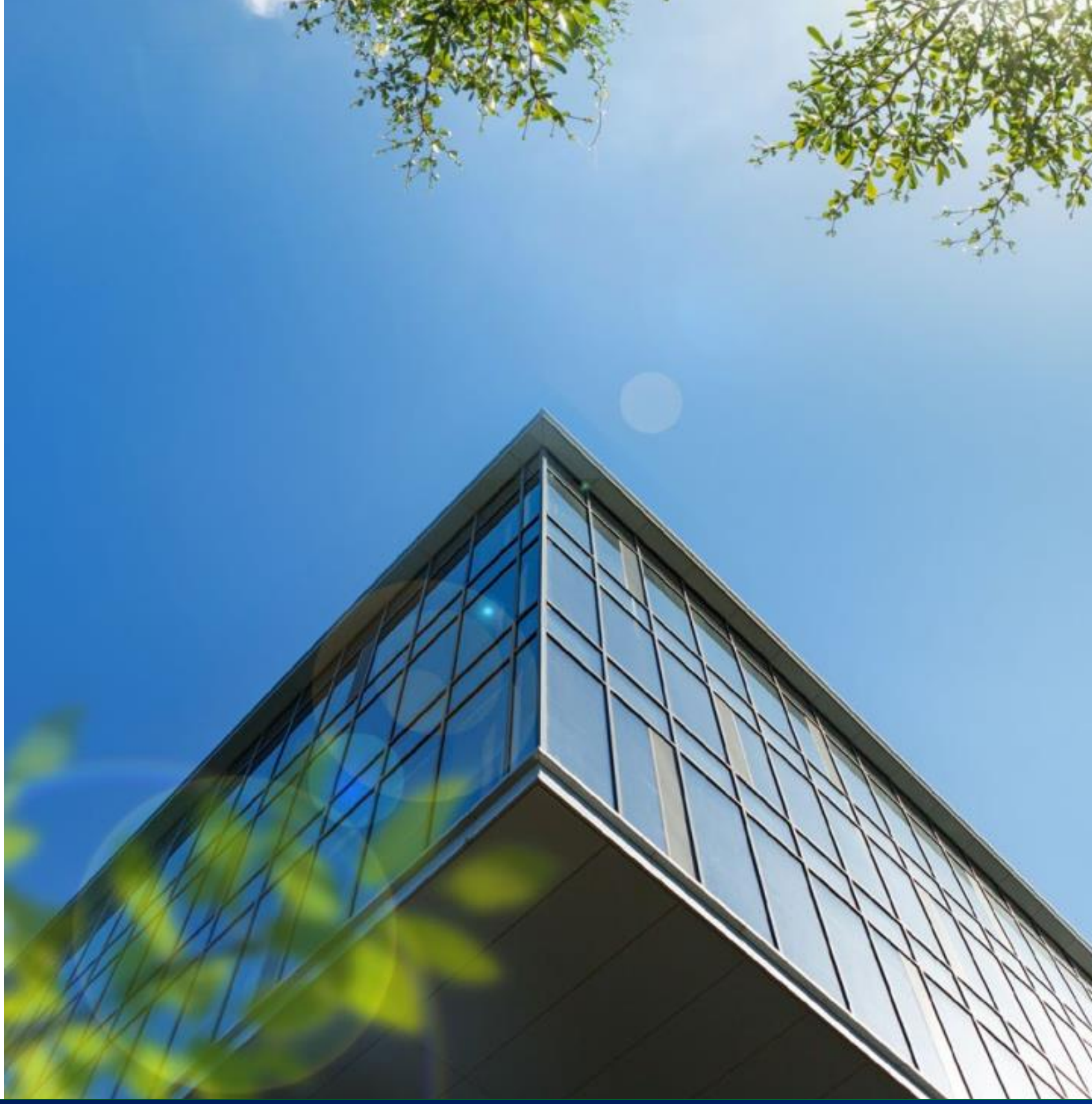

Tsinghua University School of Economics and Management

Carbon Footprint Accounting Report (2024)

SEM TSINGHUA UNIVERSITY 清华经管学院

清华大学经济管理学院

School of Economics and Management, Tsinghua University

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Preface

Climate change stands as one of the most pressing challenges confronting humanity in the 21st century. Against this backdrop, the Paris Agreement was adopted in 2016 by 178 signatory parties, establishing the long-term objective of holding the global temperature rise to well below 2℃ above pre-industrial levels while pursuing efforts to limit the increase to 1.5℃.

