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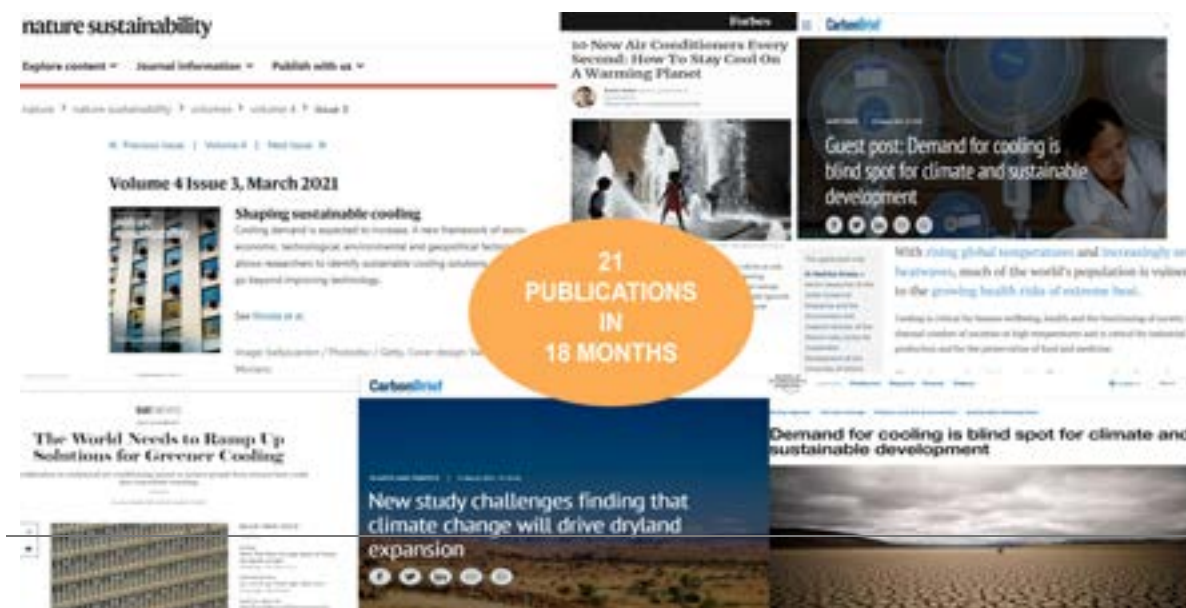
THE FUTURE OF COOLING - APRIL 2021

The Oxford Future of Cooling Programme's vision is to understand and shape worldwide cooling solutions which place planetary stewardship and protecting people's needs at their heart. These will inform and help prepare countries for extreme heat events by prioritising passive and less energy-intensive technology, while shifting the trajectory of cooling growth towards sustainability.

OUR WORK SO FAR

The team has been busy, with 21 published (or in press) peer-reviewed and policy papers in a matter of 18 months. The stand-out publication is our Nature Sustainability article 'Cooling for Sustainable Development' which sets out an agenda for the urgency of tackling cooling and its links to all seventeen SDGs. The paper is the front cover of the latest NS (March 2021) issue! The paper has gained much media attention, being reported favourably in Forbes, World Economic Forum, Scientific American, and Die Tageszeitung, amongst others. Other papers by the team have also made it to the news, including a guest post for Carbon Brief (picked up by the World Economic Forum) outlining the research on the changing energy demand for cooling in India's cities.

In addition, Radhika Khosla and Nicole Miranda co-authored The Climate Action Pathway for Net Zero Cooling, with Carbon Trust, Cool Coalition, Kigali Cooling Efficiency Program, and High-Level Champions. This report lays out, for the first time, a vision for action to 2050 and details the key milestones that will be necessary to fully implement the Paris Agreement, exceed the Kigali Amendments and contribute to the UN's Sustainable Development Goals. All publications produced in the last 1.5 years are listed at the end of this update.



