

UK FIBRES

The logo for UK FIBRES features the text 'UK FIBRES' in a bold, sans-serif font. The letters 'UK', 'FI', and 'S' are dark blue, while 'RE' is white. The text is overlaid on a large, downward-pointing triangle with a vertical gradient from dark blue at the top to green at the bottom.

Locating **Resource Efficiency** at the heart
of **Future Industrial Strategy**

Challenge and Opportunity

Delivering a 20% cut in the UK's true emissions by 2050 through Resource Efficiency in industry.

Legally binding targets to achieve net-zero emissions by 2050 have now been passed in sixty countries including the UK. These targets are an extraordinary challenge for the complex supply chains that transform material resources into societal benefit. However, the requirement for radical change creates opportunities for innovation and could lead to a renaissance for manufacturing in the UK.

Delivering net-zero depends on locating Resource Efficiency at the heart of future Industrial Strategy. This requires access to data on material use, information about options for change and evidence about successful pathways to deployment. The UK government has invested £5m in the UK FIRES programme to bring together businesses across the supply-chain in a Living Lab to pose strategic challenges to leading academics and test emerging solutions in practice.

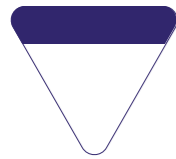


UK FIRES is a major research programme, comprising a consortium of subscribing industrial partners spanning the bulk materials supply chain working in partnership with academics from Cambridge, Imperial College, Oxford, Bath, Nottingham and Strathclyde who are funded from 2019-2024 by a £5m programme grant from the EPSRC.

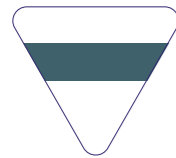
UK FIRES is led by Professor Julian Allwood FEng in Cambridge who can be contacted via allwood-office@eng.cam.ac.uk or via +44 (0)1223 748 561.

More information about UK FIRES and the outputs of its work can be found at www.ukfires.org

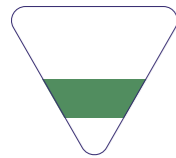
What do we need to do?



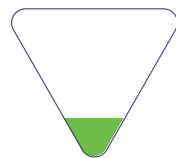
To achieve zero-emissions we need holistic strategy and policy along the supply chain which can place resource efficiency at the heart of industrial strategy. In response UK FIRES will develop new **holistic** analysis, benchmarks and standards to release climate resilient goods and businesses.



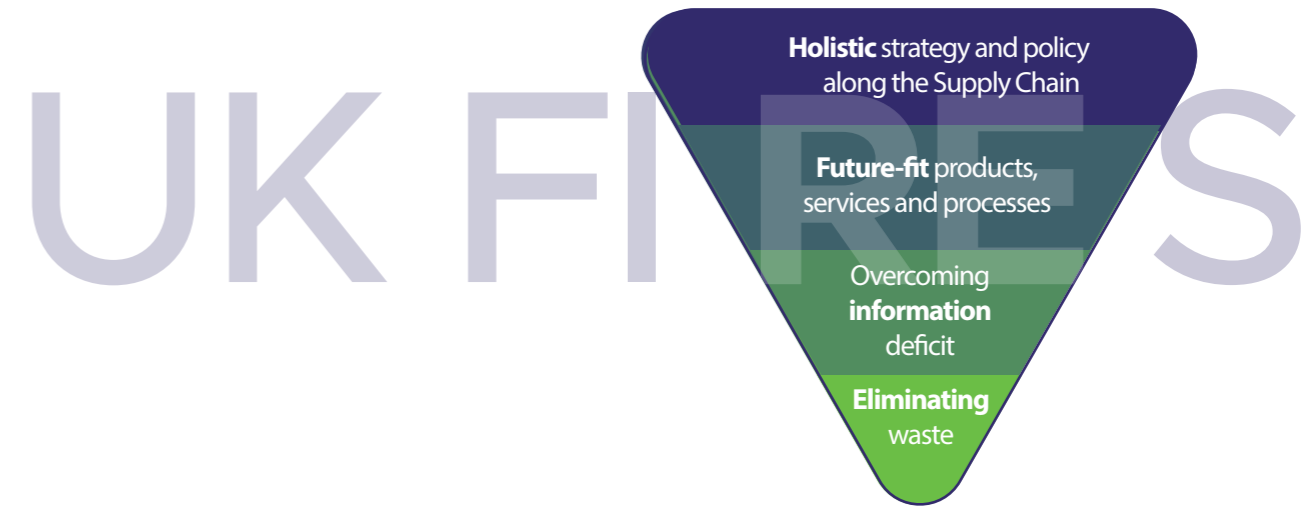
Today's industrial system was designed without resource constraints. This is not sustainable in a zero-emissions future. In response UK FIRES will use exemplar innovations to reveal the pathways to delivering a **future-fit** UK industrial renaissance with products, services and processes designed for resource efficiency.



