Tianlan Wei

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Education

University of Maryland 01/2025 – Present

Doctor of Philosophy in Geographical Sciences

Johns Hopkins University 08/2023 – 08/2024

Master of Science in Information Systems

Zhejiang University of Technology 08/2019 – 06/2023

Bachelor of Management in Business Administration

Waterford Institute of Technology 08/2021 – 12/2021

International Exchange Program

Professional & Research Experience

Department of Geographical Sciences, University of Maryland

Research Assistant 01/2025 – Present

Faculty Specialist 09/2024 – 01/2025

- **LNG Breakeven Analysis:** Used GCAM to estimate the methane-leakage thresholds and shipping distances at which U.S. LNG stays cleaner than coal in European and Asian markets.
- **Market Scenario Modeling:** Simulated global LNG market dynamics under high- and low-cost scenarios, projecting demand and trade flows through 2050 to test market resilience.
- **Historical Emission Drivers:** Applied LMDI decomposition to the drivers of LNG imports in South Korea, India and the UK, quantifying historical emission reductions from coal-to-gas switching (SSRN preprint, 2025).
- **Consequential LCA of U.S. LNG Exports:** Ran the GCAM integrated assessment modeling for a multi-institution study of how eliminating U.S. LNG exports would change global greenhouse gas emissions through 2050 (ChemRxiv preprint, 2026).
- **Ongoing Research:** Drafting a paper on the restructuring of global gas trade, using counterfactual analysis to assess how geopolitical supply disruptions change the carbon intensity of global gas consumption.

Graduate School, University of Maryland

ASCEND Fellow, Graduate Consulting Project 09/2026 – Present

- **Inaugural Cohort:** Member of the first cohort of ASCEND Fellows (Advancing Solutions for Challenges at the Nexus of Food, Water, Energy, Climate Change & Health), one of UMD's Grand

Challenges Graduate Communities, which pairs interdisciplinary graduate teams with external partners on real-world problems.

- **Research Design:** Advising an external partner on rural community resilience in a team of three fellows; co-developed the study design: how employment and the working-age population change after a plant closure in a rural county, whether existing vulnerability and resilience indices anticipate which counties recover, and what information they miss.
- **Closure Register & Event Study:** Built a reproducible data pipeline (BLS QCEW, Census population estimates and Business Dynamics Statistics) and a register of plant closures and mass layoffs in rural counties from state WARN notices, 2010–2022; set up a matched difference-in-differences event study with pre-trend checks against comparable counties without a closure.
- **Index Evaluation & New Data:** Testing how well the CDC Social Vulnerability Index and two other resilience indices rank counties by later outcomes (hit rate, precision, AUC), identifying over- and under-performing counties from elastic-net and explainable boosting residuals, and piloting language-model extraction of unrecorded closures from local news, validated against Census establishment data.

Center for Global Sustainability, University of Maryland

Research Assistant 06/2025 – 08/2025

- **Decarbonization Modeling (GCAM):** Used GCAM to simulate global steel-industry transition pathways under net-zero scenarios, explicitly modeling the deployment of hydrogen-based DRI and electric arc furnace (EAF) technologies.
- **Circular Economy Integration:** Integrated material flow analysis (MFA) to quantify the potential of scrap recycling, assessing how far secondary production can close the gap between rising steel demand and carbon constraints.
- **Pathway Analysis:** Evaluated trade-offs between primary and secondary steel production, identifying how circular-economy policies and capacity turnover rates shape the sector's long-term emission trajectory.

School of Public Policy and Management, Tsinghua University

Research Assistant 03/2024 – 09/2024

- **Database Design:** Designed and implemented the SQL database for a sociological study of environmental practices in catering businesses, including indexes, key fields and entity-relationship diagrams; imported and managed about 35,000 records.
- **Data Cleaning & Analysis:** Wrote automation scripts to remove duplicates, flag suspicious records and handle outliers, and built Tableau visualizations for a preliminary analysis of the link between consumer behavior and corporate environmental policies.

Publications

Wei, T., Sun, L., Sun, J., Vo, S., & Cui, R. Y. (2026). Clean electricity for AI data centers concentrates critical-mineral supply-chain stress. Under review.

Ravikumar, A. P., Sun, L., Chen, Q., Ma, H., **Wei, T.**, Roman-White, S., Long, W., Masnadi, M. S., Balcombe, P., Heath, G., Feng, K., & George, F. (2026). Consequential life cycle assessment impacts of U.S. liquefied natural gas (LNG) exports. *ChemRxiv* preprint.

https://doi.org/10.26434/chemrxiv.15012301/v1

Sun, L., Feng, K., **Wei, T.**, Wang, J., & George, F. (2025). Rethinking LNG in a volatile world: Emissions and strategic lessons from U.S. exports to South Korea, India, and the UK. *SSRN* preprint. https://doi.org/10.2139/ssrn.5398430

Shen, J., **Wei, T.**, & Cao, C. (2024). Stable discrete segmented reverse diffusion model for solving class imbalance in malicious websites detection. In *Proceedings of the IEEE 36th International Conference on Tools with Artificial Intelligence (ICTAI)* (pp. 556–563). https://doi.org/10.1109/ICTAI62512.2024.00084

Cao, C.*, **Wei, T.***, Xu, S., Su, F., & Fang, H. (2023). Comprehensive evaluation of higher education systems using indicators: PCA and EWM methods. *Humanities and Social Sciences Communications, 10*, 432. https://doi.org/10.1057/s41599-023-01938-x (*Co-first authors)