NEW AREAS OF WORK

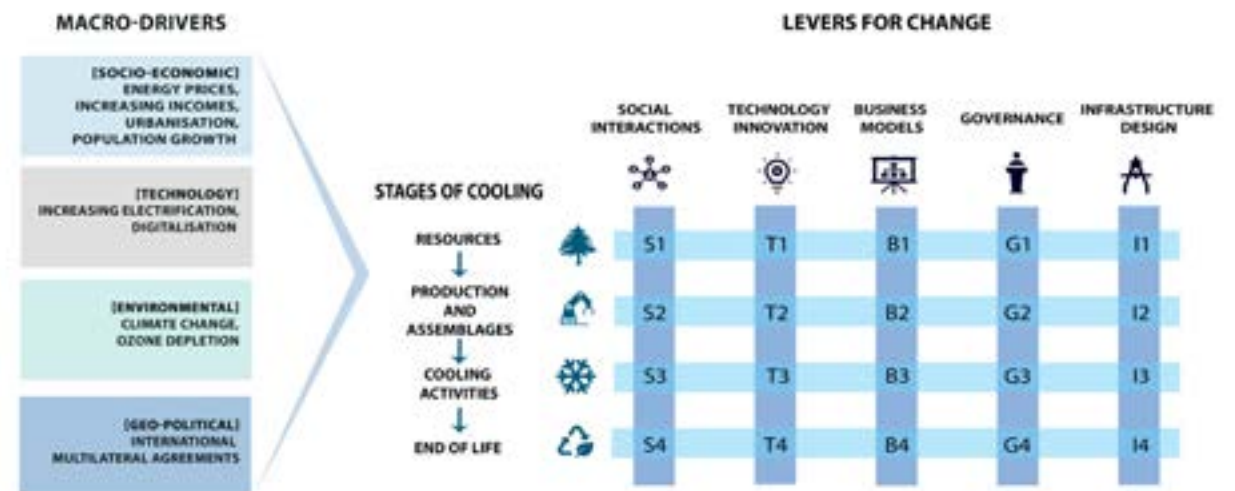
The Cooling team have also been involved in drafting a UK Parliament POSTnote, which has recently been published online. It will be available to both UK Houses of Parliament and help to inform policy on sustainable cooling.

The team continues to pursue new areas of work as well. Antonella Mazzone has been awarded a grant from the Fuel Poverty Research Network Fund to conduct a study on cooling poverty in impoverished black communities in Rio de Janeiro. In addition, Antonella Mazzone and Anant Jani are part of the Cool Coalition Working group contributing to the Sustainable Cooling for Cities Handbook.

The team has also submitted a bid to Horizon 2020, led by Universidad de Lleida. The proposal is for the development of two tools to ensure the deployment of positive energy buildings/neighbourhoods with zero-emissions and zero-pollution in all their life-cycle: 1) a methodology to develop living-labs and 2) a web-tool to reach society, industry, policy-makers and other stakeholders with the needed information for the implementation.

COOLING FOR COP26 WEBINARS

Later this year, the programme will be hosting a webinar series leading up to COP26. The webinar series is motivated by the need for high-profile and broad-reaching conversations on tackling cooling as a system. We will cover each of the themes that link to our framework on sustainable cooling, including: social interactions and cooling cultures; cooling technology and innovation; models for sustainable cold chains; circular cooling economy; infrastructure design for sustainable cooling; and finally, cooling for climate action. Watch this space for more information!



UPDATES TO THE COOLING TEAM

Giovani Palafox-Alcantar, PhD, has joined as Research Associate in Sustainable Cooling Production Networks, based in the Smith School of Enterprise and the Environment. His research will focus on Global Production Networks for cooling systems. Programme Manager and Research Associate, Nicole Miranda is taking maternity leave from April 2021 to February 2022. Gemma Watson is joining the team as Programme Manager whilst Nicole is on leave. Radhika Khosla also became Associate Professor at the Smith School of Enterprise and Environment, School of Geography and the Environment, at the University of Oxford.

PUBLICATIONS OVER THE PAST 18 MONTHS

Agenda setting:

R. Khosla et al., "Cooling for sustainable development," Nat. Sustain., Oct. 2020, doi: 10.1038/s41893-020-00627-w

Social interactions and cooling cultures:

- A. Mazzone, R. Khosla, "Socially constructed or physiologically informed? Placing humans at the core of understanding of cooling needs," Energy Research & Social Science - Paper Accepted - In press
- A. Mazzone, T. Cruz, P. Bezerra, "Firewood in the forest: Social practices, culture, and energy transitions in a remote village of the Brazilian Amazon," Energy Research & Social Science, Volume 74, 2021, 101980, doi: 10.1016/j.erss.2021.101980
- A. Mazzone, "Thermal Comfort and Cooling Strategies in the Brazilian Amazon. An Assessment of the Concept of Fuel Poverty in Tropical Climates," Energy Policy, vol. 139, 2020, Energy Policy. doi: 10.1016/j.enpol.2020.111256
- A. Mazzone, "Decentralised energy systems and sustainable livelihoods, what are the links? Evidence from two isolated villages of the Brazilian Amazon," Energy and Buildings, vol. 186, 2019, pp. 138-146, doi: 10.1016/j.enbuild.2019.01.027
- A. Mazzone, "Energy Transition in Isolated Communities of the Brazilian Amazon," in LNDMR Guimaraes (ed.), The regulation and policy of Latin American energy transitions. Elsevier. <https://www.sciencedirect.com/science/article/pii/B9780128195215000188>

