LUCAS KRUITWAGEN

ClimateTech Leader

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Lucas is a tech leader and founder with 18 years' experience in sustainability, climate, and energy. He has led software development and machine learning research teams in universities, not-for-profit organisations, and startup companies. He has deep expertise in alternative data products, especially machine learning applications with satellite imagery.

EMPLOYMENT HISTORY

TransitionZero — *London, UK* — 2022.09 – 2024.08
CTO

- Transformed an analysis-oriented environmental NGO into a product-oriented climate tech company;
- Led a team of over 20 full-time technical contributors, including front-end, back-end, research, and machine learning engineers;
- Raised over £2mn in philanthropic funding; grew the organization from 10 full-time staff to 40 in two years;
- Implemented agile software development processes;
- Built hiring, management, and retention processes to reduce employee turnover, with an emphasis on DEI;
- Designed and led the implementation of an energy transition planning platform;
- Supervised the development and delivery of asset-level energy systems data;
- Extensive back-end engineering contributions.

Oxford Earth Observation — *Oxford, UK* — 2017.08 – 2022.09
Cofounder, CTO

- Built a basin-level water stress prediction service, combining ML, Earth observation, and climate science for observational risk insights
- Raised $150k preseed, $200k grant funding; member of the *European Space Agency Business Incubation Center*, the *Creative Destruction Lab*, the *World Food Programme EO4SDGs Innovation Accelerator*

Frontier Development Lab — *Global* — 2020.06 – 2022.04
Researcher, Team Lead

- 10-week space and machine learning research sprints for the betterment of humankind
  - FDL Europe 2020: Causal machine learning of cloud-type transitions (Researcher)
  - ML4CC 2020: Development of ML4Floods, an MLOps toolkit for EO flood detection (Researcher)
  - FDL Europe 2021: Self-supervised S2 embeddings for crop detection and phenotyping (Team Lead)

Oxford Sustainable Finance Group — *Oxford, UK* — 2015.09 – 2019.03
Data Lead

- Lead the development of *2 Degree Pathways* wargame and decision support tool, allowing finance, NGO, and policy analysts to roleplay energy company decision making through energy transition scenarios
- Lead the technical development of *Risk, Impact, & Opportunity Tool,* assessing the asset-level exposure of companies in the power, steel and cement value chains to hypotheses of environment-related risk

Ecosystem Energy Services — *Toronto, Canada* — 2012.05 - 2014.08
Solutions Engineer

- Developed, sold, and implemented customized energy efficiency and renewable energy solutions worth $23M

ACADEMIA

DPhil in Geography and the Environment — 2016.10 – 2021.03
University of Oxford

Visiting Scholar, Stanford University — 2018.01 – 2021.03

Visiting Researcher, Imperial College London — 2015.09 – 2018.07

MSc, Distinction, Sustainable Energy Futures — 2016.10 – 2021.03
Imperial College London

BEng, Mechanical Engineering — 2007.08 – 2012.04
McGill University

SELECT PUBLICATIONS

Kruitwagen, L., Arderne, C., Lees, T., Thalheimer, L., Kuzma, S., Basak, S.(2022). Wave2Web: Near-real-time reservoir volume prediction for water security using Bayesian Graph LSTMs.

Kruitwagen, L., Story, K., Freidrich, J., Skillman, S., & Hepburn, C. (2021). A global inventory of utility-scale solar photovoltaic generating units, *Nature* 598: 604-610.

Dorr, F., Garcia, D., Gottfriedsen, J., Ramos, R., Kalaitzis, F., & **Kruitwagen, L.** (2021). Self-supervised learning of Sentinel2 timeseries for agricultural applications, *Frontier Development Lab Europe 2021 Technical Memo.*

Shivakumar, A., Weinstein, M., **Kruitwagen, L.**, Spiteri, S., Arderne, C., Almulla, , Y., Usher, W., Howells, M., & Hawkes, A. (2021). A techno-economic and financial analysis of a Gulf-India undersea electricity interconnector, *Climate Compatible Growth Programme Working Paper*.

Kruitwagen, L. (2021). Towards *DeepSentinel*: Self-supervised Sentinel-1, Sentinel-2 sensor fusion for general purpose semantic embedding, Presented at *NeurIPS 2020 Climate Change Workshop*.

Christensen, M., Jones, W., Kusner, M., **Kruitwagen, L.,** Pearce, T., Saeongkyongam, S., & Watson-Paris, D (2020). Aerosol effects on mesoscale structures in marine boundary layer clouds, *Frontier Development Lab Europe 2020 Technical Memo.*

Moore, C., **Kruitwagen, L.,** Mendiola, J., R., Morel, A., & Malhi, Y. (2019). Classifying Land Use in Complex Mosaic Landscapes using Drone Imagery and Machine Learning, submitted to *Remote Sensing of Environment*.

Kruitwagen, L.. (2018). Power Sector Asset Networks: determinants of the diffusion of renewables 2007 through 2017, presented at *ETH SusTec Academy*, June 17-22, Appenzell, CH.

Caldecott, B, **Kruitwagen, L.**, McCarten, M., & Zhou, X. (2018). *Climate risk analysis from space: remote sensing, machine learning, and the future of measuring climate-related risk*, Smith School of Enterprise and the Environment, Oxford, UK.

Kruitwagen, L., Collins, S., & Caldecott, B. (2017). 'Thermal Coal Power Stations', in *Coal in the 21 st Century*, ed. R. Hester, Royal Society of Chemistry, Cambridge, UK.

Kruitwagen, L. (2016). 'Financing 1.5 Degrees', Conference Proceedings of 1.5 Degrees: Meeting the challenges of the Paris Agreement, September 20-22, 2016, Environmental Change Institute, Oxford, UK.

Kruitwagen, L., Madani, K., Caldecott, B., Workman, M. H. W. (2016). Game theory and corporate governance: conditions for effective stewardship of companies subject to climate change risks. *Journal of Sustainable Finance and Investment*, 6(3): 1-23.

Caldecott, B., **Kruitwagen, L.**, & Kok, I. (2016). Carbon Capture and Storage in the thermal coal value chain. *Oxford Energy Forum*, 105: 50-55. Oxford Institute for Energy Studies, University of Oxford, Oxford, UK.

Caldecott, B., **Kruitwagen, L.**, Dericks, G., Tulloch, D. J., Kok, I., Mitchell, J. (2016). *Stranded Assets and Thermal Coal: An analysis of environment-related risks*, Smith School of Enterprise and the Environment. University of Oxford, Oxford, UK.

SKILLS

Geospatial Stack:	**Linux, GDAL, PostgreSQL/PostGIS, Flask, Google Earth Engine, STAC**
Data Science:	**(Geo)Pandas, Xarray/Zarr/Dask, Tensorflow(Keras), PyTorch(-Lightning), Tensorboard, Sacred, Weights & Biases, Dash**
Cloud:	**Docker, Azure, AWS, GCP (Vertex, BigQuery, PubSub, Cloud-Tasks, -Functions, -Build, -Run), Prefect, Dagster, Cloud/Dev/DataOps**
Front-End:	**HTML, CSS, JavaScript, React, Figma**

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