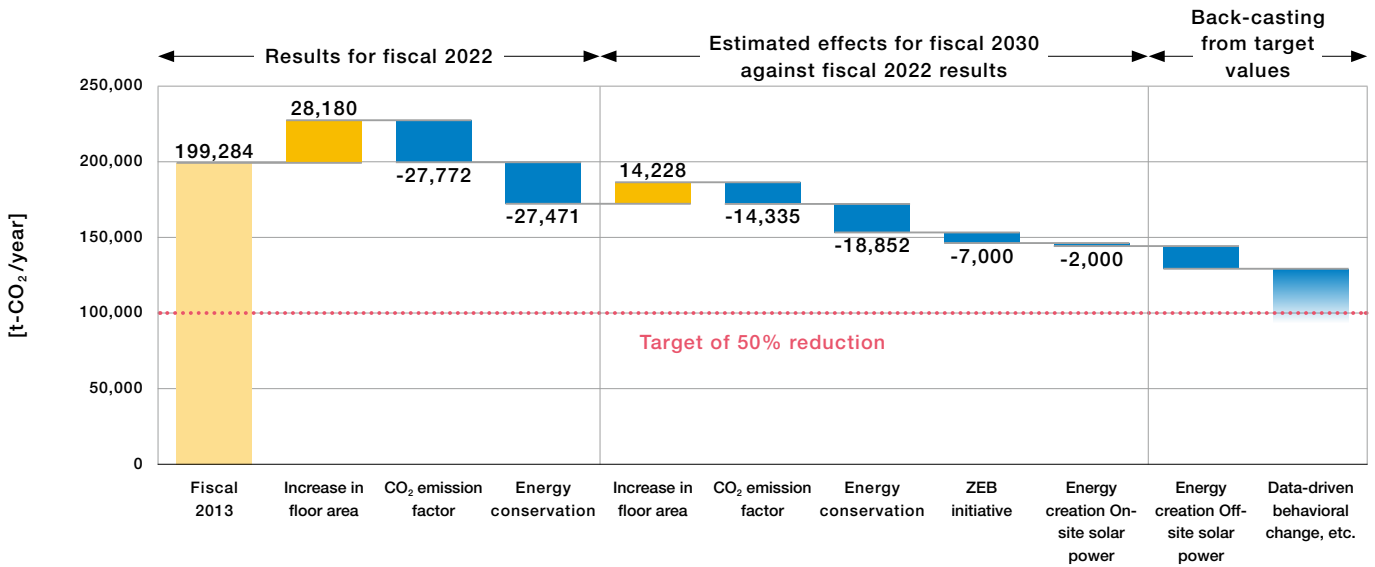


Figure 9 Emission reduction scenario up to 2030

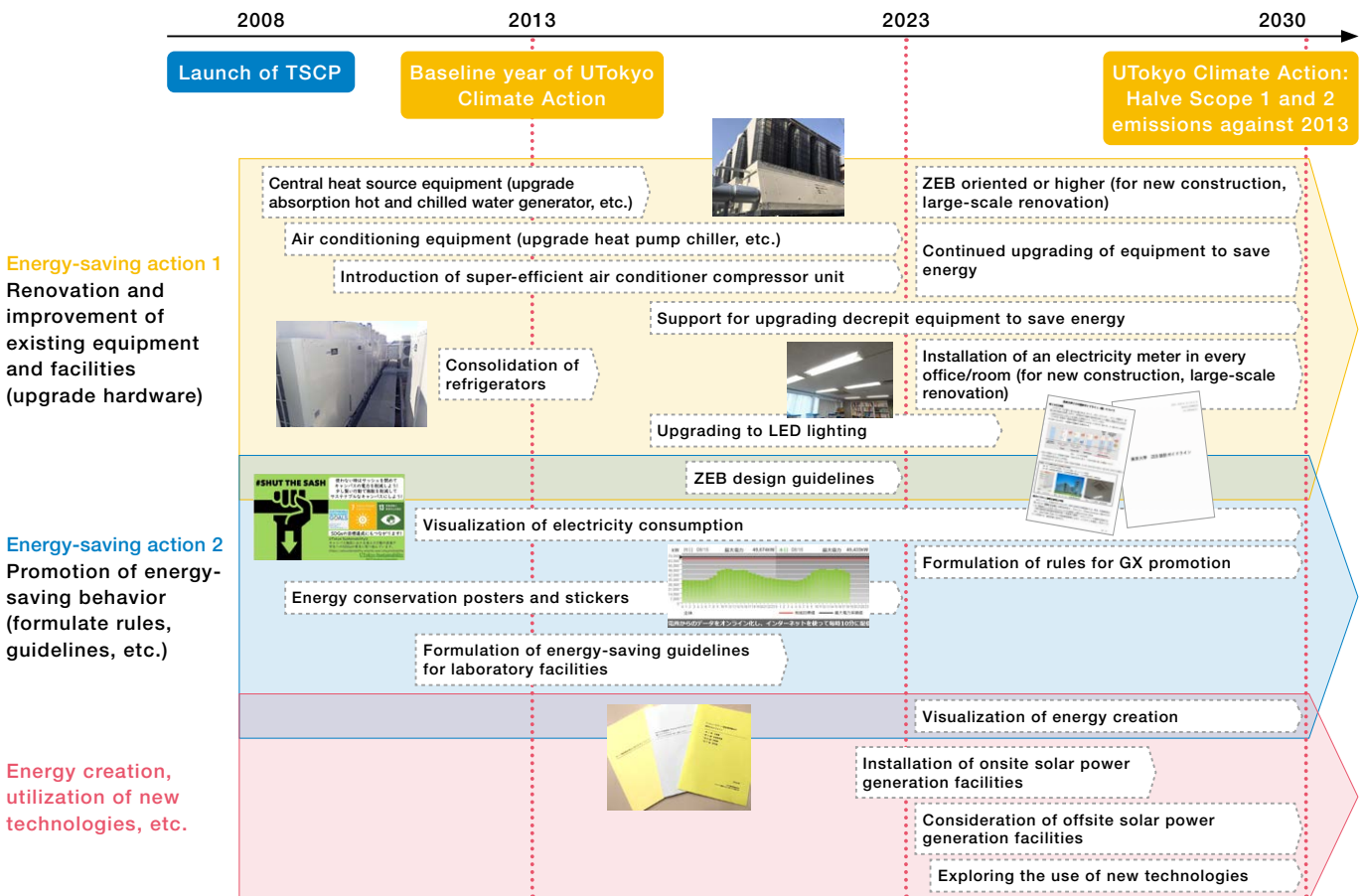


Figure 10 Emission reduction roadmap up to 2030

## Overview of Reduction Measures

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As described above, overall floor area has increased by 1.2% per year since fiscal 2013. To minimize the impact of floor area growth on effective CO<sub>2</sub> emissions, we need to consider maintaining the total floor area at an appropriate level by reviewing the need to retain existing facilities and the validity of new investments through selection and consolidation of facilities.

Energy-saving measures that have proved effective to date, such as upgrading to high-efficiency air conditioning and lighting equipment, will be steadily continued.

The planning and design of the construction of new buildings and large-scale refurbishment of existing ones will be in line with UTokyo's Net Zero Energy Building (ZEB) design guidelines to curb the impact of floor area increase on emissions.

Meanwhile, since there are limits to relying on energy-saving efforts to upgrade equipment and building efficiency based on cost effectiveness, it is necessary to further promote energy conservation by introducing a new system to allocate the cost burden of energy by space in proportion to the energy used.

Toward promoting green transformation of the campus, UTokyo will consider initiatives to utilize data-driven technology to promote energy-saving behavior among its members with the aim of contributing to emissions reduction.

UTokyo also needs to consider building mechanisms for internal carbon pricing as part of its efforts to transition from simply visualizing electricity consumption to actively showcasing not only electricity consumption but procurement, research equipment, financial data, assets, human resources and more.

Ongoing efforts for energy creation include installment of solar power generation facilities on available rooftop spaces of campus buildings.

UTokyo is also considering the introduction of energy from remote or offsite solar power generation facilities

to raise the ratio of renewable energy sources in the university's energy mix.

Practical application of new technologies such as fuel cells and cogeneration will be considered in light of social situations and technology trends.

## Concrete Reduction Actions Taken in FY2023

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With regard to energy-saving equipment, upgrading to high-efficiency air conditioning and lighting equipment is steadily promoted. A plan to convert 18,000 Hf lights to LED is being implemented in fiscal 2023.

As part of the university's ZEB initiative, a case study will be conducted on a large-scale renovation in line with the ZEB design guidelines<sup>15</sup> developed in the previous fiscal year.

