

A carbon portrait of construction

Dr Jannik Giesekam

Research Fellow in Industrial Climate Policy

University of Leeds

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Giesekam et al. (2014, 2015, 2016, 2017, 2018a, 2018b); GCB (2015); Roelich & Giesekam (2018)

Centre for Research into Energy Demand Solutions (CREDS)

New multi-disciplinary centre, funded by EPSRC and ESRC - £19m over 5 years.







www.creds.ac.uk

The headlines this month...

Final call to save the world from 'climate catastrophe'

Scientists warn of imminent climate catastrophe without massive changes

We have 12 years to limit climate change catastrophe, warns UN

Urgent changes needed to cut risk of extreme heat, drought, floods and poverty, says IPCC

World to miss Paris climate targets by wide margin, says UN panel





IPCC Special Report

"Limiting warming to 1.5°C is possible within the laws of chemistry and physics but doing so would require unprecedented changes"

Jim Skea, Co-Chair of IPCC Working Group III



Global Warming of 1.5°C

An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.







The Paris Agreement

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Nations Unies Conférence sur les Changements Climatiques 2015

COP21/CMP11



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(A)	Framework Convention on	Ditte United
	Climate Change	12 December 2015
-,		Original: English
Conference Twenty-first s Paris, 30 Novo	of the Parties ession mber to 11 December 2015	
Agenda item 4 Durban Platfo Adoption of a agreed outcom applicable to a	(b) orm for Enhanced Action (decision 1/CP.17) protocol, another legal instrument, or an ae with legal force under the Convention Il Parties	
1	ADOPTION OF THE PARIS AG	REEMENT
1	Proposal by the President	
1	Draft decision -/CP.21	
	The Conference of the Parties,	
t	Recalling decision 1/CP.17 on the establish he Durban Platform for Enhanced Action,	ment of the Ad Hoc Working Group on
	Also recalling Articles 2, 3 and 4 of the Cor	ivention,
	Further recalling relevant decisions of the decisions 1/CP.16, 2/CP.18, 1/CP.19 and 1/CP.20,	e Conference of the Parties, including
F I I I	Welcoming the adoption of United N VRES/70/1, "Transforming our world: the 2030 A varticular its goal 13, and the adoption of the A international Conference on Financing for Devel "ramework for Disaster Risk Reduction,	lations General Assembly resolution genda for Sustainable Development", in ddis Ababa Action Agenda of the third opment and the adoption of the Sendai
t t	Recognizing that climate change represent hreat to human societies and the planet and thus by all countries, and their participation in an esponse, with a view to accelerating the reduction	s an urgent and potentially irreversible requires the widest possible cooperation effective and appropriate international of global greenhouse gas emissions,
t	Also recognizing that deep reductions in gl o achieve the ultimate objective of the Conventio n addressing climate change,	obal emissions will be required in order n and emphasizing the need for urgency
s	Acknowledging that climate change is a c hould, when taking action to address climate cha espective obligations on human rights, the right to	ommon concern of humankind, Parties nge, respect, promote and consider their health, the rights of indigenous peoples,
I		

Global carbon emissions continue to rise





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Global Carbon Project (2017) Carbon budget and trends 2017 - www.globalcarbonproject.org



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Image from Tuvalu courtesy of Climate Visuals

We need changes in supply and demand





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Global Carbon Project (2017) Carbon budget and trends 2017 - www.globalcarbonproject.org

Concentrations unprecedented in last >800,000 years







Global Carbon Project (2017) Carbon budget and trends 2017 - www.globalcarbonproject.org

Impacts include

Increasing global temperature



Declining Arctic sea ice



Increasing sea levels



Widespread impacts on ecosystems







See IPCC (2014) Climate Change 2014 Synthesis report & Royal Society (2017) Climate updates. What have we learnt since the IPCC 5th Assessment Report? for full description of impacts

Already ~1.1°C warmer where we are today



In comparison to 1951-1980





screenshot from interactive developed by Carbon Brief (2018) www.carbonbrief.org/ mapped-how-every-part-of-the-world-has-warmed-and-could-continue-to-warm



Source: ASC synthesis of the main areas of risk and opportunity within the chapters of the Evidence Report. Notes: Future magnitude is based on a combination of climate change and other drivers of risk (e.g. demographic change), taking account of how current adaptation policies and plans across the UK are likely to reduce risks.