Our understanding of today's resource transformation and use is constrained by an **information** deficit. This information deficit needs to be overcome to enable responsive business models which achieve zero-emissions. In response UK FIRES will develop the digital tools to provide better foresight in future industrial systems.



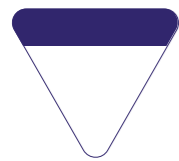
Bulk materials are cheap, this means they can be used inefficiently with over-specification and high levels of production scrap. In response UK FIRES will **eliminate** waste by revealing the full range of options for design and production, identifying and amplifying best practice using technologies available today.



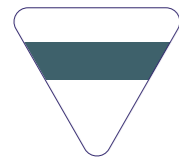
The Cost of Doing Nothing

Since 1990, UK manufacturing output has declined in favour of importation. Without a newly pro-active industrial strategy the UK will continue the trend of manufacturing decline and rely on importing goods with high embodied emissions to meet UK demand. 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 instead of generating them. Reducing consumption emissions to net-zero by 2050 requires a total transformation of the UK industrial system, with pro-active climate policies translated into a focus on Resource Efficiency. If we reverse the trend of industrial decline and deliver innovative products and services with zero emissions, the UK could lead an Industrial Renaissance to be a major winner in this transformation to zero emissions.

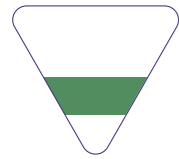
How we'll deliver change



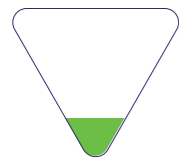
To support holistic industrial strategies and supply chains UK FIRES academic partners will create **Responsive strategic analysis** tools. Living Lab industrial partners will apply these findings through the generation of new business models in collaboration with our Policy Champion.



Through specific case studies of process, product and service innovation, the consortium will seek to define the **innovation pathways** by which the new practices of Resource Efficiency can be the basis of thriving UK businesses. Living Lab partners will be supported to exploit these opportunities in practice.



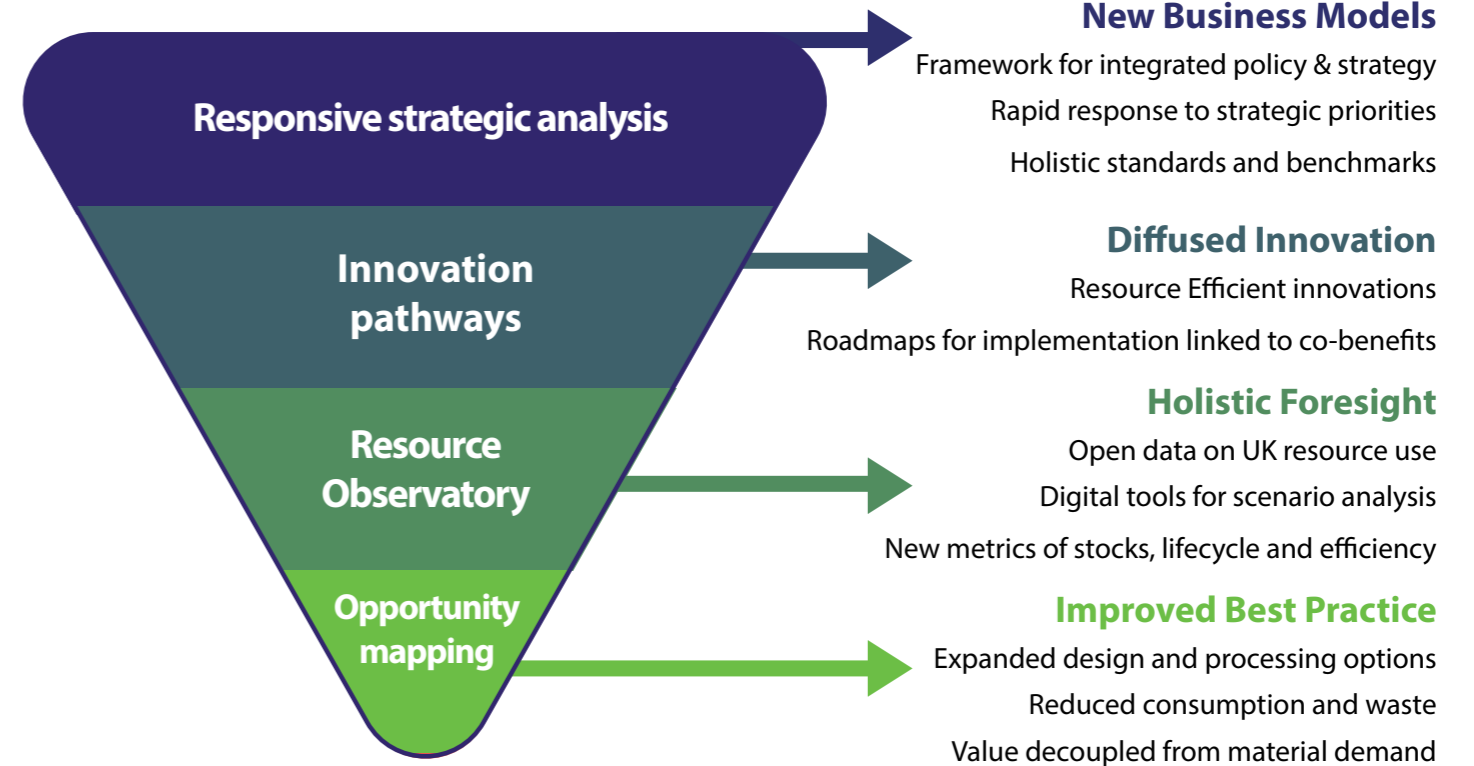
The tools of recent advances in data science will be applied in a new **Resource Observatory**, to provide the highest-resolution insights into the UK's use of resources, with new metrics, scenarios and search tools used to identify opportunities for valuable innovation and efficiency gains. These tools will give our industry partners foresight in strategic decision making