China's responses to climate change are an important part of its efforts to achieve eco-environmental progress and high-quality development. Addressing climate change serves as a key domain for engaging in global governance and upholding multilateralism. At the general debate of the 75th Session of the United Nations General Assembly on September 22, 2020, President Xi Jinping announced that China would scale up its Nationally Determined Contributions (NDCs) by adopting more vigorous policies and measures, strive to peak CO_2 emissions before 2030, and achieve carbon neutrality before 2060. The dual carbon goals of peaking emissions and achieving carbon neutrality represent China's strategic response to pressing resource and environmental challenges, as well as its solemn commitment to fostering a shared future for humanity.

In alignment with national "dual carbon" objectives and its social responsibilities, Tsinghua University School of Economics and Management (Tsinghua SEM) launched an annual carbon footprint assessment and reporting initiative in 2023. This systematic effort aims to quantify institutional emissions, formalize carbon neutrality commitments, and chart a science-based decarbonization pathway. Through this report, Tsinghua SEM seeks to comprehensively assess its greenhouse gas (GHG) emission profile, identify opportunities for low-carbon transformation, and operationalize its institutional net-zero emissions target by 2035.

I. Net-Zero Goals and Pathways

1. School Profile

Founded in 1984, Tsinghua SEM has a mission "to advance knowledge and cultivate leaders for China and the world"; aspires "to be a world-class school of economics and management"; and holds "integrity, dedication and respect" as its core values. For over 40 years, Tsinghua SEM has led the nation in talent training, scientific research, social influence and international exchange, and strove to become a world-class school of economics and management.

Tsinghua SEM has seven departments: Accounting; Economics; Finance; Innovation, Entrepreneurship and Strategy; Leadership and Organization Management; Management Science and Engineering; and Marketing. Together, these cover four first-level disciplines of theoretical economics, applied economics, business administration, and management science and engineering. It also houses the Secretariat of the China National MBA Education Supervisory Committee.

2. Background and Goal Setting

Climate change has become a serious global challenge. In response to climate change, the international community has committed through multilateral agreements like the Paris Agreement to limit global temperature rise to well below 2℃ while pursuing efforts to cap it at 1.5℃ above pre-industrial levels. Countries have formulated and implemented carbon emission reduction policies to promote economic and social transformation towards low-carbon sustainable development.

The Chinese Government attaches great importance to the issue of climate change, actively participates in global climate governance and has put forward the "dual carbon" goal, i.e., striving to have CO_2 emissions peak before 2030 and achieve carbon neutrality before 2060. This commitment not only reflects China's highly responsible attitude towards global environmental protection, but also points out the direction for China's sustainable economic and social development. In order to achieve this goal, the

Chinese Government has formulated a series of domestic dual-carbon policies, including strengthening the adjustment of the energy structure, promoting clean energy, improving the efficiency of energy utilization, developing a circular economy, and strengthening ecological protection and restoration.

Tsinghua University has taken the initiative to take on the role, and achieved a number of advanced level innovations in a number of carbon neutral core research areas, such as zero-carbon power generation and power, new electric power system, zero-carbon transportation, zero-carbon buildings, etc. In January 2024, Tsinghua University set up the Campus Carbon Neutral Planning Working Group to comprehensively push forward the construction of the campus carbon peaking and carbon neutrality. In October 2024, the 2024 Global Carbon Neutrality Annual Progress Report, co-authored by Tsinghua University's Institute for Carbon Neutrality and other institutions, was released, providing comprehensive, systematic, and objective information to advance global carbon neutrality transitions. In December 2024, the Carbon Dioxide Emissions Report 2024 for Emerging Economies, co-authored by Tsinghua University's Institute for Carbon Neutrality and other institutions, was published, revealing the spatiotemporal heterogeneity characteristics of energy consumption in emerging economies and their impacts on global carbon emissions.

Tsinghua SEM, as a leading institution of economics and management in China, has conducted in-depth research and analysis on climate change issues, international carbon emission policies, China's dual-carbon commitment and domestic dual-carbon policies. The school believes that achieving carbon neutrality is an important way to address climate change, fulfill social responsibility and promote sustainable economic and social development.