Wei, T., Cao, C., & Shi, Y. (2022). Personal information protection behaviors of consumers in different country context and user interface designs. In *Proceedings of the 24th International Conference on Human-Computer Interaction (HCII), Cross-Cultural Design* (pp. 82–98). Springer. https://doi.org/10.1007/978-3-031-06050-2_7

Ding, X., **Wei, T.**, & Cao, C. (2022). Towards a four-dimensional dynamic trust model in B2C cross-border e-commerce. In *Proceedings of the 2022 13th International Conference on E-Education, E-Business, E-Management and E-Learning (IC4E)* (pp. 414–418). ACM. https://doi.org/10.1145/3514262.3514299

Ding, X., Lou, L., Xie, S., **Wei, T.**, & Cao, C. (2021). Research on the pattern of “dual circulation” development in Zhejiang Province under regional integration: Taking digital economy as an example. In *Proceedings of the 2021 Fall Conference of the Korea Society of Management Information Systems (KMIS)* (pp. 300–301). https://www.earticle.net/Article/A402839

Presentations

Clean electricity for AI data centers concentrates critical-mineral supply-chain stress. Poster, *AGU Annual Meeting 2026*, Session GC33F, December 2026.

Personal information protection behaviors of consumers in different country context and user interface designs. Talk, *HCI International 2022* (virtual), session “Kansei Issues in Cross-Cultural Design III,” June–July 2022.

Internship Experience

Kuaishou Technology: E-commerce Data Operations 03/2023 – 07/2023

- **Industry Data Support:** Used SQL to analyze on-platform consumer behavior in consumer electronics across search, recommendation and store-page scenarios, and turned recurring analyses into reusable evaluation methods for similar business scenarios.
- **Specialized Business Analysis:** While preparing the E-commerce Mall project, analyzed category trends, brand features and user behavior across devices using on- and off-platform classifications, and delivered visual reports that guided new business-model exploration.

Capgemini: IT Consulting Assistant – Product Owner 11/2022 – 02/2023

- Worked on the agile development and optimization of the My BMW and MINI user apps for BMW.
- **Requirements Analysis:** Consolidated customer software requirements on user experience into implementable solutions and product prototypes.
- **Feature Design:** Planned features and wrote summaries and manuals for new software versions; designed in-app data points and wrote programming requirements for iterative development with the engineering team.
- **Project Management:** Helped the scrum master run the agile process: tracked progress in Jira and Confluence, estimated workloads, and broke down and assigned tasks.

Mercer: Consulting Assistant 02/2022 – 08/2022

- **Industry Research:** Collected and analyzed data on the power, chemicals, home décor and new-media industries to brief clients on industry conditions and pay levels; compiled recent HR management research and drafted SOPs for client relationship maintenance.
- **Job Grading:** Analyzed a client's job hierarchy and salary data and mapped its HR management system using Mercer's Global Position Evaluation methodology.

Project Experience

Clean Electricity for AI Data Centers Concentrates Critical-Mineral Supply-Chain Stress 04/2026 – Present

- **First-author manuscript under review; poster at the AGU Annual Meeting 2026 (Session GC33F, December 2026)**
- **Integrated Modeling Framework:** Designed and coded a framework coupling the GCAM v8.2 integrated assessment model with bottom-up material flow analysis across a 2 × 3 matrix of data center demand and carbon-price scenarios (U.S., China, Europe), isolating the marginal power-system expansion, CO_2 emissions and material requirements of data center growth through 2050.
- **Supply-Stress Indices:** Quantified 19 materials across generation, grid-connection and 24/7 carbon-free storage layers with Monte Carlo uncertainty (N = 1,000); developed expansion-absorption and residual-supply indices that test the post-2025 increment against historical-pace, announced-pipeline and maximum-expansion supply trajectories net of background demand.
- **Attribution & Procurement Levers:** Applied Shapley decomposition to separate climate-policy from data center demand effects, quantified the AI share of the exposure, and evaluated eight technology-substitution scenarios plus an integrated material-aware procurement package (constrained CdTe, silver thrifting, rare-earth-lean wind, LFP storage, renewable-adjacent siting).

Research on the Pattern of Dual-Circulation Development in Zhejiang Province under Regional Integration: Taking the Digital Economy as an Example 05/2021 – 05/2022

- **National College Students' Innovation and Entrepreneurship Training Program**
- Developed four theoretical models for different research questions, ran experiments and surveys in several countries, and analyzed the data with partial least squares structural equation modeling (PLS-SEM).
- Examined how enterprises are moving into the digital economy under China's dual-circulation strategy, and analyzed what the digital economy covers and how it develops.
- Analyzed the relationship between the Regional Comprehensive Economic Partnership (RCEP)

and the digital economy, and how RCEP is changing the Asia-Pacific region.

- Proposed a dynamic consumer-trust model built on public opinion, consumers, companies and third-party organizations, and studied trust management and privacy disclosure in cross-border e-commerce.

Honors & Awards

- Beta Gamma Sigma – Lifetime Member (Johns Hopkins Carey Business School, 2024)
- Interdisciplinary Contest in Modeling (ICM), COMAP – Meritorious Winner (2022)
- Interdisciplinary Contest in Modeling (ICM), COMAP – Honorable Mention (2021)

Skills

- **Modeling & Methods:** Integrated assessment modeling (GCAM), material flow analysis, LMDI and Shapley decomposition, scenario and counterfactual analysis, Monte Carlo simulation, PLS-SEM, machine learning (elastic net, gradient boosting)
- **Programming & Tools:** R, Python, SQL, Tableau, Jira, Confluence