



# FINANCING A CIRCULAR CHEMICAL ECONOMY

## Executive Summary

Key findings and recommendations from policy workshops discussing how to finance a transition to a circular economy in the UK chemical manufacturing sector. Senior representatives from academia, industry, special interest groups and learned societies were invited to contribute their views, requirements and perceived challenges.

Moving to a circular economy is imperative not only for environmental reasons. It has potential for wide-ranging economic and societal benefits, giving the capacity to grow and thrive, create green jobs, upskill the workforce, increase self-sufficiency by reducing import reliance, improving infrastructure and providing a brighter outlook for future generations.

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## The Circular Economy

A **Circular Economy (CE)** offers a vision where **products and materials are designed to be reused, repaired or remanufactured, ensuring resource extraction, waste generation and pollution are kept to a minimum.** By focussing on society-wide benefits, it seeks to redefine growth by gradually decoupling economic activity from the consumption of finite resources. All of this is underpinned by a transition to systems and sources of renewable energy. Three key principles are the foundation: 1) better product design to remove waste and pollution; 2) keeping products and materials in use; 3) regenerating natural systems.

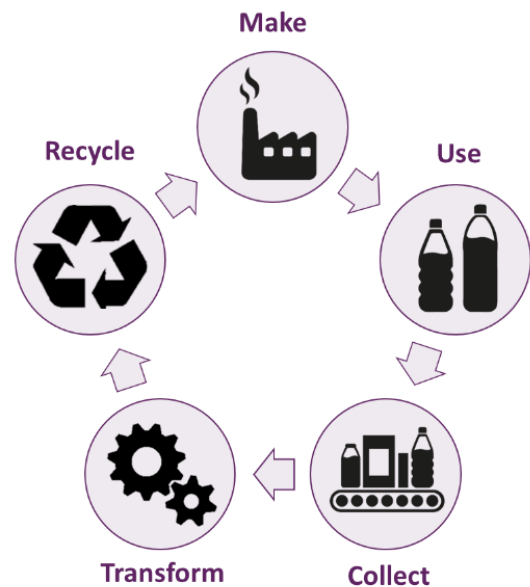
Current business models focus on a ‘take-make-use-dispose’ approach and are not sustainable in the long-term.



*A linear economy of take-make-use-dispose.*

Crucially, transitioning to a CE also brings many positive benefits, not only addressing the negative aspects of a linear economy. **It represents a fundamental shift that generates business and economic opportunities, provides environmental and societal benefits and builds long-term resilience.** It is estimated

that a CE in Britain could create over half a million jobs by 2030.<sup>1</sup> Furthermore, circular models can **reduce production costs and bolster resource security, lessening import dependency and supply chain disruption risks.**



*A circular economy, where extraction of natural resources is minimised and recycling of materials is promoted.*

The CE, and Industrial Symbiosis and Resource Efficiency in particular, aims to transform the way we manufacture and consume products. Relying solely on renewable energy solutions to reduce greenhouse gas (GHG) emissions will only address 55% of these emissions. The CE can reduce a significant portion of the remaining 45%.<sup>1</sup> Intense demand for energy and resources can be cut by circulating products and materials, instead of producing new ones.



## Our Vision

To transform the UK chemical sector's current linear supply chain model into a fossil-independent, climate positive and environmentally friendly circular economy.

## The UK Chemical Industry

The UK chemical industry makes a significant contribution to the UK economy. With revenue of £75.2 billion in 2021, corresponding to a gross value added (GVA) of £30.7 billion and 141,000 direct jobs,<sup>2</sup> it is one of the largest export sectors with demand predicted to double in the next 10 years.



CO<sub>2</sub> emissions



Energy &  
Resources



Waste



£75.2 billion  
annual turnover



Demand 2x in  
next 10 years



Large export  
sector

However, business as usual is no longer an option. The sector is one of the largest consumers of energy and resources and, consequently, one of the largest producers of waste and emitters of CO<sub>2</sub>. Carbon-based chemistries are integral to the majority of chemical sectors. **Therefore, we need to defossilise rather than decarbonise energy systems and carbon sources.** Alternative, non-fossil derived sources of carbon are needed urgently to achieve our vision.

