Luxuan Sun

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Ph.D. candidate at Process-Energy-Environmental Systems Engineering (PEESE) lab, Cornell University, Ithaca, NY

SUMMARY

I'm a PhD candidate in Systems Engineering, conducting life-cycle environmental assessments of emerging supply chain systems. My research develops Life Cycle Assessment (LCA) models grounded industry data and extended through scenario analysis to characterize emissions hotspots and evaluate feasible decarbonization pathways.

Research Interests: Life Cycle Assessment; Sustainable Supply Chains; Circular Economy; Industrial Ecology

EDUCATION

Ph.D. in Systems Engineering   **Expected: May 2026**

Process-Energy-Environmental Systems Engineering (PEESE) lab, Cornell University, United States

Dissertation: Sustainable Futures in Emerging Electrification-Driven Supply Chains and Mobility Systems

M.S. in Environment and Resources   **Jun 2024**

China-UK Low Carbon College, Shanghai Jiao Tong University, China

Thesis: Environmental Benefits of Recycling Plastics from Waste Electrical and Electronic Equipment (WEEE)

B.S. in Energy Economics (Honors Talent Class)   **Jun 2021**

School of Economics and Business, Chongqing University, China

Thesis: Income Gap and Global Carbon Productivity Inequality: A Meta-frontier Data Envelopment Analysis

SELECTED PUBLICATIONS

- **Sun, L. X.,** Tian X.Y., You F.Q., (2026). Comparative Life Cycle Carbon Footprints of Buy Online Pick Up In-Store Retail. *Transportation Research Part D: Transport and Environment*, 154, 105290. https://doi.org/10.1016/j.trd.2026.105290

- **Sun, L. X.,** Tian X.Y., You F.Q., (2026). Low-Carbon Solutions for Energy-Intensive Live-Streaming Commerce. *Energy* (Accepted).

- **Sun, L. X.,** Dong, H., Dai, Y., Dong, J., Fujii, M., Geng, Y., & Liu, X. (2024). Environmental benefits of recycling plastics from waste electrical & electronic equipment. *Resources, Conservation and Recycling*, 211, 107855. https://doi.org/10.1016/j.resconrec.2024.107855

- **Sun, L. X.,** Wang, M., & Feng, C. (2023). The realistic way to the decoupling of carbon dioxide emissions from economic growth in China's service sector. *Emerging Markets Finance and Trade*, 59(3), 786-799.

- **Sun, L. X.,** Wang, M., Xia, Y. S., & Feng, C. (2022). Measuring the inter-structural low-carbon economic inequalities from perspectives of industrial heterogeneity and scale economy: a case study of China's 29 non-ferrous metal industries. *Technological and Economic Development of Economy*, 28(4), 1022-1043.

- **Sun, L. X.,** Xia, Y. S., & Feng, C. (2021). Income gap and global carbon productivity inequality: A meta-frontier data envelopment analysis. *Sustainable Production and Consumption*, 26, 548-557.

RESEARCH EXPERIENCE

Cornell University   **Aug 2024 - Present**

Graduate Researcher in Sustainable Retail Supply Chain (PI: Prof. Fengqi You)

Study 1: Live-Streaming Commerce (LSC), Journal: Energy

- Built the first cradle-to-grave LCA model of energy-intensive live-streaming commerce (LSC), integrating both technical infrastructure (end-user devices, internet networks, data centers, and logistics) and socioeconomic drivers (consumer viewing and purchasing behavior).

- Quantified how platform design and consumer engagement shift emissions hotspots toward electricity use and identified the main mitigation pathways under different operational and grid conditions.
- Translated results into actionable levers, including digital efficiency, consumer behavior, logistics design, and power sector decarbonization to guide low-carbon strategies for platforms and policymakers through 2050.

Study 2: Buy Online, Pick Up In-Store Retail (BOPIS), Journal: Transportation Research Part D: Transport and Environment
- Developed the first cross-region LCA comparisons of retail fulfillment strategies for Europe (EU-27), the U.S., and the U.K., harmonizing assumptions across distinct energy mixes, travel patterns, and retail operations.
- Quantified how pickup travel, store energy use, and last-mile logistics shape regional emissions, and translated the results into practical levers for retailers, such as pickup program design, store energy management, and delivery consolidation.
- Tested key uncertainties with Monte Carlo simulation and reported region-specific ranges to support robust, policy-relevant conclusions.

Study 3: Vertical Take-Off and Landing Mobility (VTOL, also called flying car)
- Building the first spatially explicit, cradle-to-grave LCA frameworks for VTOL mobility across U.S. states, capturing heterogeneity in grid emissions, travel demand, and infrastructure requirements.
- Coupling IAM-consistent electricity decarbonization pathways with eVTOL demand growth and technology learning to identify when electrified aviation delivers net climate benefits by 2050.