With regard to technology-based and data-driven behavioral change, demonstration research will be launched as a small start toward a big difference.

As part of energy creation efforts, onsite solar power generation facilities with a total capacity of 1,200 kW will be installed on the main campuses in Tokyo during fiscal 2023. In addition to campuses in Tokyo, solar power facilities are planned to be installed in Kashiwa Campus in fiscal 2024 and onward.

It is important that through the implementation of energy conservation and creation measures, each member of the university recognizes their contribution to realizing a sustainable and carbon-neutral campus and improves their GX literacy in the form of behavioral change.

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<sup>15</sup> <https://www.u-tokyo.ac.jp/content/400215557.pdf> (in Japanese)

### 3. Scope3

#### Scope3 Emissions and Reduction Measures

As indicated in Figure 5, Section 2.1.5. 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 overseas<sup>16</sup>. 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 the financial expenditure data for each account title as the indicator of activity volume, except for Category 3

'Fuel- and Energy Related Activities Not Included in Scope 1 or 2'.

##### (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 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, 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.

#### Measurement of UTokyo's Activities

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

16 <https://cgic.ifi.u-tokyo.ac.jp/en/topics/gcsi2022-2/>

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).

On the other hand, the University of Tokyo Co-op (hereafter Utcoop), one of the largest purchasing organizations of the university, maintains a transaction database in which individual items can be identified to a certain extent. It is considered that more detailed analysis of purchase items will become possible by linking Utcoop's data with UTokyo's financial and accounting data. The financial and accounting system is planned to be updated in fiscal 2026 by introducing some digital transformation elements. Possibilities for linking data are being discussed between Utcoop and relevant departments of UTokyo.

Of course, detailed measurement of activities related to purchase of products and services cannot be achieved just by data coordination with Utcoop. It will probably require cooperation with the suppliers' systems and review of the operational flow associated with purchase activities. Utilization of digital transformation initiatives is currently considered to achieve this without increasing operational loads.

### Collaboration for Addressing Scope 3 Emissions

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Scope 3 emissions relate to all aspects of university activities, and their measurement requires the collaboration of different departments and divisions holding various data and those in charge of data analysis to measure and calculate activity volume and associated emissions.

Furthermore, the Scope 3 reduction activities that lie ahead of the measurement will require building a collaborative relationship with suppliers and other external stakeholders comprising the value chain, not to mention the cooperation of individual UTokyo members. To make that happen, it is necessary to make clear,

as mentioned earlier, what behavioral change leads to reduction of which emission, which in turn requires quantification through life cycle assessments (LCA).

UTokyo boasts the largest number of LCA experts among Japanese universities. In 2023, the UTokyo LCA Center for Future Strategy (UTLCA) was launched as a new collaborative research organization. Leveraging the power of these experts, UTokyo is working to measure its activities and associated Scope 3 emissions, with an aim to start developing a series of concrete actions from 2024.

### Concrete Reduction Actions Taken in FY2023

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As mentioned earlier, efforts related to Scope 3 emissions involve a number of challenges related to the measurement of GHG emissions, planning of reduction actions, and evaluation of the reduction effect of the actions implemented. Given the challenges, the development of a concrete action plan is expected to take until fiscal 2024 at earliest.

As such, we will start by identifying the product categories being procured in particularly large amounts and see if information on their carbon footprint is available or what is required to obtain such information, as the first steps to improving the accuracy of the measurement and to identifying priority reduction targets.

Given the large number of departments and divisions related to these activities, there is need to build a new system to coordinate among relevant departments and address the issue from LCA and other expert perspectives. This coordination system will eventually need to assume the function of coordinating between purchasers within UTokyo and external stakeholders (suppliers, contractors, service providers, etc.).

Besides, there may be potential reduction measures that could be implemented in terms of behavioral change without waiting for the refinement of measurement and calculation. The following are some examples:

Reducing the resources consumed in daily business operations is a means that would be relatively easy for everyone to put into practice. For example, reduction

of Scope 3 CO<sub>2</sub> emissions during production and disposal of paper can be expected by reducing resource consumption through paperless operations. If the CO<sub>2</sub> emission reduction effect per sheet of paper becomes clear, that would help motivate university faculty and staff to reduce paper consumption. Quantification of reduction effects, however, requires thorough consideration from an LCA perspective.