Software tools to enumerate all options for design and delivery of resource intensive goods with today's technologies will be developed and commercialised. This **opportunity mapping** will identify new methods of design and manufacture which improve on existing best practices. An example of our work in this area is given in the case study opposite.

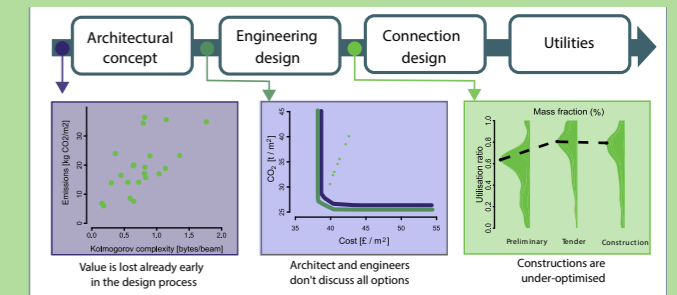
Actions

Outcomes




Opportunity mapping in commercial construction


In previous work we identified up to 100% over-specification in UK commercial construction. In response, we developed and are now commercialising a software tool to map and value design options, and we are innovating with optimising technologies of fabric formwork and metal fabrication.





A Different Coalition

Resource Efficiency is a long-established goal, but resource use is still rising. UK FIRES brings together a new coalition of skills aiming at real change.

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UK FIRES populates the interfaces between different approaches to resource efficiency. It brings together Corporate Strategy, Data Science, Materials Processing, Economics, Material Efficiency and Systems Analysis aiming to bridge the divide between economic and political framing of technology innovations in order to reach scale in implementation.
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The Living Lab will create a real-time dialogue between the strategic needs of our industry partners and the goals of the research team. UK FIRES aims both to have maximum practical impact and to target its research effort by delivering the work collaboratively.
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UK FIRES is closely connected to the UK's Catapult network and through Policy Champion Laura Sandys will be an active player in Resource Efficiency policy in national and regional government, and with the network of influencers around policy developments.
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UK FIRES will connect to all relevant UK activities on Resource Efficiency through an annual forum to share best practice and innovation.

The central diagram, 'Living Lab', consists of four overlapping circles:

- 1. Opportunity mapping** (purple circle): Eliminating waste
- 2. Resource observatory** (blue circle): Overcoming information deficit
- 3. Innovation pathways** (green circle): Future fit products, processes and services
- 4. Responsive strategic analysis** (light green circle): Holistic strategy and policy

The 'Living Lab' text is located in the center where all four circles overlap.

Surrounding the diagram are 21 portraits of experts, each with a caption:

- Professor Sam Turner: CTO High Value Manufacturing Catapult
- Dr Rick Lupton: Probabilistic system modelling, Bath
- Professor Tim Ibell: Material efficiency in structures, Bath
- Dr Cyrille Dunant: Material use in construction, Cambridge
- Laura Sandys: Policy champion
- Dr Philippa Horton: Industrial liaison
- Professor Hamish Low: Economics and Policy, Oxford
- Professor Ian Horrocks: Data Science, Oxford
- Professor Teppo Felin: Corporate Strategy, Oxford
- Dr Jonanthan Cullen: Metrics of resource use, Cambridge
- Dr André Serrenho: Material systems analysis, Cambridge
- Professor Serena Best: Chair of International Advisory Board
- Dr Christopher Cleaver: New forming processes, Cambridge
- Professor Adam Clare: New manufacturing processes, Nottingham
- Professor Michael Ward: Manufacturing innovation, Strathclyde
- Professor Jianguo Lin: Metals processing, Imperial College
- Professor Julian Allwood: Principal Investigator, Cambridge

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 and developing “resource ingenuity” as they pursue Resource Efficiency in practice.

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

- ▼ Quarterly meetings of the Living Lab, in which members across the bulk materials supply chains 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 Annual UK FIRES Resource Efficiency Forum.

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

What our industrial partners say about UK FIRES

“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**

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