In response to the national goal of achieving carbon peak by 2030 and carbon neutrality by 2060, in conjunction with the requirements of the campus carbon neutrality plan of Tsinghua University, taking into full consideration of the current situation of Tsinghua

SEM's energy consumption and carbon emissions, the future development plan of the college, and the analysis of the technological and economic feasibility, Tsinghua SEM has established 2035 as its net-zero target year. That is, **Tsinghua SEM will strive to achieve carbon neutrality by 2035**.

3. Pathway and Implementation Plan

Tsinghua SEM will implement a multidimensional strategy encompassing the following priority areas. In terms of energy use, the school will vigorously promote the use of clean energy and gradually replace traditional fossil energy. At the same time, the school will strengthen energy management, improve energy efficiency and reduce energy waste through intelligent and refined energy management systems.

In addition to energy use, Tsinghua SEM will adopt low-carbon measures in the areas of office and travel. The school will advocate green office, promote electronic office and meetings, and reduce the use of paper documents. In addition, the school will encourage students, faculty and staff to adopt low-carbon travel methods, such as cycling, walking or using public transportation, and reduce the use of private cars, thereby reducing carbon emissions.

At the same time, Tsinghua SEM will actively participate in the research, formulation and implementation of international and domestic carbon emission policies, contribute Chinese wisdom to global climate governance, and provide scientific basis and intellectual support for governmental decision-making. The school will strengthen partnerships with international institutions to jointly promote the development and application of low-carbon technologies. The school will also strengthen cooperation and communication with all sectors of the society, and jointly promote the implementation of dual-carbon policies in various fields of the society.

In conclusion, based on its in-depth study of climate change issues and active response

to international and domestic carbon emission policies, Tsinghua SEM, is actively taking action to realize the goal of carbon neutrality. The school will continue refining best practices through ongoing research to contribute to the building of a shared future for mankind and the realization of green and sustainable development.

II. Methodology

1. Measurement Scope

Carbon footprint refers to the total emissions of CO_2 and other GHGs directly or indirectly generated by individuals, organizations, events or products within a specific period of time, usually measured in terms of carbon dioxide equivalent (CO_2e). It is an important indicator to assess the impact of climate change, reflecting the direct or indirect impact of human activities on the environment.

The carbon footprint of an organization is the total amount of greenhouse gas emissions generated by an institution (e.g., school, business, etc.) during its operations. These emissions may come from the organization's direct energy consumption (e.g., electricity, heat) or from indirect activities, such as employee commuting, supply chain management, etc.

2. Accounting Methodology

The methodology for measuring the carbon footprint is based on activity data and emission factors. Organizational activity data - including energy consumption, transportation mileage, material flows, and waste generation - is systematically compiled prior to analysis. Subsequently, these activity data are multiplied by the corresponding emission factors (GHG emissions per unit of activity data) to calculate the total GHG emissions.

III. 2024 Carbon Footprint Analysis

1. Organizational Boundary

The organizational boundary of this carbon footprint accounting is set in the way of "Operational Control" in accordance with the ISO 14064 standards and with reference to GHG Protocol Corporate Accounting and Reporting Standard. The carbon footprint of Tsinghua SEM in 2024 calculated in this report encompasses emissions from the school's Beijing-based academic facilities, its Shenzhen campus operations and the activities of relevant personnel.

2. Reporting Period

This report covers carbon footprint data for the year 2024, with a specific timeframe of January 1, 2024 to December 31, 2024, and provides a real-time quantitative reference for Tsinghua SEM's future sustainability development.

Tsinghua SEM has clear responsibilities in carbon footprint accounting, with a dedicated accounting team responsible for data collection, calculation and reporting. This report is valid until the report is revised or revoked.

3. Emission Factor Selection

For specific source categories, carbon emissions are usually calculated on the basis of carbon emission factors, such as electricity and heat. The sources of emission factors are usually the official emission factors released by government documents and standards, the authoritative results released by industry experts and professional organizations, research reports and literature. In order to ensure the authority of the carbon footprint measurement results, the emission factors used in this report are all taken from government documents, standards and literature.

4. Greenhouse Gas (GHG) Emissions Calculation

According to GHG Protocol Corporate Accounting and Reporting Standard, GHG emissions will be categorized as Scope 1 (direct emissions), Scope 2 (indirect

emissions), and Scope 3 (other indirect emissions). Scope 1 includes emissions from Tsinghua SEM's fuel combustion and fugitive emission sources. Scope 2 consists of emissions from electricity and purchased heat consumed by Tsinghua SEM. Scope 3 includes emissions from other non-direct sources such as business travel, municipal tap water, solid waste, sewage treatment, paper, bottled water and other indirect emission sources.