Likewise, on-campus food sustainability is another issue that requires careful discussions. Recent scientific studies have demonstrated the effectiveness of several options for reducing GHG emissions: such as using local food produce, reducing food loss, improving waste disposal methods, and using creativity in devising specific menus offered on campus. UTokyo cafeterias too can play a part in reducing environmental burden by offering more sustainable options on campus, such as using locally produced sustainable food products in their menus.

In the field of construction, it will be necessary to specify standards that should be met by materials selected for constructing new buildings. In addition, locally produced materials that are recyclable, reusable, low in toxicity, and do not emit environmentally harmful substances should be chosen for renovation projects, as well.

It is also necessary to consider both the financial cost and environmental impact of waste treatment in order to select appropriate methods for respectively treating laboratory waste, general waste, and infectious waste. Needless to say, waste reduction is also effective for reducing CO<sub>2</sub> emissions.

Reducing GHG emissions associated with transportation is another issue that needs to be considered. We have not yet assessed the ratio of means of transportation used by students and therefore the impact of student commuting on Scope 3 emissions is unclear. We need to conduct a questionnaire survey at each campus to assess the means of transportation used by students. It may also be possible to devise campaigns and incentives (reduce the number of commuter tickets issued) based on the results of such surveys. If the effect

of remote working from home on CO<sub>2</sub> emission reduction becomes clear, we may encourage working from home. Furthermore, UTokyo needs to educate its faculty, staff, and students on the environmental impact of travelling for business purposes. Providing a list of environmentally preferable transportation options will also be necessary. Where traveling by air cannot be avoided, such as engagements overseas, the number of flights should be minimized by streamlining the schedule, utilizing online conferencing tools, and limiting the number of people traveling to strictly those necessary. Utilization of carbon offset programs offered by airlines is also an option though it should not be counted as a reduction measure at present.

## **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.

We believe that to create academic knowledge in the fields of technology and social sciences and to foster human resources who will lead global green transformation are both important climate actions for UTokyo, as a research and educational institution aiming to lead Japan and the world by bringing together comprehensive knowledge to solve climate change.

We also recognize the importance of gaining the understanding of climate actions and participation therein from all UTokyo members including faculty, staff, and students and collaborating with external stakeholders including businesses, central and local governments, and other universities to form the basis of our initiatives.



## Contribution through Initiatives and Research

**As one of the first universities in the world to tackle the issue of sustainability**

### —Alliance for Global Sustainability (AGS)

The AGS was created with the aim to accelerate progress toward the goal of the sustainable development of mankind. It was formed in 1994 as a unique international partnership between four of the world's leading universities—the University of Tokyo (UTokyo, Japan), the Massachusetts Institute of Technology (MIT, U.S.), the Chalmers University of Technology (Sweden), and the Swiss Federal Institute of Technology (ETH Zurich, Switzerland)—to advance research collaboration in pursuit of the sustainability of the anthropogenic sphere. (Chalmers joined the Alliance in 2001)

The four universities decided to form a partnership across the boundaries of academic discipline and geography, to engage in collaborative research, with an aim to deepen the scientific understanding of the challenges that face the anthropogenic sphere and to apply the research findings through policy proposals and other means. Another mission of the AGS was to foster next-generation leaders who will pursue sustainable development in various fields. Until 2014, the AGS member schools hosted annual meetings.

### 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 an unprecedented blueprint for the future of the chemical industry including the pathway to reach net zero

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

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 on both supply and demand sides 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 CO<sub>2</sub> emissions by 2050 by introducing renewable energy sources and combining multiple scientifically proven measures such as promoting electrification.

- (3) Release of Global Commons Stewardship (GCS) Index 2022 (3rd edition) (July 2023)

<https://cgc.ifi.u-tokyo.ac.jp/en/topics/gcsi2022-2/>

GCS Index is the world's first index of countries' environmental impact, prepared 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, to inform policy priorities and investment decisions to safeguard the global environment. It tracks countries' domestic and



Figure 11 The 2022 GCS Index

international spillover impacts on the Global Commons – stable and resilient earth system which consists of, for instance, the climate system, the land biosphere, and oceans – caused by their economic activities and identifies responsible supply chains. Taking advantage of the latest advances in trade data (multi-regional input-output tables), environmental research, and industrial ecology, the 2022 GCS Index, which is the 3rd version of the index, has expanded its geographical scope of analyses from 99 countries in the 2nd version to 146 countries.