Shanghai Jiao Tong University   **Sep 2021 - Jun 2024**
Graduate Researcher in Circular Economy (PIs: Prof. Yong Geng, Prof. Huijuan Dong)
- Built a forecasting model by integrating LCA with an *LSTM-based Machine Learning* model and scenario analysis to project e-waste generation to 2050 and translate future waste flows into impact-reduction potential.
- Led stakeholder mapping (recyclers, downstream brand owners, industry associations, and consumers) to identify key actors, bottlenecks, and governance constraints in recycled plastic industry.
- Found large performance variation across recycling technologies (13%-77% reduction) and estimating 10.33 Mt CO2eq reduction potential by 2050 under improved pathways.

PROFESSIONAL EXPERIENCE

Beef Systems Intern, *Environmental Defense Fund (EDF), New York, United States*   **June - Aug 2025**
- Conducted field research in Colorado ranches and feedyards and interviewed operators to document real-world practices and decision constraints (feed, manure management, and grazing).
- Integrated qualitative and quantitative evidence by combining mass balance analysis with targeted evidence synthesis to explain drivers of impact differences between grass- and grain-finished systems in the U.S. and derive actionable mitigation levers for stakeholders.

Consulting Assistant, *TÜV Rheinland*, Guangzhou, China   **June - Aug 2023**
- Conducted expert interviews and stakeholder meetings with recyclers, material processors, and downstream brand owners to collect and validate primary supply-chain data, clarify system boundaries, and align allocation choices for recycled plastics.
- Supported the development of a China industry standard for recycled-plastics Product Carbon Footprint (PCF) calculation methodology, aligning with ISO 14067 Standard.

Climate Corps Fellow, *Environmental Defense Fund (EDF), Shanghai, China*   **June - Aug 2022**
- Engaged internal teams and supply-chain stakeholders to gather primary product and process information, supporting a cradle-to-gate PCF for a consumer product with recycled plastics.

- Quantified a 10.2% CO_2eq reduction potential by substituting up to 75.14% of PP/ABS with recycled materials, a performance-feasible share validated through discussions with materials suppliers and product engineers, and integrated their input to interpret feasibility, constraints, and adoption barriers.
- Synthesized qualitative and quantitative evidence into implementation-focused recommendations to scale low-carbon material adoption in product design and procurement.

TEACHING EXPERIENCE

Teaching Training, *Cornell University*   **Sep 2025**

Completed Cornell teaching assistant training on inclusive teaching, discussion facilitation, grading, feedback, and classroom communication.

Undergraduate Thesis Mentor   **Sep 2023 - Jan 2024**

Mentored undergraduate theses on low-carbon economy and inequality, refined research questions, guided literature synthesis, and coached academic writing.

Teaching Assistant, *Carbon Accounting Course*   **Sep 2023 - Dec 2023**

Led an industry collaborative course project with Shanghai Electric Nuclear Power Equipment Co., Ltd., coordinated on-site fieldwork and project logistics.

AWARDS & HONORS

- **University Fellowship,** *Cornell University*   2024
- **Wenzhi New Talent Award** (University distinction, 10 awards), *Shanghai Jiao Tong University*   2023
- **Academic Star Nomination Award** (University's highest academic honor, 20 awards), *Shanghai Jiao Tong University*   2022
- **Outstanding Paper Award** (Top 1%), *Global Alliance of Universities on Climate*   2022

ACADEMIC SERVICE & PUBLIC OUTREACH

Reviewer, *Renewable & Sustainable Energy Reviews*   **Aug 2025 - Present**

Reviewer, *Socio-Economic Planning Sciences*   **Sep 2023 - Present**

Lead Author & Editor, *Climate Change Economics Briefs (academic outreach)*   **Dec 2019 - Present**

- Manage an academic WeChat Official Account translating peer-reviewed research into short briefs on climate economics and policy, oversee content planning and editing, grew audience to 64,349 followers.

PRESENTATIONS & CONFERENCES

Sustainable Futures in Emerging Supply Chains and Mobility Systems (Cornell University), Presenter   2026

Environmental Impact Analysis of the Beef Grass- and Grain-Finishing Systems in the US (EDF), Presenter   2025

Environmental Benefits of Recycling Plastics from E-waste (SJTU), Presenter   2024

Technical Symposium on Plastic Circularity (Recycled Plastic Supply Chain Working Group), Attendee   2023

Environmental Engineering Solid Waste Seminars (National Natural Science Foundation of China), Attendee   2023

Quantifying the Carbon Abatement Potential of Recycled Plastics in Supply Chain (EDF), Presenter   2022

Cross Straits Symposium on Energy and Environmental Science and Technology (SJTU), Attendee   2022

Global Youth Summit on Net-zero Future (Global Alliance of Universities on Climate), Presenter   2021

Sino-American Youth Dialogue (MIT & Tsinghua), Outstanding Paper   2021

Economic and Technological Developments in East Asia and Singapore (NUS), Presenter   2021

SPECIALIZED SKILLS

- **Life Cycle Assessment (LCA):** cradle-to-grave attributional LCA, SimaPro, GaBi, OpenLCA, Python, MATLAB, Ecoinvent database, circular design principles, recycled-content integration
- **Other Quantitative Methods:** Uncertainty Analysis, Sensitivity Analysis, Scenario Analysis, Machine Learning