(1) Scope 1 (Direct Emissions)

Tsinghua SEM's scope 1 emission sources include fuel-powered vehicles, refrigerant fugitive emissions, cesspool methane emissions, and fire extinguisher emissions. Carbon emissions from fuel-powered buses, refrigerant fugitive emissions, cesspool methane emissions, and fire extinguishers were calculated based on gasoline consumption, refrigerant leakage volume, cesspool treatment capacity, and fire extinguisher usage. The final calculation shows that the Scope 1 emissions of the school in 2024 amounted to 54.37 tons of CO_2, with breakdown data presented in the table below.

Table 1 Tsinghua SEM's Scope 1 Carbon Footprint in 2024

Scope	Emission category	Carbon emissions (tons)	Total carbon emissions (tons)
Scope 1	Gasoline for owned vehicles	2.54	54.37
	Refrigerants	23.26	
	Cesspools	28.56	
	Fire extinguishers	0.01	

(2) Scope 2 (Indirect Emissions)

Tsinghua SEM's scope 2 emissions mainly include carbon emissions generated by purchased electricity and purchased heat. The carbon emissions of purchased electricity are calculated according to the power consumption of Tsinghua SEM's Beijing teaching

and research office and the office outside Beijing (Shenzhen campus). The purchased heat only exists in the teaching and research office space in Beijing, and is supplied centrally by the heating station of Tsinghua University. To ensure the accuracy of the calculation, we collected the consumption of natural gas, electricity for water pumps and municipal tap water of the heating station in 2024. According to the proportion of Tsinghua SEM's building area to Tsinghua University's heating building area, we calculated the carbon emissions of Tsinghua SEM's purchased heat. The final calculation of Scope 2 emissions of Tsinghua SEM in 2024 is 4,839.27 tons of CO_2 . See the table below for the breakdown data.

Table 2 Tsinghua SEM's Scope 2 Carbon Footprint in 2024

Scope	Emission category	Carbon emissions (tons)	Total carbon emissions (tons)
Scope 2	Electricity	3,327.60	4,839.27
	Heat	1,511.67	

(3) Scope 3 (Other Indirect Emissions)

Tsinghua SEM's scope 3 emissions are mainly the carbon emissions generated by business travel, municipal tap water, printing paper and bottled water. The carbon emissions of business travel are calculated by four modes of transportation, namely, plane, train, subway and car, according to the travel records of the faculty and staff of Tsinghua SEM. Carbon emissions from solid waste and sewage treatment are calculated based on the quantities of solid waste and sewage. The carbon emissions of municipal tap water, printing paper and bottled water are calculated according to their consumption in Tsinghua SEM's Beijing teaching and research office and the office outside Beijing (Shenzhen campus). The final calculation of Scope 3 emissions of Tsinghua SEM in 2024 is 2,150.48 tons of CO_2 . See the table below for the breakdown data.

Table 3 Tsinghua SEM's Scope 3 Carbon Footprint in 2024

Scope	Emission category	Carbon emissions (tons)	Total carbon emissions (tons)
Scope 3	Municipal water	4.36	2,150.48
	Solid waste	75.84	
	Sewage treatment	71.37	
	Car travel	173.83	
	Subway	0.10	
	Train travel	8.82	
	Air travel	1,767.93	
	Paper	30.59	
	Bottled water	17.64	

(4) Summary

According to the above calculation results, the total carbon emissions of Tsinghua University School of Economics and Management in 2024 is 7,044.12 tons of CO_2 , of which the emissions of Scope 1 is 54.37 tons of CO_2, Scope 2 is 4,839.27 tons of CO_2, and Scope 3 is 2,150.48 tons of CO_2. Detailed breakdown of data is as follows.

Table 4 Tsinghua SEM's Carbon Footprint in 2024

Scope	Emission category	Carbon emissions (tons)	Total carbon emissions (tons)
Scope 1	Gasoline for owned vehicles	2.54	54.37
	Refrigerants	23.26	
	Cesspools	28.56	
	Fire extinguishers	0.01	
Scope 2	Electricity	3,327.60	4,839.27
	Heat	1,511.67	
Scope 3	Municipal water	4.36	2,150.48

Solid waste	75.84	
Sewage treatment	71.37	
Car travel	173.83	
Subway	0.10	
Train travel	8.82	
Air travel	1,767.93	
Paper	30.59	
Bottled water	17.64	
Total		7,044.12

From the perspective of GHG accounting scope, Tsinghua SEM's carbon footprint in 2024 is mainly composed of Scope 2 (indirect emissions) and Scope 3 (other indirect emissions) carbon emissions, of which Scope 2 carbon emissions account for the highest share of 68.70%, followed by Scope 3 carbon emissions with a share of 30.53%. Scope 1 carbon emissions accounted for the lowest share of 0.77%. See the pie chart below for details.