**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.

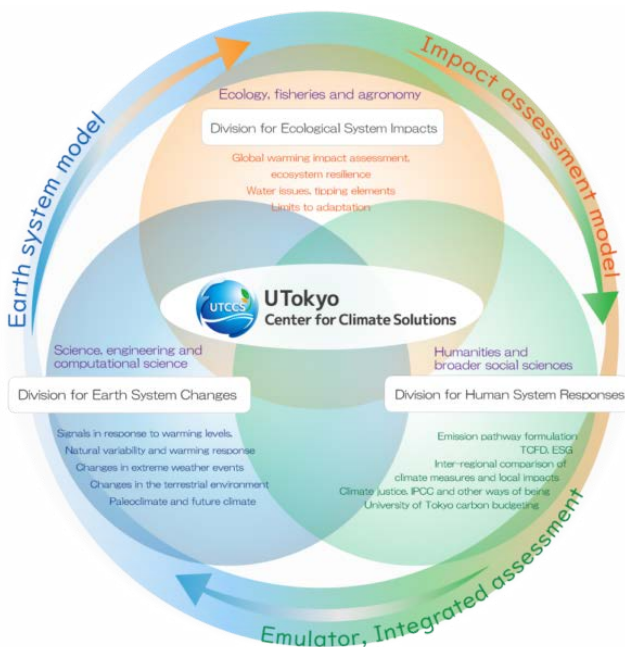


Figure 12 Organizational structure and research themes of UTokyo Center for Climate Solutions

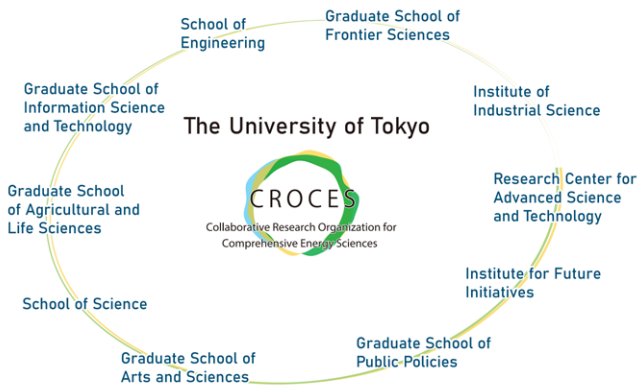


Figure 13 Organizational structure of Collaborative Research Organization for Comprehensive Energy Sciences

### 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, with significant increase of renewable energy led by the legislation of the aim to realize a carbon neutral society, a wide range of scientific research is required to advance such technologies as battery cells, hydrogen, and forest absorption of carbon dioxide as well as fossil fuel and nuclear energy. 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 CO<sub>2</sub> reduction” “Energy policy, energy economics and management of global resources” and “Innovative materials and energy management to improve human comfort and health.”

**Building our future strategy now with advanced scientific technologies and preemptive LCA  
—UTokyo LCA Center for Future Strategy (UTLCA)**

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

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 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.

**Forest resources contributing to carbon neutrality  
University of Tokyo Forests (UTF) affiliated to the  
Graduate School of Agricultural and Life Sciences**

<https://www.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



Figure 14 Relationship between changes in society toward carbon neutrality in 2050 and product lifecycle and social implementation of new technologies

Table 6 UTokyo forest resources

Forest Name	Year Established	Forest Area [ha]	Altitude [m]	Climate Zone
The University of Tokyo Chiba Forest	1894	2,160	50 - 370	Warm-temperate zone
The University of Tokyo Hokkaido Forest	1899	21,863	190 - 1,459	Cool-temperate and subarctic zones
The University of Tokyo Chichibu Forest	1916	5,726	530 - 1,990	Cool-temperate zone
The University of Tokyo Tanashi Forest	1929	7	60	Warm-temperate zone
Ecohydrology Research Institute	1922	1,252	2 - 692	Warm-temperate zone
Fuji Iyashinomori Woodland Study Center	1925	37	990 - 1,060	Cool-temperatezone
Arboricultural Research Institute	1943	214	10 - 520	Cool-temperatezone
Total		31,259		

