

What are the key non-technical challenges for industrial decarbonisation?

Skills and employment

- People's livelihoods; loss of jobs.
- Lack of skills (new technology may require new skills/people).
- Funding for upskilling.
- One area of job would change – not like coal mines closing. This needs to be communicated.
- 43% apprenticeships failed therefore need to change training system. Area breakdown?
- Lack of incentives to teach trade to new people.

Public acceptance

- Acceptance to transition to green economy. Trust issues.
- Public awareness.
- Public attitude – climate denialism, attitude to change.
- Tensions around past deindustrialisation (acknowledgement of past events). Language used and generational understanding.

Just Transition

- Understanding boundary conditions, e.g. worldwide boundaries moving slave labour to other countries.
- Quantifying justice for UK community versus justice for Global South. Is it better to push harder here and “ruin lives” in UK to save people in “Third World”.
- Technology lock-in, e.g. other areas don't have technology.

Economic & Government

- Carbon taxes – once it's not economic companies leave, need them to be involved in the process.
- Up front financial support.
- Government support (subsidies and policy).
- Other priorities for funding e.g. social care.
- Companies do not want to lose profits. Lack of incentivisation to decarbonise.
- Barriers for funding.
- Insufficient resources and supply chain disruption.
- Lack of political will. Short political timescales.

Environmental

- Not wanting to take on environmental responsibility.
- Remediation and waste disposal.

Other

- Data challenges.
- Health and safety.
- Infrastructure.
- Lack of communication between academia and industry.
- Language and communication difficulties.
- Are the clusters too broad? E.g. is the whole of Scotland one cluster? A centralised approach seems too broad.

For the challenges you've highlighted, how do you think they could/should be resolved? Is there a need for central coordination? Is it a top-down or bottom-up approach?

Skills and employment

- Early education programme.
- Fund more PhDs, workshops, training and international collaboration.
- Proposing plans for skilling to industry for their buy-in.
- Increase education on decarbonisation topics. Wider educational reform is needed, e.g. less focus on fossil fuels, more focus on new areas.
- Top down for apprenticeships reform. Need different levels of apprenticeships.
- Better pay so it can facilitate movement to apprenticeships.
- How do you compare skills and experience with a degree qualification?
- Increase training provision to meet skill shortages.

Public acceptance

- Social media, more interaction with the local community.
- Offer site visits.
- Support your claim by providing evidence (data).
- Quantify benefits for CCUS and hydrogen.

Just Transition

- Adopting a synergy across the world because failure in one place can affect the rest of the world.
- Top-down, bottom-up approaches should be region specific e.g. in Africa bottom up may be more appropriate, while in UK top down is better.

Economic & Government

- Private investment.
- Business models. Companies need better awareness of costs.
- Create new policies to force companies/start taxing based on emission.
- Put in place legislation/tax breaks for companies to incentivise decarbonisation.
- Ensure policies and regulation are consistent.
- Central coordination from UK government (top-down approach).
- Social economic models. Need to evaluate costs to evaluate social and security issues.
- Reform the government.
- Increase communication between researchers and policy makers.
- Cost scaling.

Other

- Proposing plans for technologies to industry and the reliability of these technologies.
- Answer the question on availability and sustainability of feedstocks/inputs.
- Learning from more established clusters, e.g. Solent cluster.
- More simplistic messaging.

Regional Industrial Citizen Assemblies

- Place specific but could feed back to a National Assembly.
- To facilitate discussions between local people and industry.
- How to select people – make sure to include local people's vision for their area.
- Long term vision for regions.
 - Education (career pathways)

- Encourage people to stay in local areas.
- Targets and commitments.
- Ongoing feedback and stakeholder participation.
- Political autonomy.

How could researchers help to address some of the challenges around skill gaps and/or public engagement? What are your barriers to this? How could research centres support you to undertake some of these tasks?

- We need to reach out to other clusters and people. Share findings that make sense for communities. Should be back and forth conversation rather than just speaking at them. How? Emotive rather than facts and figures. Personalise it.
- Make it a crisis – we can solve them.
- Academics are trustworthy.
- Change in language. Click bait titles are hard to communicate and are misinterpreted.
- Require more from journalists and ourselves while we disseminate facts.
- Encourage in between steps; we don't have to go straight from fossil fuels to nuclear/hydrogen. There are small steps and steps back aren't villainised.
- Show that the transition can be equitable.
- Push back against the "non-believers".
- More funding for social science research to facilitate engineering applications.
- Recognising the actual/wider problem.

Methods

- Simplify technical terms in a video and share it through various distribution channels (e.g. tiktoks).
- Create educational games/books/learning materials/fairytales.
- Providing positive case studies.
- Consider the platform you're presenting on for public engagement. Use more accessible platforms for public.
- Work with FE colleges, trade unions and skill development agencies. Amplify these voices to develop skills.
- Conversations with friends and family is a start.
- Vote for policy changes.
- Access to data from industry.

Barriers

- Time and money to share findings – no support from government or private companies.
- Lack of skills/training for public dissemination.
- No matter the facts and figures there will always be climate denialism.
- Loudest voices are always the wrong ones. Have to give space to voice concerns.
- Takes an extreme situation e.g. energy crisis for people to understand.
- Must be respectful of others' knowledge, which is hard when you are an expert.
- Funding.
- Lack of connections.

Centre support

- ECR training for public engagement, software (e.g. simapro) etc.
- Organise free engagement events about decarbonisation.
 - Make accessible.
 - Encourage general public, not just business.
- Provide multidisciplinary awareness.
- Quizzes, surveys.
- Workshops to invite discussion, e.g. more open sharing/conferences. Ensure discussion between academia and industry.