

Towards a sustainable and circular metals economy: the case of copper in China

Dong, D.

Citation

Dong, D. (2021, June 16). *Towards a sustainable and circular metals economy: the case of copper in China*. Retrieved from https://hdl.handle.net/1887/3188567

Version:	Publisher's Version
License:	<u>Licence agreement concerning inclusion of doctoral thesis in the</u> <u>Institutional Repository of the University of Leiden</u>
Downloaded from:	https://hdl.handle.net/1887/3188567

Note: To cite this publication please use the final published version (if applicable).

Cover Page



Universiteit Leiden



The handle <u>https://hdl.handle.net/1887/3188567</u> holds various files of this Leiden University dissertation.

Author: Dong, D. Title: Towards a sustainable and circular metals economy: the case of copper in China Issue Date: 2021-06-16

Acknowledgements

Throughout the writing of this thesis I have received a great deal of support and assistance.

First and foremost, I wish to express my deep gratitude and appreciation to my promotores Dr. Ester van der Voet and Prof. dr. Arnold Tukker for their professional and valuable guidance, support and encouragement of my PhD study and personal development. Dr. Ester van der Voet drew my attention to material flow analysis and life cycle assessment and broadened my perspective on the different aspects of sustainable development, nationally and globally. Thank you for all the opportunities I was given to further my research. My other promoter, Prof. dr. Arnold Tukker, has always been a cheerful motivator, who taught and supported me to manage projects. In daily life, he also helped me learning about Dutch culture. I still remember the first traditional Dutch food he recommended-Boerenkool.

Many thanks to China Scholarship Council (CSC) and EIT Raw materials for the financial support of my PhD study. Special thanks to the coordinator of the IDS-FunMat-Inno project, Prof. Thierry Toupance from Université de Bordeaux, and all the project members for their inspiration and help throughout the project.

I would like to acknowledge to the collaborators Luis Tercero Espinoza, Antonia Loibl and Matthias Pfaff, Helmut Rechberger and Huajiao Li for their important contributions to our research and the supportive arrangement of my visit. I also want to thank the colleagues Lauran van Oers, Bernhard Steubing and Glenn A. Aguilar Hernandez from CML, for their support and many insightful discussions about the research, which not only guided me through the completion of my PhD research but also motivated me to think deeper about the meaning of Industrial Ecology.

I would like to express my sincere gratitude to my thesis reading committee: Prof. dr. ir. P.M. van Bodegom, Prof. dr. ing. Martina G. Vijver, Prof. Dr. H. Rechberger, Dr. Ing. L. Tercero Espinoza, Dr. E.G.M. Kleijn and Dr. T. Fishman for evaluating this thesis and providing valuable comments.

My gratitude extends to the CML Support and Scientific Staff for organizing different kinds of meetings and workshops, they are always helpful and

considerate. Thanks to my officemates Franco Donati, Sebastiaan Deetman, Pim Wassenaar and Olivier Burggraaff in office A320 for nice talks and joyful company throughout the years. I would like to extend sincere thanks to my Chinese colleagues for their help and company, I really enjoyed the parties and the hanging out together. Special thanks to my LADIES Feibo Duan, Weilin Huang, Chen Tang, Juan Wu, Qi Yu, Jianhong Zhou and some great friends in China Zhi Qin, Zhiqiang Yu and Lina Zhu for cherished time spent together, the long evening chats about life, and the opportunity to vent my frustration. I would like to thank all members in my Study Group and Sports Group for the great moments we have shared during the special situation (COVID-19) and happy distractions to distract my mind from my research.

I dedicate this work to my family, who always encourage me to explore new pathways in life and who support me with unconditional love. I could not have finished this PhD without their support. 我爱你们! ♥

Curriculum Vitae

Di Dong was born on June 30th, 1991 in Jining, Shandong Province, China. She graduated from No.2 High School in 2010, and started her Bachelor study in Engineering Management in Zhejiang University of Finance and Economics from 2010 to 2014. She was one of the "Outstanding Graduates" in 2014. She continued her Master study in Management Science and Engineering in China University of Geosciences (Beijing) from 2014 to 2017. During this period, she was supervised by Prof. Haizhong An and Prof. Wei Fang. Her Master thesis was focused on "Embodied carbon in international copper trade from an industry chain perspective" and was awarded one of the "Outstanding Master Thesis".

After her Master study, she was granted a scholarship by the Chinese Scholarship Council for a PhD project, and started her PhD study in the Institute of Environmental Sciences in Leiden University in 2017 under the supervision of Dr. Ester van der Voet and Prof. dr. Arnold Tukker. Her PhD research was focused on the sustainable and circular metals economy, specifically on the case of copper in China. The copper model designed in her research has been used by the International Copper Association (ICA) to do further research.

She participated in the EIT-labelled International Doctoral School Programme- the IDS-FunMat-Inno project during PhD study. She visited the Fraunhofer Institute for Systems and Innovation Research ISI (Karlsruhe, Germany) in 2018 and the Vienna University of Technology (Vienna, Austria) in 2019, where she focused on modelling of copper waste management and supply.

In addition, she presented her research findings in the International Society for Industrial Ecology (ISIE) 6th Asia-Pacific (AP) conference, the ISIE conference in 2019 and the 5th international conference on Final Sinks. During the PhD study, she also assisted the course of "Resilient Cities-Minor Sustainable Development".

List of Publications

- 1. Dong, D., Tercero Espinoza, Luis A. Loibl, A., Pfaff, M., Tukker, A., & van der Voet, E. (2020). Scenarios for anthropogenic copper demand and supply in China: implications of a scrap import ban and a circular economy transition. Resources, Conservation and Recycling, 161, 104943.
- 2. Dong, D., van Oers, L., Tukker, A., & van der Voet, E. (2020). Assessing the future environmental impacts of copper production in China: Implications of the energy transition. Journal of Cleaner Production, 274, 122825.
- 3. Dong, D., Tukker, A., & van der Voet, E. (2019). Modeling copper demand in China up to 2050: A business-as-usual scenario based on dynamic stock and flow analysis. Journal of Industrial Ecology, 23(6), 1363-1380.
- 4. Dong, D., Tukker, A., Steubing, B., van Oers, L., Rechberger, H., Aguilar, Hernandez G., Li, H., van der Voet, E., Towards "Zero waste" management of copper in China: dematerialization and environmental impact minimization. Environmental Science & Technology, under review.