Locating Resource Efficiency at the heart of Future Industrial Strategy
UK FIRES is a major research programme, comprising a consortium of subscribing industrial partners from resource-intensive sectors working with academics from Cambridge, Imperial College, Oxford, Bath, Nottingham and Strathclyde who are funded from 2019-2024 by a £5m programme grant from the EPSRC. The collaboration is co-ordinated through a Living Lab.

UK FIRES is led by Professor Julian Allwood FREng in Cambridge who can be contacted via allwood-office@eng.cam.ac.uk or via +44 (0)1223 748 561.

More information about UK FIRES and the outputs of its work can be found at www.ukfires.org
Delivering the UK government’s legally binding commitment of net-zero emissions by 2050 is an extraordinary challenge for the complex supply chains that transform material resources into societal benefit. The challenge will create opportunities for innovation and could trigger a renaissance for resource-intensive industry in the UK. The challenge requires industry to place Resource Efficiency at the heart of its strategy. The revision of industrial strategy will require: energy and material use data, options for change and potential pathways to deployment; these together are the focus of UK FIRES.

UK FIRES takes a pragmatic approach: we focus only on technologies that are available to us today and exclude those that have yet to be proven at meaningful scale, since they simply may not be ready in time. In 2050 we aim to meet the energy demand of UK society by non-emitting electricity generation.

The final services that drive activities that cause emissions are shown on the left side, leading to the greenhouse gases on the right side. The yellow-loop in the middle demonstrates that most industrial emissions are associated with producing the buildings, vehicles and other equipment which provide final services from energy, but which themselves require energy in production.

This is important because most of this year’s industrial output is to produce equipment (durables) that will last for several years. The services provided in one year therefore depend on the accumulation of a stock of goods made in previous years - and this long-lasting stock limits the rate at which change can be made to our total emissions.
An extraordinary challenge requires...

UK FIRES brings together a widely diverse set of skills and experience including:

- Corporate Strategy
- Data Science
- Materials Processing
- Economics
- Material Efficiency
- Systems Analysis.

... a remarkable group of people

UK FIRES brings together university researchers, industry leaders and government policy makers in collaborative workshops called Living Labs. We frame technology innovations in the context of economics and policy in order to implement at full-scale.
From challenge to opportunity

Without a newly pro-active industrial strategy the UK will increasingly rely on importing goods with high embodied emissions. Whilst this supports the legal commitment of generating net-zero emissions in the UK, our consumption emissions would still be too high as we would be importing our emissions from other countries. We need holistic strategy and policy along the supply chain that places resource efficiency at the heart of industrial strategy.

Reducing consumption emissions to net-zero by 2050 requires a total transformation of the UK industrial system, with a focus on delivering products and services with zero emissions. Such a transformation will make UK industry a major winner in the zero carbon world.

We will underpin our competitive advantage by creating innovation pathways that do not reply upon significant offsets from Negative Emissions Technologies since those that are ready for deployment have limited capacity (see below).

Why Absolute Zero?

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Territorial GHG emissions in 2018 (Mt CO₂e).
Academic partners will create responsive strategic analysis tools for use by Living Lab industrial partners to develop strategies for reaching zero greenhouse gas emissions in 2050.

UK FIRES will seek to define innovation pathways by which the practice of Resource Efficiency can become a key driver of competitive advantage for UK business.

A new Resource Observatory will use state-of-the-art data science tools to provide detailed insight into the UK’s use of resources. In the Observatory our industry partners will be able to explore scenarios for decarbonisation and gain foresight for strategic decisions.

We will develop software tools to map options for design and delivery of resource intensive products and services with today’s technologies - see case study opposite.

The Living Lab creates a real-time dialogue between the strategic needs of our industry partners and the goals of the research team.

In the Lab industry leaders pose strategic challenges to leading academics and gain early sight of emerging solutions.

UK FIRES is closely connected to the UK’s Catapult network. It seeks to shape UK government’s decarbonisation policies at national and regional levels by working with Lord Browne of Ladyton at the House of Lords and Policy Champion, Laura Sandys.

Through its Strategy Workshops UK FIRES will connect to all relevant UK activities on Resource Efficiency and share best practices for decarbonisation and cross-sector opportunities.

1. Opportunity Mapping
   - Eliminating waste

2. Resource Observatory
   - Overcoming information deficit

3. Innovation Pathways
   - Future fit products, processes and services

4. Responsive Strategic Analysis
   - Holistic strategy and policy
Case study: Transport

**Problem**
Sheet metal utilisation in car body structures is estimated at a disappointing 56% globally. Currently, car manufacturers create multi-model platform designs through which much of the body architecture, systems and components are carried over from previous models.

**Solution**
The platform design process has locked in an unnecessary waste of resource. We proposed new design tools to assess material utilisation early in the product development cycle. This holistic approach changes the allocation of design resources (see below).

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Case study: Construction

**Problem**
At the end of a building’s useful life, steel sections that could be reused are routinely recycled creating unnecessary greenhouse gas emissions. Currently, however, only 5% of construction steel in the UK is reused.

**Solution**
Introduction of a new actor in the supply chain
A reconditioning specialist, procures used beams, certifies them, and aggregates so as to have the inventory to meet orders for new builds.
Membership

UK FIRES aims to provide data, tools, experience and analysis to support its partner companies in specifying new business models, accessing innovation, identifying opportunities, improving best practice as they decarbonise products, services and processes.

UK FIRES members can access the resources of the £5m programme through:

- Quarterly meetings of the Living Lab, in which members across resource intensive industries specify target challenges for future work, support current activity and provide feedback on the application of programme insights in practice.
- Early access to emerging analysis of strategic opportunities
- Shared or dedicated PhD students applying the collective insights of the UK FIRES team to specific commercial contexts
- Pilot testing of new tools developed in the research programme
- Shaping the agenda and participating in the UK FIRES Strategy Workshops.

To discuss membership, please contact us via ukfires-office@eng.cam.ac.uk

What our industrial partners say

“Through UK FIRES we hope to connect with our customer base to better understand their future needs as we move towards zero carbon steelmaking” - Paul Sherman, Director Metallurgical Services & Richard Cinderey - Head of New Technologies, Primetals Technologies Limited

“Reducing carbon is part of our core values. UK FIRES provides an opportunity to explore new solutions to achieving this” - Nick Jones, Programme Director, Infrastructure, Atkins Global

“UK FIRES can be the test-bed to lead the way for new business models that will eventually be sought by the rest of the world” - Peter Schmitz, Head of Commodity Research, Anglo American plc group

“Implementation of new and improved processes can be challenging; we need to overcome a reluctance to change to achieve higher rates of scrap recycling” - Alan Scholes, Chief Technology Officer, Materials Processing Institute

“Improving resource efficiency offers manufacturers the opportunity to improve their competitiveness and attract new customers. The UK FIRES project complements the High Value Manufacturing Catapult’s Circular Economy Strategy and will deliver ideas we will take and scale to support a thriving manufacturing sector.” - Sam Turner, Chief Technology Officer, High Value Manufacturing Catapult

“We know our world is going to change. We want to find out what our company looks like in 30 years time. Who are our customers and how will we prosper?” - Bob Rivett, V P Technology, Emerson Advanced Design Center