Shi Chen 陈诗

Postdoc Fellow in Climate and Energy, Carnegie Institution for Science schen10@carnegiescience.edu

Summary

Confronting the pressing challenges of climate change and the ambitious goal of achieving net-zero emissions, my research is dedicated to developing solutions that navigate the complexities of transitioning to a net-zero emissions future. Adopting a spatial-temporal approach, I leverage extensive databases to gain insights into the spatial variations and temporal dynamics critical to this endeavour. My study encompasses a comprehensive integration of technical, economic, variability, and environmental considerations, employing a multidisciplinary strategy to address these multifaceted challenges.

My scientific contributions have been published in journals such as PNAS, Joule, One Earth, and Communications Earth& Environment, among others. The papers published in PNAS and Joule were recommended as front-cover papers in their respective issues, and the publications have received commendation from renowned scientists from Finland, Japan, and Sweden in accompanying commentary articles published in PNAS and Joule. And I have successfully applied my expertise in the solar industry, working with prominent companies such as LONGi in China and Startimes in Africa.

Education

SEP 2017 - JUN 2021

Ph.D. in Environmental Engineering

School of Environment, Tsinghua University, China

Dissertation: *Research on the potential of the solar photovoltaic power system and its two-way interaction mechanism with the environmental system*

Graduate with honors

SEP 2013 - JUN 2017

B.S. in Environmental Science

School of Environmental Science and Engineering, Nankai University, China

GPA: 92.3/100 (Ranking: 1/30), Summa Cum Laude, Dissertation Award

MAR 2015 - JUN 2017

B.B.A. in Business Administration

College of Management and Economy, Tianjin University, China

Double major

Research Experience

JAN 2024 - PRESENT

Postdoctoral Research Fellow

Carnegie Institution for Science, Stanford, the United States of America

PI: Profs. Ken Caldeira and Steven J. Davis

JUL 2021 - DEC 2023

Postdoctoral Research Fellow

School of Environment, Tsinghua University, China

PI: Prof. Jiming Hao

FEB 2023 - MAY 2023

Guest Research Assistant

International Institute for Applied Systems Analysis, Austria

Working with Dr. Fabian Wagner and Mr. Zbigniew Klimont

SEP 2019 - SEP 2020

Research Fellow

John A. Paulson School of Engineering and Applied Sciences, Harvard University, the United States of America

PI: Prof. Michael B. McElroy

Grants

2024-2027 **Princeton University**
High Meadows Environmental Fellowship, USD 251,000
Supporting research and teaching at Princeton (Withdrawn)

2023-2025 **National Science Fund of China (72204132)**
Yong scholars Program, CNY 300,000
Developing Mechanisms and Policies for the Optimal Utilization of Land Resources in Solar Photovoltaic Power Generation to Align with China's Carbon Neutrality Targets

2021-2023 **China Postdoctoral Science Foundation (BX2021148)**
Postdoctoral Innovative Talents Support Program, CNY 230,000
Research on photovoltaic development strategy with ecological priority of China

Publications

Peer-reviewed Journal Articles # Co-first author(s), * Corresponding author(s)

1. **Shi Chen**, Xi Lu*, Chris Nielsen, Michael McElroy*, Gang He, Shaohui Zhang, Kebin He, Xiu Yang, Fang Zhang, and Jiming Hao.
Deploying PV first in carbon-intensive regions brings gigatons more carbon mitigations to 2060.
Communications Earth& Environment (2023), https://doi.org/10.1038/s43247-023-01006-x.

2. **Shi Chen**, Youxuan Xiao, Chongyu Zhang, Xi Lu*, Kebin He, and Jiming Hao.
Cost dynamics of onshore wind energy in the context of China's carbon neutrality target.
Environmental Science and Ecotechnology (2023), https://doi.org/10.1016/j.ese.2023.100323.