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

The trees of UTF continue to grow each year absorbing CO<sub>2</sub>. The amount of CO<sub>2</sub> absorption by the trees of UTF has been made public every year since fiscal 2014 in the annual Environmental Report. The method of calculation of CO<sub>2</sub> absorption was recently reported in a journal issued by UTF (Miscellaneous Information of The University of Tokyo Forests Vol.67, pp 59-69). Based on stock-change approach, increase in the amount of CO<sub>2</sub> accumulated in growing trees is estimated from the amount of CO<sub>2</sub> sequestration at the beginning of the fiscal year, then the decrease due to logging is subtracted to obtain the sum of CO<sub>2</sub> absorption for the year. The amount of CO<sub>2</sub> sequestration in trees is obtained pursuant to “National Greenhouse Gas Inventory Report of Japan 2020” using the equation to multiply the forest stock (stem volume) specific to forest type and tree species by bulk density, biomass

expansion factor, the ratio between underground and aerial parts, and carbon content. The growth amount is estimated using the ratio of forest stock to growth amount (gross volume increment) of the national forests in the prefectures where the respective university forests are located.

The actual figures for fiscal 2021 were as follows: CO<sub>2</sub> sequestration at the beginning of the fiscal year was 13,189,000 t-CO<sub>2</sub> (of which artificial forests accounted for 2,173,000 t-CO<sub>2</sub>); increase in CO<sub>2</sub> sequestration due to growth was 141,000 t-CO<sub>2</sub> (of which artificial forests 48,000 t-CO<sub>2</sub>); decrease in sequestration due to logging was 26,000 t-CO<sub>2</sub> (of which artificial forests 10,000 t-CO<sub>2</sub>); the sum of CO<sub>2</sub> absorption during the year was 115,000 t-CO<sub>2</sub> (of which artificial forests 38,000 t-CO<sub>2</sub>).

### Research projects that contribute to the UN’s 17 Sustainable Development Goals (SDGs) Future Society Initiative SDGs Project

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

The Future Society 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, 2023 is 208.