## Key Findings



### Technologies

**CO<sub>2</sub> is currently viewed as a waste product**, but it is a valuable commodity resource to reduce costs for many industries within the chemical sector and beyond.

Current UK policies place an **over-importance on biomass for fuels**. Sustainable aviation fuel (SAF) and similar methods are not sustainable in the long-term and there are valuable chemical feedstocks to be extracted before conversion into fuel.

Accessing resources and facilities for **scaling-up early-stage research and building demonstrator units** is extremely difficult. A portfolio of demonstrator units would help to boost investor confidence and de-risk these new technologies.

### Finance & Fiscal

**UK-based finance opportunities are severely lacking which poses a significant barrier to developing and scaling innovation.**

Increasingly, funding of the scale required is being sought and obtained overseas leading to an outward flow of UK innovations.

**Investment risk remains a significant challenge**, particularly with business-as-usual activities having greater stability and return on investment. Limited investor understanding of this sector further adds to the perceived degree of risk.

**Sector funding requirements are far greater** than in other areas, in the billions of GBP, with considerably high seed funding costs and a large gap between the early and pre-commercial stages requiring additional support.

**Government collaboration**, both inter-administration and with industry and financial institutions, is needed urgently.



## General

**The utilisation value of carbon should be recognised.** There should be a product-focus on waste generation to create efficiencies in the supply chain, such as **incentivising Carbon Capture & Utilisation (CCU) over Carbon Capture & Storage (CCS)** (which is economically unproductive and likened to landfilling).

While intellectual property (IP) generation is generally strong **the transition to commercialisation and retention of IP is weak. The UK is not seen as an attractive investment for scaled infrastructure**, which is compounded by high manufacturing and labour costs. In turn this creates an **outward flow of manufacturing** meaning emissions of embodied carbon are overseas.

**A longer-term outlook is needed to prioritise environment over profit**, facilitated by increasing profit potential and decreasing risk to invest in such areas. An over-focus on return on investment under short timeframes is a barrier to change.

**Further education** is needed to help investors and policymakers understand this technical space. If the risks are not fully understood, investor confidence will be low.

**Competing priorities and strategies** of government departments are hindering progress. A unified, multi-department approach is needed, with clear, attainable sustainability targets.

**The sole focus on Net Zero can hinder broader sustainability achievements.** A more holistic view is required to address overall environmental issues, of which emissions reduction is one aspect.

An impediment to change is that **understanding of the chemical industry and circular business models are underdeveloped and different across UK administrations.**

## Key Recommendations



### Technology

- 1. Support industrial symbiosis clusters.**  
Initiatives that use the waste from one sector as feedstocks for another will help to accelerate circular businesses.
- 2. Create national, collaborative public sector research institutions operating as a commercial business with industry and academia.** To incentivise partnerships and commercialisation and support early-stage research scale-up, plus the added benefits of employment opportunities and revenue generation.
- 3. Support novel technologies and early-stage research through all TRL levels to de-risk investment opportunities.** Greater access to financial support and resources to assess and minimise risk in building demonstrator units should enable quicker scale-up and growth.
- 4. CCU must be prioritised over CCS.** CCU can be revenue generating and give rise to economic growth and jobs creation. A longer-term vision for CCU must be realised with investment in infrastructure.

*“There are a lot of ‘stick’ approaches but not a lot of ‘carrot’ in the UK... at the moment everything that we’re doing is very much a ‘stick’ approach. There’s going to be emissions taxes... but we don’t have any incentives.”*

### Financial & Fiscal

- 1. Carbon taxes should be of a sufficient scale to actively disincentivise poor behaviour not simply act as a punitive charge.** Consider the carbon emission efficiencies and only subsidise the actual carbon savings – see **Box 1**.
- 2. Greater appreciation of the value of the chemical industry** from an economic and political perspective.
- 3. Oil and gas tax relief refocussed towards re-skilling and training.** Ensuring minimal job losses and continued sector growth - see **Box 2**.