3. **Shi Chen**, Xi Lu*, Chris P. Nielsen, Guannan Geng, Kebin He, Michael B. McElroy*, Shuxiao Wang, and Jiming Hao.
Improved Air Quality in China can Enhance Solar Power Performance and accelerate Carbon Neutrality.
One Earth (2022), https://doi.org/10.1016/j.oneear.2022.04.002.

   Commentary article by Haoran Zhang and Jinyue Yan:
   Co-benefits of renewable energy development: A brighter sky brings greater renewable power.
   Joule (2022), https://doi.org/10.1016/j.joule.2022.05.017.

4. Xi Lu#*, **Shi Chen**#, Chris P. Nielsen, Chongyu Zhang, Jiacong Li, He Xu, Ye Wu, Shuxiao Wang, Feng Song, Chu Wei, Kebin He, Michael B. McElroy*, and Jiming Hao.
Combined Solar Power and Storage as Cost-competitive and Grid-compatible supply for China's Future Carbon-neutral Electricity System. (**Front cover**)
the Proceedings of the National Academy of Sciences (PNAS) (2021), https://doi.org/10.1073/pnas.2103471118.

   Commentary article by Christian Breyer:
   Low-cost solar power enables a sustainable energy industry system.
   PNAS (2021), https://doi.org/10.1073/pnas.2116940118.

5. **Shi Chen**#, Xi Lu#*, Yufei Miao, Yu Deng, Chris P. Nielsen, Noah Elbot, Yuanchen Wang, Kathryn G. Logan, Michael B. McElroy*, and Jiming Hao.
The Potential of Photovoltaics to Power the Belt and Road Initiative. (**Front cover**)
Joule (2019), https://doi.org/10.1016/j.joule.2019.06.006.

6. Da Zhang, Ziheng Zhu, **Shi Chen**, Chongyu Zhang, Xi Lu*, Xiliang Zhang, Xiaoye Zhang, Michael R Davidson*. Spatially resolved land and grid model of carbon neutrality in China. **the Proceedings of the National Academy of Sciences (PNAS)** (2024), https://doi.org/10.1073/pnas.2306517121.

7. Zihua Yin, Xi Lu*, **Shi Chen**, Jiaxing Wang, Jie Wang, Johannes Urpelainen, Rachael Marie Fleming, Ye Wu, and Kebin He. Implication of electrification and power decarbonization in low-carbon transition pathways for China, the U.S. and the EU. **Renewable and Sustainable Energy Reviews** (2023), https://doi.org/10.1016/j.rser.2023.113493.

8. Mai Shi, Xi Lu*, Haiyang Jiang, Qing Mu, **Shi Chen**, Rachael Marie Fleming, Ning Zhang, Ye Wu, and Aoife M. Foley. Opportunity of rooftop solar photovoltaic as a cost-effective and environment-friendly power source in megacities. **iScience** (2022), https://doi.org/10.1016/j.isci.2022.104890.

9. Shaojie Song, Haiyang Lin, Peter Sherman, Xi Yang, **Shi Chen**, Xi Lu, Tianguang Lu, Xinyu Chen, and Michael B. McElroy*. Decarbonization of the Indian Economy: 2050 Prospects for Wind, Solar, and Green Hydrogen. **iScience** (2022), https://doi.org/10.1016/j.isci.2022.104399.

10. Guang Shi, Xi Lu*, Hongxia Zhang, Haotian Zheng, Zhonghua Zhang, **Shi Chen**, Jia Xing, and Shuxiao Wang. Air Pollutant Emissions Induced by Rural-to-Urban Migration During China's Urbanization (2005–2015). **Environmental Science and Ecotechnology** (2022), https://doi.org/10.1016/j.ese.2022.100166.

11. Chongyu Zhang, Xi Lu*, Guo Ren, **Shi Chen**, Chengyu Hu, Zhaoyang Kong, Ning Zhang, and Aoife M. Foley*. Optimal Allocation of Onshore Wind Power in China Based on Cluster Analysis. **Applied Energy** (2021), https://doi.org/10.1016/j.apenergy.2021.116482.