## Human Resource Development to Tackle Climate Change

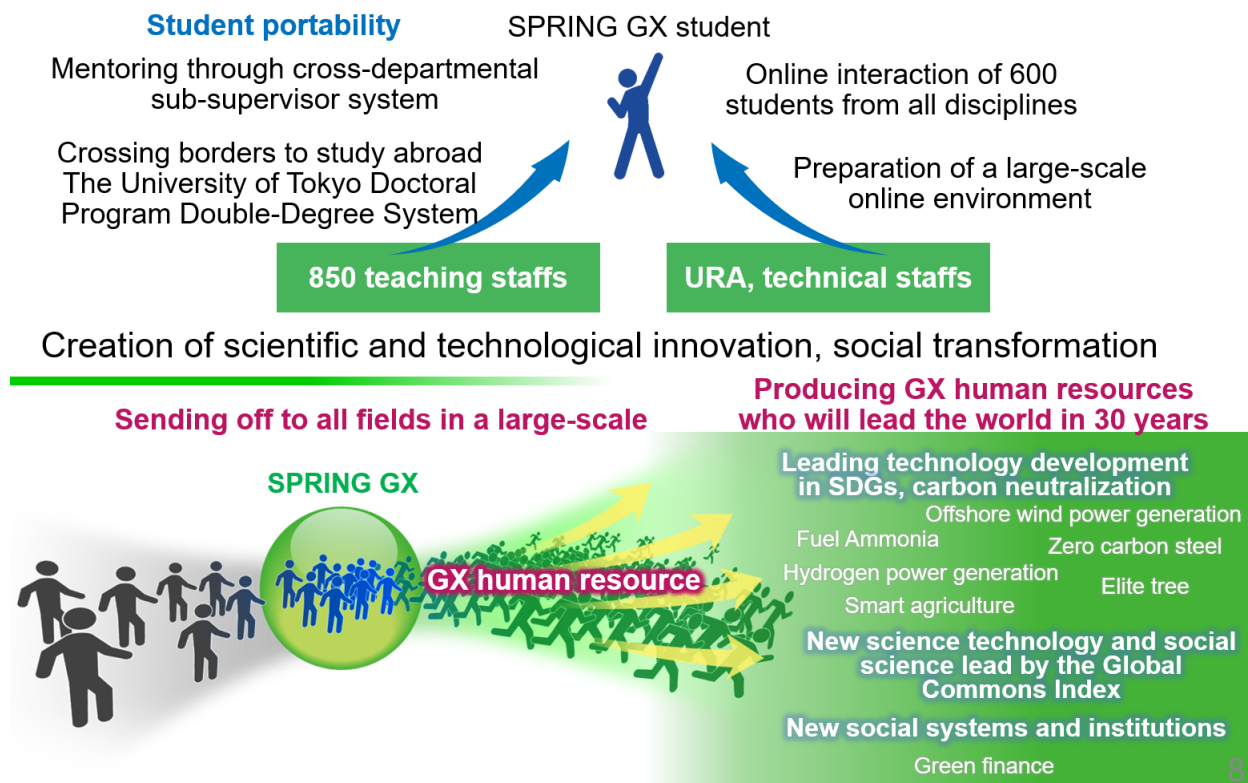


Figure 15 Provision of a challenging and interdisciplinary research environment

### Development of Global Leaders

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

[https://www.cis-trans.jp/spring\\_gx/index-e.html](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”). Six hundred 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. More specifically, its aims are to:

- Create an environment where students with expertise and high-level research ability can freely conduct challenging and emergent research to feed their curiosity.
- Foster an awakened culture where GX encompasses the future vision of society and each student’s research is related to societal issues.
- Develop transferable skills to fully demonstrate professional abilities in society.

To these ends, UTokyo has developed three core programs and advanced skill training programs and

developed a student support environment ensuring high portability. The project manager selects students with the assistance of the steering committee based on the students' will to position their research in GX, their expertise, and the emergent potential of the doctoral study. To ensure transparency is maintained, experts from national research institutes and the industrial sector are engaged in the student selection process. Figure 15 illustrates the project's concept of developing an environment for challenging and emergent research.

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

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

GPSS-GLI is a graduate program created as part of the Graduate School of Frontier Sciences (GSFS). The program is operated by the Sustainable Society Design Center, which was newly established within GSFS in April 2022. These all-English graduate school programs 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 from diverse backgrounds 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.

### Enhancing GX Education Programs for All Students

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In order for UTokyo to send leaders of green transformation to various fields of society, it needs to not only foster advanced human resources but to provide a wide range of students with the opportunity to learn about green transformation. There are many individual subjects related to GX in various departments. The plan is to provide students with an opportunity to learn about

the various aspects of GX beyond their major fields by organizing GX-related subjects into a cross-departmental education program. The program will be available starting in fiscal 2024.

### Recurrent Education for Working Adults

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

The aforementioned the Sustainable Society Design Center offers three education programs targeted at young to middle-aged working adults. The Smart City School aims to foster human resources who will lead the realization of smart cities and urban/regional digital transformation initiatives to contribute to solution and value creation through data utilization and social implementation of novel technologies. 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. The System Design School develops and offers programs to learn the theory and practice of planning/exploring technological system and business transformation through a system design approach.

# Co-creation and Collaboration with Stakeholders

## Student-led Activities and Collaboration with Students

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 collaboration between these student activities and the rest of the university, 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 aims to further invigorate student 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.

### Activities of TSCP Student Committee

- 2022 UTokyo Student Survey on Sustainability Awareness

[https://www.u-tokyo.ac.jp/focus/ja/articles/z1313\\_00008.html](https://www.u-tokyo.ac.jp/focus/ja/articles/z1313_00008.html) (in Japanese)

This is a large-scale survey conducted on the university system with the cooperation of the university administration. The 2022 survey was the fourth of its kind. Awareness of SDGs among UTokyo students is increasing, marking 95.7% in the latest survey.

- UTokyo Sustainability Office Hour 2023

The event was held in March 2023 for the purpose of raising awareness and encouraging sustainable action through dialogue with faculty members who are working to improve sustainability and promote green transformation in UTokyo.

- Exchange with other universities

In December 2022, the TSCP Student Committee participated in EcoPro 2022, one of the largest environmental exhibitions in Japan and mingled with students from across Japan. The Committee also engages in student exchange through an event to share activities and exchange opinions on sustainability initiatives implemented by universities located in Bunkyo ward.

## Activities of UTSN

- Water Server Project

This project to install water servers mainly on the Komaba 1 Campus was started in spring 2023, 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 use is being measured for ongoing monitoring of the effect of the project.

- Submission of opinions on the Race to Zero

The "Students' Call to Climate Action for UTokyo" was submitted to the university in October 2022 by the UTokyo Sustainable Network Race to Zero Planning Project Team. Exchange of opinions regarding the "Students' Call" continues between the university and students through the GX Student Initiative.