**4. Additional support for investment opportunities.** Investment funding guarantees should be offered more frequently and include a requirement of independent investment review to de-risk and boost investor confidence. Public equity, private funds and wider debt and equity instruments are

needed to develop and scale CE interventions and technologies.<sup>3</sup>

**5. A stronger and clearer carbon credit framework** will help to incentivise further emissions reductions and the CE transition. Carbon offsetting is permitted greenwashing and should not be encouraged.

*“The UK is not seen as an attractive place for investment in green tech. It is behind the curve in terms of investment into technology and business growth.”*

## General

**1. Recognise the value of typical waste products, such as carbon dioxide.** Current ‘waste’ streams contain valuable resources and feedstocks for many chemical industries, helping to reduce environmental damage and boost economic growth.

**2. Adopt a unified industrial strategy for a CE transition.** Government departments need to develop a robust, unified, cross-cutting intra-departmental strategy with industry collaboration.

**3. Refocus the current biomass strategy on value extraction before fuel generation.** Valuable commodities and

chemical compounds should be extracted first before any remainder is turned into biofuel, thus generating new revenue streams and jobs.

**4. Implement a standardised Life Cycle Assessment (LCA) framework** to assist in determining the degree of risk for investment, but current approaches do not fully consider the whole system and related boundaries.

**5. Embrace longer-term thinking to achieving positive impact.** Sustainable initiatives typically require longer investment and return periods to have measurable impact.

*“We do need to have a more collaborative approach in terms of how the financial institutions and the government could work together.”*

### Box 1 – Carbon Emission Efficiencies

Carbon emission efficiency refers to the economic benefits of production activities that simultaneously emit carbon, such as carbon capture operations. The fewer carbon emissions generated per unit of production output, the more carbon emission efficient the process is.

In this context, the subsidy incentive for CCU/S activities should not be for the total amount of carbon captured, but rather taking the efficiency of the process into account. For example, if a particular process captures 10 tonnes of CO<sub>2</sub>, but 9 tonnes of CO<sub>2</sub> are emitted doing so, then the efficiency is just 1 tonne. Therefore, any subsidy should only apply to this 1 tonne (and not the full 10 tonnes).

Adopting this approach would correct incentives towards driving process efficiencies and carbon capture *with value-added purpose*.

### Box 2 – Reallocation of Incentives Through Tax Relief for Oil and Gas

The UK oil and gas sector employs over 200,000 people<sup>4</sup> and incentives through tax relief have been a part of ensuring continued job retention and economic growth. Opponents of phasing out oil and gas extraction often cite job losses as a reason not to do so. A phased reallocation of such incentives will help to address this concern by ensuring minimal job losses through re-skilling and re-training. Many current oil and gas sector employees possess the necessary skills and expertise to transition to green sector jobs with the correct retraining and education.

By way of an example, assuming an annual tax relief of £11 billion:

- Year 1: £10 billion to oil and gas; £1 billion to green sector/retraining
- Year 2: £9 billion to oil and gas; £2 billion to green sector/retraining
  - Continuing until no oil and gas subsidies are present:
- Year 11: £11 billion to green sector/retraining

1. Ellen MacArthur Foundation, *Financing a Circular Chemical Economy* (2020)
2. *Key figures of the United Kingdom chemical industry in 2021*, Statista, <https://www.statista.com/statistics/1174177/united-kingdom-chemical-industry-key-figures/>
3. Lysaght *et al.*, *Public Policy Taxonomy for a UK Circular Economy* (2024)
4. UKEITI, Total employment supported by the UK Upstream Oil and Gas Industry, <https://www.ukeiti.org/oil-gas>