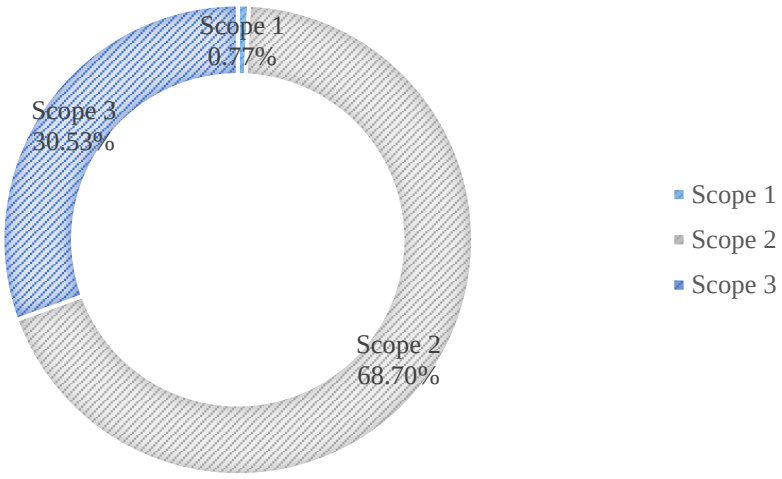

Figure 1 Tsinghua SEM's Carbon Footprint Scale Structure in 2024

From the perspective of emission categories, Tsinghua SEM's carbon footprint in 2024

mainly consists of purchased electricity, air travel and purchased heat, with purchased electricity accounting for the highest share of carbon emissions at 47.24%, air travel accounting for the second highest share of carbon emissions at 25.10%, and purchased heat accounting for the third highest share of carbon emissions at 21.46%, and the above three carbon emissions account for 93.80% of Tsinghua SEM's total carbon emissions. The rest of the consumption categories accounted for about 6% of the total carbon emissions. See pie chart below.

