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# The National Centre for Infrastructure Materials

The **National Centre for Infrastructure Materials** combines the expertise of Imperial College London and the Universities of Manchester and Leeds, providing world-leading facilities to UK industry and academia for research into the performance of existing and novel infrastructure materials.

## Facilities

**Imperial Centre for Infrastructure Materials (Imperial College London)** is a new suite of laboratories (**Advanced Infrastructure Materials Lab**) focusing on producing, processing, imaging, analysing and testing infrastructure materials. The aim is to provide advanced techniques that are not readily available to infrastructure materials researchers in the UK.

**Leeds Centre for Ageing of Infrastructure Materials (University of Leeds)** is a networked suite of facilities to research the ageing and deterioration of a whole suite of infrastructure materials. A range of lab-scale exposure facilities is coupled with large-scale environmental chambers. These facilities allow accelerated ageing of common and novel materials under a range of simulated environments. The Centre will also include a field exposure site with full meteorological monitoring for the long-term exposure of materials.

**UKCRIC Infrastructure Materials in Demanding Environments Lab (University of Manchester)** provides unique facilities to quantify the high temperature mechanical properties of materials under multi-axial loading conditions, and mechanical properties of materials under combined high temperatures and high strain rates. These facilities enable investigations of the structural performance of materials exposed to extreme loading conditions of fire, impact and blast.

## Purpose

Global spend on new economic infrastructure by 2025 is expected to be about £5.3 trillion with £483 billion planned in the UK. Most of the current infrastructure has been built over the last 300 years and 80% of that will exist in 2050, the time by which the UK must meet its 80% emissions reductions, as enshrined in the 2008 Climate Change Act. Some 50% of the UK's annual

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construction budget is spent on infrastructure maintenance and repair. Climate change will accelerate degradation of existing infrastructure materials; to provide resilience, existing materials must be reinforced to cope, and new infrastructure materials must be designed to endure. To maintain and enhance a productive, connected, resilient and healthy society investing in infrastructure material research is thus critical.

Significant quantities of materials are used for infrastructure—and consequently the contribution of infrastructure materials to greenhouse gas emissions can be considerable. For example, production of 3.4 billion tonnes of Portland cement per year is the source of -6% of anthropogenic carbon dioxide emissions, while the 0.3 billion tonnes of steel used for construction contributes a further 2%. Therefore, optimal use of materials for infrastructure, both in terms of materials efficiency and improved longevity, can make a considerable contribution both to reduce global GHG emissions and avoid depletion of primary resources.

Many of the materials used today have been used for centuries, offering a wealth of performance data, both for fresh materials and for those which have been subject to a diverse range of loading and environmental conditions. This knowledge has enabled material performance and workmanship to evolve, allowing the construction industry to create more efficient and effective new structures. New materials and new construction methods have been designed in response to increased performance requirements, but there is a pressing need for scientific research that provides the underlying knowledge to support the adoption of these materials in order to address increasing resource scarcity, urbanization and zero carbon goals.

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