- Plant-based Menu Project

A project implemented in collaboration with University of Tokyo Co-op (Utcoop) to offer plant-based menus (made with soy meat and other plant-based ingredients) at the Utcoop cafeteria and to raise awareness.

- Nature Positive University Project

BioBlitz, a public-participation event to survey the creatures that live on campus was organized led by students who participated in the UN CBD COP15 held in 2022. A campus biodiversity strategy and associated action plan are also under development.



BioBlitz and its participants



• UTokyo Sustainability Week

UTokyo Sustainability Week was held over a week in June 2023 to present the results of efforts made to date. The main event, UTokyo Sustainability Talks featured UTokyo President Teruo Fujii, Executive Vice President Tatsuya Okubo and nearly 30 other faculty members as speakers and attracted a total of over 300 participants.



Student members who ran the Sustainability Talks event

**Collaboration with Other Universities in Bunkyo Ward**

On December 21, 2022, the five universities of Ochanomizu University, Toyo University, Japan Women’s University, Nihon Pharmaceutical University and UTokyo, all situated in Bunkyo Ward held an event to share activities and exchange opinions on sustainability initiatives at the Fukutake Hall of Hongo Campus, with the participation of 103 (of which 63 were online participation) faculty, staff, and students mainly who are engaged in sustainability activities in universities within Bunkyo Ward.

Mayor of Bunkyo Hironobu Narisawa gave an address at the event. Case examples of initiatives were shared by the participating universities and University of Tokyo Co-op, before holding a panel discussion. Starting in fiscal 2023, other universities in the ward will be called for participation in the event to further spread this movement.

**Collaboration with the Local Community - 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 humans can be organically integrated and circulated in a high-level partnership among public-private-academic sectors towards Beyond Zero Carbon. Various entities including universities, research institutions, businesses, and local governments are participating in the program.



Figure 16 Conceptual diagram of "Co-JUNKAN" platform

## **Social Collaboration with Businesses, etc. Related to GX**

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Collaboration with the private and other sectors are indispensable for the social implementation of knowledge created by academic institutions. The following are examples of the various ways UTokyo collaborates with the private sector:

### **Energy Transitions Initiative - Center for Global Commons (ETI-CGC)**

Twelve of Japan's representative companies from various sectors are participating in the ETI-CGC.

### **Energy Transformation (EX) Study Group**

Social collaboration is one of the important missions of the Collaborative Research Organization for Comprehensive Energy Sciences (CROCES). As of fiscal 2022, 35 companies are participating in the Energy Transformation (EX) Study Group established by CROCES.

### **Industry-academia collaboration by the social collaboration arm of preemptive LCA**

LCA is a practical field of research requiring the participation of private-sector companies to apply preemptive LCA in practice. As of September 2023, 16 companies are participating in this social collaboration.

### **Collaboration with the Imperial College London (ICL)**

In May 2023, ICL and UTokyo announced a new partnership for clean technology and energy research. This partnership builds on industry-academia co-creation projects related to climate change and energy systems implemented respectively between each of the two institutions and Hitachi, Ltd.

### **Collaboration with Microsoft Corporation**

In August 2023, UTokyo signed a strategic memorandum of understanding (MOU) with Microsoft Corporation to collaborate on green transformation (GX), diversity and inclusion (D&I) and artificial intelligence (AI) Research. With regard to GX, Microsoft will help drive UTokyo's efforts toward net zero greenhouse gas emissions with its technologies and support the development of human resources who understand the essence of GX and lead activities toward the realization of GX.

## Communication with UTokyo Members

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### Soliciting opinions for UTokyo CA

Preceding the publication of the first UTokyo CA in October 2022, opinions were solicited from UTokyo faculty, staff, and students over the period from early September to early October the same year, and 22 opinions were received. The opinions were raised especially on visualization and publication of UTokyo's emissions, raising awareness of and enlightening university members, promotion of initiatives unique to a research university, information communication, and other aspects were used to inform future policies for UTokyo CA.

### Rank-based training programs and dialogue with the President

A dialogue with the President is held every year as part of the rank-based training of UTokyo staff members, selecting a theme from the UTokyo Compass. The theme for fiscal 2023 will be green transformation. To raise awareness on an ongoing basis, programs targeted at all staff members may also be introduced utilizing e-learning and other means.

## Information Communication to Society

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### Establishing a logo for GX

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.



Figure 17 UTokyo Green Transformation logo



UTokyo  
Green  
Transformation