Climate Jobs: Building a workforce for the climate emergency

Decarbonising processes and materials: climate jobs in industry

Technical Companion

References in the Industry Chapter

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DECARBONISING PROCESSES AND MATERIALS: CLIMATE JOBS IN INDUSTRY

REFERENCES IN THE CHAPTER

This section presents the details for the numbered references given in the industry chapter of the Climate Jobs booklet.

1. Department for Business, Energy and Industrial Strategy (BEIS) Annex: 2019 UK Greenhouse Gas Emissions, final figures by end user and fuel type and 2019 UK Greenhouse Gas Emissions, Final Figures.

   2019 UK Greenhouse Gas Emissions, Final Figures (publishing.service.gov.uk)

2. Office for National Statistics, *Material Footprint in the UK: 2018*, May 2021.

   Material footprint in the UK - Office for National Statistics (ons.gov.uk)

3. Coal Action Network, *Coal in steel: problems and solutions*, September 2021

   Coal in Steel

4. Hoffman, Van Hoey and Zeumer, *Decarbonisation challenge for steel*, McKinsey & Company, June 2020.

   Decarbonization in steel | McKinsey

5. Energy Transitions Commission, *Mission Possible: Reaching net zero carbon emissions from harder to abate sectors by mid-century*, August 2020.

   ETC Mission Possible

6. This press release from the government is almost absurdly optimistic:

   UK's largest carbon capture project to prevent equivalent of 22,000 cars' emissions from polluting the atmosphere from 2021 - GOV.UK (www.gov.uk)

7. https://www.uselessgroup.org/sites/www.uselessgroup.org/files/chapter_7.pdf

   The link to the site for the whole of the Use Less Group publication is here:

   https://www.uselessgroup.org/publications/book/chapters

8. With just 20 facilities operating commercially, carbon capture and storage has failed, says Marco Magrini - Geographical Magazine

   After 20 years of trial and error, a mere 20 commercial CCS projects are currently operating globally. They jointly capture about 40 million tonnes of CO2 a year, or one thousandth of current carbon emissions. According to the Global CCS Institute, a lobby group, 2.8 billion tonnes of CO2 must be sequestered annually by 2050 if we're to reach the goals set in the Paris Agreement.

   Drax's planned project for BECCS in pilot stage, almost ready to go operational.

   BECCS and negative emissions - Drax

9. Carbon Capture, Usage and Storage: an update on the business model for transport and storage (publishing.service.gov.uk)

   Note that Allwood distinguishes between future breakthrough technologies and current technologies that are already technically and commercially viable and can be mainstreamed. He puts CCS in the former category so expects it to contribute little to decarbonisation by 2050 in the UK based on the speed of uptake and R&D of such technologies. See his presentation here: https://www.greenhousethinktank.org/event-july-2021.html

10. It is worth referring to Jevons Paradox here. Increasing efficiency tends to drive growth in consumption (as it reduces the energy unit cost for production) unless wider aspects are changed. Consider for example increased mileage with the adoption of EVs, increased emissions of lighting whilst each light bulb shifts to LED, more efficient computers but more of them etc. Or indeed average temperature in average UK home 7^{o}C warmer than 1970 through central heating and insulation: comfort has increased which has dampened the reduction of emissions in home heating that would otherwise have occurred.

11. Lehne and Preston, *Making Concrete Change: Innovation in low-carbon cement and concrete*, Chatham House report, 2018.

    Making Concrete Change: Innovation in Low-carbon Cement and Concrete | Chatham House – International Affairs Think Tank

12. The biggest shift required is one where the 'alternative materials' for new buildings and infrastructure is simply the bricks, concrete and steel of what is already there through reusing and repurposing rather than demolishing what is already first. A radical call for this to change is set out by a call from leading architects in 2021 – see Built for the Environment Report:

https://www.architecture.com/knowledge-and-resources/resources-landing-page/built-for-the-environment-report

See also BBC Today programme, 24 September 2021, interview with Professor Rebecca Lunn, University of Strathclyde. She mentions the re-use of existing foundations as the basis for new buildings, which would require significant new engineering training to ensure safety standards in terms of load bearing.

13. In the current situation, investment in what already exists is discouraged as financial incentives encourage demolition and wasting of already embodied carbon, and few products or buildings are intentionally designed for disassembly or deconstruction. But rather than wait for this to come about our starting point should be to reuse and repurpose, reimagine and reengineer what already exists. This is the essence of a local and sustainable 'circular economy'.

George Monbiot writes in the Guardian, 'while governments and construction companies are happy to give us more of everything, the one thing we cannot have is less. The overarching rule is this: if you want a greener world, resist the rising tide of concrete.'

We can't build our way out of the environmental crisis | George Monbiot | The Guardian

14. As Ref. 11.

15. Still less needed is the huge amount of riverside luxury tower block construction in London that is pushing out the working population and hollowing out the city to leave it a 'playground' for wealthy elites.

16. As Ref. 3.

17. As Ref. 4.

However, most of the talk in the steel industry focuses on shifting to hydrogen steel, meaning that we continue to burn coal to make steel in the UK until this is realised. This is as bad as continuing to fly, and build new runways, until the promise of sustainable jet fuel or electric planes materialise.

As with concrete, the challenge for steel should first be to reduce the amount of steel needed in our new generation of electric cars which would be smaller and last longer

(consider how many EV minis you could make from scrappage of a large SUV). Similarly, the shift from building new, and taller, to first address the retrofit challenge will radically change the pallet of materials used in the building sector. Instead of construction it should be called the retrofit profession in future. Steel would not be displaced by an alternative structural element but by an increase in demand for insulation, much of which could be made from recycling and product sourcing on a local or sub-regional basis.

Then the UK would be able to provide for its own steel needs – with the steel needed for a rapid roll-out of renewables come from within our 'scrappage' and the reduced the demand for steel elsewhere in the economy.

Clearly, a far more concerted and widespread effort to salvage scrap metal would be required in the UK, as well as changes to how steel is made from direct reduction of iron. The problem of the scarcity of green hydrogen which will also be in relation to the demand for powering any remaining aviation, to fuel HGVs and other heavy vehicles, to balance the electricity grid and make fertiliser. This should not be under-estimated, and the issue of energy loss in the production of hydrogen in the first place not overlooked.

Yet, the economics of switching from blast furnaces to electric arc furnaces is a dissuading factor for the leading players in the industry. This requires government intervention which could localise steel production across the UK, accompanied by a green new deal to transition to sustainable jobs (see other chapters of this booklet) in locations with existing iron and steel production (Port Talbot and Scunthorpe).

18. As Ref. 11.

19. As Ref. 5.

20. Atmospheric emissions: greenhouse gases by industry and gas - Office for National Statistics

21. As Ref. 11.