12. Tianguang Lu, Peter Sherman, Xinyu Chen*, **Shi Chen**, Xi Lu, and Michael B. McElroy*. India's Potential for Integrating Solar and On- and Offshore Wind Power into its Energy System. **Nature Communications** (2020), https://doi.org/10.1038/s41467-020-18318-7.

13. Zilin Wang, Xi Lu*, Minghao Zhuang, Chongyu Zhang, and **Shi Chen**. Spatial Optimization of Wind-PV Hybrid Energy Systems for the Three-North Region in China. **Journal of Global Energy Interconnection** (2020), https://doi.org/10.19705/j.cnki.issn2096-5125.2020.01.011.

14. Kong, Zhaoyang, Xi Lu*, Qingzhe Jiang, Xiucheng Dong, Guixian Liu, Noah Elbot, Zhonghua Zhang, and **Shi Chen**. Assessment of Import Risks for Natural Gas and Its Implication for Optimal Importing Strategies: A Case Study of China. **Energy Policy** (2019), https://doi.org/10.1016/j.enpol.2018.11.041.

Book Chapters # Co-first author(s), * Corresponding author(s)

15. **Shi Chen***, Chongyu Zhang, Xi Lu. Energy Conversion from Fossil Fuel to Renewable Energy. In: Hajime Akimoto, Hiroshi Tanimoto (eds) Handbook of Air Quality and Climate Change. Handbook of Air Quality and Climate Change. Springer, Singapore (2023). ISBN 978-9-811-52759-3.

16. Zhaoyang Kong, **Shi Chen**, Xi Lu*. Chapter 2- Greenhouse gas mitigation of renewable energy in China. In: Xiaojun Qian, Jian Zhou (eds) Green and Low-Carbon Transformation and Mechanism Innovation under New Concepts. Tsinghua University Press, China (2021). ISBN 978-7-302-57257-2.

Journal Articles submitted # Co-first author(s), * Corresponding author(s)

17. **Shi Chen***, Xi Lu, Jiming Hao, Edgar Virguez, Ken Caldeira, and Steven J. Davis*. High land costs favor fixed-tilt solar power. Submitted to **Nature Energy**.

18. **Shi Chen*#**, Yuhan Wang#, Xi Lu*, Kebin He, and Jiming Hao. Global disparity in synergy of solar power and vegetation growth. Submitted to **Nature communications**.

Awards & Honors

JAN 2024	Princeton University High Meadows Environmental Institute (HMEI) Environmental Fellowship
FEB 2023	MIT Technology Review TR 35 Innovators under 35, China
JUN 2021	Recipient of the Postdoctoral Innovation Talents Support Program an exclusive selection awarded to 400 postdoctoral researchers across all disciplines in China

JUL 2021	Shuimu Tsinghua Scholars Award conferred upon 200 postdoctoral researchers representing diverse disciplines at Tsinghua University
MAY 2021	Innovation Award, Environmental Defense Fund only 2 individuals in China received this award
JUN 2021	Excellent Graduate of School of Environment, Tsinghua University
Dec 2020	Merit Scholarship, Tsinghua University
SEP 2019	Chinese Government Scholarship for Overseas Study
SEP 2017	Future Scholar Award, Tsinghua University preceding scholarship based on admission assessment rankings: 2 Recipients annually, consecutively awarded for 5 Years
JUN 2017	Excellent Graduate, Nankai University
SEP 2014- SEP 2016	National Scholarships, Ministry of Education Recipient for Three Consecutive Years