Cooling technologies:

- R. Renaldi, N. D. Miranda, R. Khosla, and M. D. McCulloch, "Patent landscape of not-in-kind active cooling technologies between 1998 and 2017," Journal of Cleaner Production, 126507, doi: 10.1016/j.jclepro.2021.126507
- N. Miranda, R. Renaldi, R. Khosla, and M. D. McCulloch, "Bibliometric analysis and landscape of actors in passive cooling technologies," Under review Sustainable and Energy Reviews, 2020

Cooling economies:

- F. Creutzig, X. Bai, R. Khosla, V. Viguie, and Y. Yamagata, "Systematizing and upscaling urban climate change mitigation," Environ. Res. Lett., 2020, doi: 10.1088/1748-9326/abb0b2
- D. Ürge-Vorsatz et al., "Advances Toward a Net-Zero Global Building Sector," Annu. Rev. Environ. Resour., 2020, doi: 10.1146/annurev-environ-012420-045843
- R. Khosla, A. Agarwal, N. Sircar, and D. Chatterjee, "The what, why, and how of changing cooling energy consumption in urban India" (revise and review), Environ. Res. Lett., 2020
- R. Khosla, A. S. Kamat, and V. Narayanamurti, "Successful clean energy technology transitions in emerging economies: learning from India, China, and Brazil," Prog. Energy, vol. 2, no. 4, p. 043002, Oct. 2020, doi: 10.1088/2516-1083/abb52b

PUBLICATIONS OVER THE PAST 18 MONTHS

Cooling and health:

F. Cohen, M. Schwarz, S. Li, Y. Lu, and A. Jani, "Perspectives on the Economics of the Environment in the Shadow of Coronavirus," *Environ. Resour. Econ.*, vol. 76, no. 4, pp. 447–517, Aug. 2020, doi: 10.1007/s10640-020-00493-2

F. Cohen and A. Dechezleprêtre, "Mortality, temperature and public health provision: Evidence from Mexico.," *Accepted American Economic Journal: Economic Policy*, 2020 Hess, S. Bickersteth, and F. Cohen, "Guidelines for Modeling and Reporting Health Effects on Climate Change Mitigation Actions," *Environ. Health Perspect.*, 128(11), 2020, doi: 10.1289/EHP6745

Cold chains:

P. Trotter, M. B. Mugisha, A. T. Mgugu-Mhene, B. Batidzirai, A. R. Jani, and R. Renaldi, "Between Collapse and Resilience: Emerging Empirical Evidence of COVID-19 Impact on Food Security in Uganda and Zimbabwe," *SSRN Electron. J.*, 2020, doi: 10.2139/ssrn.3657484

P. A. Trotter, T. Becker, R. Renaldi, X. Wang, R. Khosla, G. Walther. "Cold chains for sustainable food system transitions" Under review *Nature Food*, 2021

Policy Briefs:

A. Saud, R. Khosla, and Et al., "Enhancing voluntary collaboration on cooling through the G20 - Policy Brief," 2020.

A. Mazzone, R Rathmann, Lucena, R Schaeffer, "Energy Safety Nets - Policy Brief," https://www.seforall.org/system/files/2020-03/ESN_Brazil_Policy-SEforALL.pdf

Austin, W., Cohen, F., Coomes, D., Hanley, N., Lewis, S., Luque-Lora, R., Marchant, R., Naylor, L., Queirós, A. M., Savaresi, A., Seddon, N., Smith, A., Smith, P. and Wheeler, C. (2021) "Nature-based solutions for climate change, people and biodiversity," COP26 Universities Network Briefing
Cohen, F., Ives, M., Srivastav, S., Schwarz, M., Lu, Y., Mealy, P., Bento Maffei de Souza, P., Jackson, L. & Hepburn, C. (2020) "Climate change and Emerging Markets after Covid-19," a report prepared for Pictet Asset Management in partnership with the Smith School of Enterprise and the Environment, University of Oxford. pp. 1-154