Emissions from the built environment and its supply chains





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Adapted from Allwood & Cullen (2012) Sustainable materials with both eyes open

Long term goal is net zero emissions

"...the UK's current emissions targets are not aimed at limiting global temperature to as low a level as in the Agreement"

In 2016 CCC advised that the **UK must be net zero CO**₂ **by 2055-2075** for >66% chance of achieving 2°C or before 2050 for 1.5°C

Updated advice expected early 2019







Implications for UK built environment





EPSRC Engineering and Physical Sciences Research Council See Giesekam et al. (2018) Aligning carbon targets for construction with (inter)national climate change mitigation commitments *doi:10.1016/j.enbuild.2018.01.023* for detailed discussion

Construction Sector Deal

Mission to halve the energy use of new buildings by 2030

Targets 50% reduction in greenhouse gas emissions in the built environment by 2025







HM Government (2018) Industrial Strategy Construction Sector Deal

Green Construction Board Low Carbon Routemap progress

250 MtCO₂e

Total built environment emissions in 2014



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See Giesekam et al. (2018) Aligning carbon targets for construction with (inter)national climate change mitigation commitments *doi:10.1016/j.enbuild.2018.01.023* for detailed discussion

UK construction company carbon targets

Carbon reduction targets of selected UK housebuilders & construction firms (representing turnover of £88.4bn in 2016) - based on July 2017 review



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Figures from Giesekam et al. (2018) Aligning carbon targets for construction with (inter)national climate change mitigation commitments & UKGBC (2017) Delivering low carbon infrastructure















Numbers accurate as of 31/10/18 - see sciencebasedtargets.org for more information

Typical breakdowns of whole life carbon emissions



As operational emissions in new buildings reduce, the focus must move towards reducing **whole life emissions**, including embodied emissions





for a primer read Giesekam (2018) Reducing carbon in construction: a whole life approach Figures from UKGBC (2017) Embodied carbon: developing a client brief

Guidance on embodied/whole life carbon







RIBA (2018); RICS (2017); UKGBC (2015,2016,2017); GCB & CLC (2016); WRAP (2014); GLA(2013); CPA (2012)

Draft London Plan

August 2018 revisions include:

New Policy SI2 DB: "Development proposals referable to the Mayor should **calculate whole life-cycle carbon emissions** through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce life-cycle carbon emissions."

This is expanded upon in new 9.2.9A section and included in the energy strategy requirements.







Coming up...

Several important CCC reports (Bioenergy, land use, long term targets, CCUS) WorldGBC & CIFF campaign

WorldGBC responds to IPCC: The entire building and construction supply chain must decarbonise by 2050 to reach 1.5 degrees

Monday 08th October 2018



WorldGBC will begin work to assess how the increasing emissions from building and construction can reach net zero by 2050

Coming up

Keep up to date with CCC publications and events

15 November 2018

CCC report: Bioenergy Review

In the autumn of 2018 we will publish a new report on bioenergy. This will provide an analysis of the latest evidence, and build on the **Bioenergy Review** we published in 2011.

15 November 2018

CCC/ASC report: The future of land use in the UK – impacts on climate change mitigation and adaptation

The Committee on Climate Change and its Adaptation Sub-Committee will publish a joint report on how the future use and management of non-developed land in the UK could change in order to deliver deeper reductions in greenhouse gas emissions and increased carbon sequestration to 2050 and beyond, whilst maintaining its resilience to climate change.





For more information see: www.theccc.org.uk/coming-up & www.worldgbc.org/news-media/ worldgbc-responds-ipcc-entire-building-and-construction-supply-chain-must-decarbonise

Embodied Carbon Living Lab

2 year programme co-created with local stakeholders addressing embodied and whole life carbon emissions on a series of live projects in Yorkshire

Will trial new approaches, conduct a city scale assessment of impacts and propose amendments to participants' construction standards and the local sustainable construction SPD







A thought on plastics







Image of Yiwu Santa Store at Futian market from 2017 film Bulkland



Thank you

Please get in touch with any queries J.Giesekam@leeds.ac.uk







slides available from www.jannikgiesekam.co.uk