Invited Talk

April 2024	Engineering Special Seminar, Westlake University, Hangzhou, China (remote)
April 2024	Sustainability Data Science Conference, Stanford University, United States
March 2024	Department of Global Ecology (DGE) lunch chat, Carnegie Science, United States
Dec 2023	The 2nd International Excellent Young Scholars Environment Forum, Beijing, China
AUG 2023	The 1st Beijing Interdisciplinary Conference, Beijing, China Best Oral Presenter
JUL 2023	The 1st China Environmental Science Youth Forum, Guangzhou, China
NOV 2022	Yong Scholars Salon- Tsinghua Youth Climate Week, Beijing, China
NOV 2022	The 1st National Environmental Postdoctoral Forum, Beijing, China Best Oral Presenter
DEC 2021	The 1st Guangdong-Hong Kong-Macao Greater Bay Area Environmental and Ecological Young Crops International Forum, Guangzhou, China
NOV 2020	The 11th China Energy Scientists Forum, Jiaozhou, China

Teaching Experience

SEP 2018 - PRESENT

Guest Lecturer

Taught Solar power energy basis and climate mitigation strategies

- China Agricultural University, Postgraduate course: Introduction to Energy Crops
- Peking University, Postgraduate course: Energy Utilization and Sustainable Development
- Tsinghua University, Undergrade course: Sustainable Society: Energy, Environment and Behaviour

SEP 2017 - FEB 2018

SEP 2018 - FEB 2019

Teaching Assistant

School of Environment, Tsinghua University

Course: Sustainable Society: Energy, Environment and Behaviour (in English and collaborative course with University of Washington)

- Collaborated with instructors from Tsinghua University and the University of Washington to develop complementary coursework
- Facilitated effective communication among students to ensure the successful completion of assignments
- Organized a two-week field trip for the University of Washington to Beijing, which included arranging energy field visits, lectures, collaborative research projects, cultural experiences, and campus visits.

JUL 2018- SEP 2018

Executive committee chairperson

International Summer School, School of Environment

- Orchestrated the study and visit schedules for over 110 students hailing from nearly 40 different countries during their time at Tsinghua University
- Supervised a Teaching Assistant team comprising more than 10 graduate students

JUL 2018- SEP 2018

JUL 2019- SEP 2019

Teaching Assistant

Experiencing China International Summer School —Environmental Track （2018 2019）

- Assisted ~30 students from ~20 different countries in their learning journey and provided them with an immersive experience of China
- Coordinated and organized ~10 field visits, facilitated ~10 lectures, and guided students in completing group reports

Academic service

AUG 2023 - Youth editorial board member for Clean Energy Science and Technology

FEB 2022 – OCT 2022 Executive Secretary and Working Group Member for the China Carbon Neutrality and Clean Air Synergy Path Report 2022, organized by the China Clean Air Policy Partnership (CCAPP)

MAR 2022 – JUN 2023 Executive Secretary of the Wind and Solar Development Report for China, led by the Institute for Carbon Neutrality at Tsinghua University

DEC 2021- PRESENT Reviewer for Energy Strategy Reviews, Energies, the National Environmental Conference for Doctoral Students, China

Industry Experience

JUL 2021- SEP 2021

Climate Corps fellow of Environmental Defense Fund (EDF)

LONGi Green Energy Technology Co., Ltd., Xi'an, China

- Supporting the company to develop a greenhouse gas emissions and mitigation analysis model to align with the Science-Based Targets Initiative (SBTi)
- The analysis results derived from the model were adopted by the company, written into the first white book of the company 2021 Climate Actions of LONGi, disclosed to the public and approved to align with 1.5 degree climate target.

AUG 2019 - SEP 2019

Marketing Intern

StarTimes Cooperation, Nairobi and Kisumu, Kenya

- Analysing the investment return of household solar power kits and financial risks
- In charge of optimizing the marketing process of photovoltaic products for African households of Nairobi and Kisumu

References

Prof. Ken Caldeira
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Prof. Steven J. Davis
University of California, Irvine
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Prof. Michael B. McElroy
Harvard University
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Dr. Fabian Wagner
International Institute for Applied Science Analysis
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Prof. Jiming Hao
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Mr. Chris P. Nielsen
Harvard University
nielsen2@fas.harvard.edu