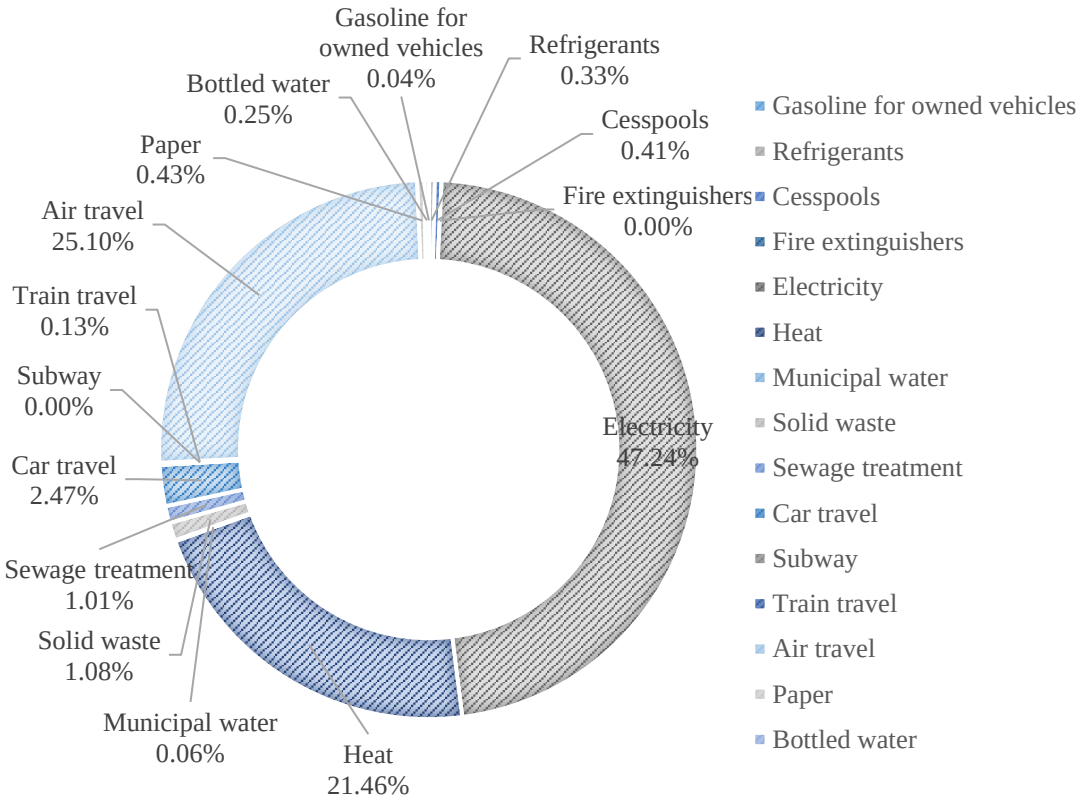

Figure 2 Carbon Footprint Scale Structure in 2024 (Emission category)

5. Data Quality Assurance

This GHG emissions report is in accordance with ISO 14064 and is based on the same principles of relevance, completeness, consistency, transparency and accuracy. Aspects of our data quality management have the following components:

Quality Management Staff: Members of the accounting team are tasked with coordinating smooth interactions among relevant departments and external stakeholders, organizations, and projects.

Quality Management Activities: Operational procedures are formulated. To meet the requirements of precision, data management centers on quality verification activities for both general and specific emissions.

General Quality Verification: Conducting rigorous yet proportionate quality verification for common errors that are prone to oversight and may lead to inaccuracies during data collection and processing, data modeling, and emission quantification.

IV. Carbon Neutrality Initiatives

1. Leveraging Academic Expertise for Innovation

Tsinghua SEM places significant emphasis on the healthy and sustainable development of China's economy, prioritizing climate change-related areas such as carbon neutrality and carbon peaking. The school is committed to leveraging research outcomes to provide insights for social development and guidance on critical issues shaping China's current and future economic landscape. On June 29, 2024, Professor Li Donghong of Tsinghua SEM released the National "East-to-West Data Transfer" Hub Node Green Computing Power Index Research Report at the first China Green Computing Power Conference, co-authored by the Institute for Global Industry at Tsinghua University and the Linger Green Computing Power Development Research Center. This report offers scientific support for the deep integration of the digital economy and energy systems under the "dual carbon" goals. On July 31, 2024, Professor Chen Yubo and his collaborators' paper, Media Coverage of Climate Change and Sustainable Product Consumption: Evidence from the Hybrid Vehicle Market, was awarded the 9th Higher Education Scientific Research Outstanding Achievement Award (Humanities and Social Sciences). By uncovering the mechanisms through which media and social norms influence green consumption, this research proposes an innovative "market-oriented + socialized" pathway for low-carbon development. Moving forward, the school will continue to focus on cutting-edge fields related to carbon neutrality, including new technologies, methodologies, and policies, to provide more scientific and innovative academic support for China's dual carbon strategy.

2. Advancing Public Policy Recommendations

Tsinghua SEM has also been actively organizing and planning academic activities around the goal of "dual-carbon" to provide breakthrough ideas and policy suggestions for the realization of the dual-carbon strategy.

On March 24, 2024, at the China Development Forum 2024 in, Bai Chong-En, dean and Distinguished Professor of Arts, Humanities and Social Sciences at Tsinghua SEM, engaged in a dialogue with Tim Cook, CEO of Apple, on "Green Technology

Innovation and Development Opportunities."

On September 20, 2024, the 2024 Tsinghua University Forum on Carbon Neutral Economy was held at Tsinghua SEM, bringing together representatives from government agencies, major enterprises, and renowned experts in the carbon neutrality field. Participants explored low-carbon transformation pathways and envisioned the future of green development.

On December 3, 2024, the "China Carbon Neutrality Forum", co-organized by Tsinghua SEM, was successfully convened at Tsinghua University. The Forum focused on "New High-Quality Productive Forces Driving Green and Low-Carbon Industrial Transformation".

On December 18, 2024, at the 2024 Zero Carbon Research Institute Green Development Forum hosted by Beijing News, the "Top 10 Green Development Cases of 2024" were unveiled. Co-selected by the China Business Case Center (CBCC) of Tsinghua SEM and the Beijing News Zero Carbon Research Institute, these cases cover six areas: technological innovation, green manufacturing, green finance, energy transition, circular economy, and green consumption. They provide replicable industrial upgrading models for China's corporate low-carbon transformation.

3. Talent Development for Industrial Transition

To meet the strategic needs of green and low-carbon development and address major global sustainable development challenges, Tsinghua SEM, as one of the three key supporting departments, actively participated in the preparation, construction, and talent cultivation of Xiuzhong College, Tsinghua University. In September 2024, Xiuzhong College successfully launched the Global Green Governance Talent Program, aiming to cultivate outstanding professionals with global green governance capabilities to tackle sustainable development challenges and inject new vitality into the future.

In August 2021, Tsinghua SEM released the "China ECO Explorer" program in order to accelerate the formation of a consensus and promote the actions of industries and

enterprises. So far, three sessions of the "China ECO Explorer" program have been inaugurated. Since its initial launch, more than 120 outstanding practitioners of China's ongoing low - carbon revolution and pioneers of green civilization have joined. This has led to the establishment of a new ecosystem for collaborative development across the entire industrial chain, marking a fresh start in the journey towards global green development.

In addition, a number of mandatory and elective courses related to sustainable development such as "Green Finance: Theory and Practice" and "The Cutting-Edge Mode of China's ESG (Environment, Society and Governance)" are offered by Tsinghua SEM's teaching programs, covering a wide range of areas such as environment, resources, ethics, morality, thinking, innovative technologies and entrepreneurship management, law, corporate responsibility, cross-cultural management, etc., which are an important part of Tsinghua SEM's talent training program.

4. Low-Carbon Campus Transformation

Tsinghua SEM is also committed to the sustainable development and environmental protection of campus construction for a long time, and the new buildings fully implement the low-carbon green development concept. Taking the Tsinghua SEM new building as an example, the project took low-carbon, green, smart and healthy as its core goals from the beginning of design, and comprehensively adopted low-carbon energy-saving technologies and measures such as efficient variable frequency chillers, variable frequency air handling units, heat recovery in pre-cooling air units, all fresh air operation in transition season, 100% 1st-Class water-saving sanitary appliances, etc. Due to outstanding performance in the field of sustainable development, as well as excellence in design, construction and other stages, Lihua Building was awarded the Three-Star Certificate of Green Building Design Label in 2021, and LEED Gold Certification in 2022. Lihua Building is currently applying for the Three-Star

Certificate of Green Building Label (Operation Phase).

Tsinghua SEM is also continuing to carry out low-carbon renovation and upgrading of existing buildings. The renovation project of Tsinghua SEM's "Weilun Building" aims at Three-Star Certificate of Green Building Label and LEED Gold certification and implements the concept of low-carbon green development throughout the entire process from design, construction, operation and maintenance. In June 2024, Tsinghua SEM installed approximately 100 m^2 of dimming film on the west-facing glass curtain wall of the Lihua Building Lobby. This film can adjust the transmittance of visible light, ultraviolet (UV), and infrared (IR) radiation via switchable states, addressing issues of temperature rise and glare caused by solar radiation. The installation achieved significant effects in energy conservation, carbon reduction, and enhanced thermal and lighting comfort. In the future, the college will take measures to strengthen the utilization of renewable energy such as solar energy, improve the level of energy saving in buildings, promote the use of energy-saving electrical products, further reduce building energy consumption and carbon emissions, and continuously improve the green and low-carbon building spaces.

5. Promoting Low-Carbon Lifestyles

Tsinghua SEM actively organizes green and low-carbon themed faculty-student events. On November 30, 2024, the Tsinghua SEM Graduate Student Association, in collaboration with sister departments across Tsinghua, hosted a "Handmade Plant Rubbing Canvas Tote Bags" activity, urging young students to raise awareness of environmental issues and shoulder the environmental stewardship of the new era.

Tsinghua SEM's carbon reduction action is also reflected in the teaching, research work and daily activities. We have launched the green campus initiative, implemented energy-saving and emission reduction measures, such as using energy-saving lamps, optimizing the heating and cooling system, implementing paperless office, encouraging

the use of public transportation, etc. We have established and improved the waste separation and recycling system, improved the recycling efficiency, and reduced landfills and incineration. Encourage teachers and students to participate in actions such as saving water and electricity, walking or riding to school, and using reusable tableware.

Through these strategies and measures, we can not only guide our faculty and students to practice low-carbon life, but also promote low-carbon concepts and practices in the broader social and academic fields, and contribute to the building of a sustainable future.

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