

ACCESSING INTERNATIONAL MARKETS

CONTAMINATED LAND AND REMEDIATION: A WORLD-CLASS INDUSTRY

Hit the world running ^{UK}

INTRODUCTION

This brochure highlights the UK's strengths and experience in the contaminated land and remediation (CLR) industry, part of the country's transition to a low carbon economy.

Other brochures are available that provide an overview of the UK's environment and water sector:

- Waste management and recycling
- Waste to energy
- Air pollution control
- Environmental instrumentation, monitoring and analysis
- Water and wastewater.



Above: Construction of London 2012 Olympic Stadium on former contaminated land site.

LEADING THE UK'S LOW CARBON TRANSITION

INTRODUCTION

LEADING THE UK'S LOW CARBON TRANSITION

THE INDUSTRY

UK CAPABILITIES

REGULATION

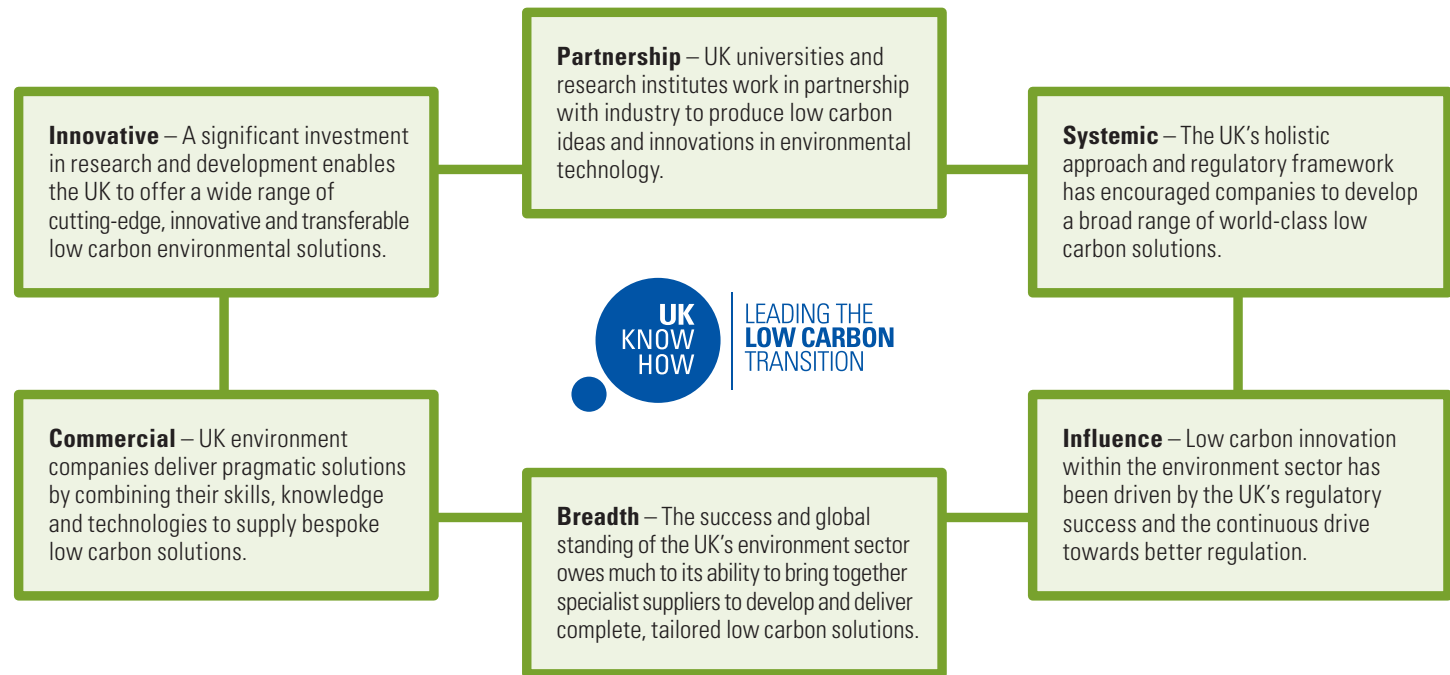
INNOVATION AND PARTNERSHIP

CASE STUDIES

CONTACT US

The UK is rapidly becoming a global hub for world-class low carbon solutions and green technologies. Within the environment and water sector, the UK offers knowledge, technology and experience to bring about incremental and sizeable reductions in carbon emissions – a low carbon consultancy

on a big scale. With a progressive business and policy environment that fosters carbon reduction, the UK is designing and developing the solutions that will increasingly prove valuable to international partners looking to reduce and manage their own emissions.



INTRODUCTION

LEADING THE UK'S LOW CARBON TRANSITION

THE INDUSTRY

UK CAPABILITIES

REGULATION

INNOVATION AND PARTNERSHIP

CASE STUDIES

CONTACT US

The UK is a world leader in contaminated land management and remediation, delivering services to clients across the globe. The sector is worth over £1 billion per year and comprises some 220 companies, including niche specialist and multidisciplinary consultancies, technology providers, contractors, equipment suppliers and laboratories. They are complemented by expert legal, financial and insurance firms.

The UK's expertise in contaminated land management has been borne out of necessity. As the first industrialised country in the world, it is estimated that as many as 370,000 sites covering an area of over 400,000 hectares are potentially contaminated land. Often located in urban areas and waterfronts, this is largely a legacy of the Industrial Revolution and the mining industry. To date, some 67,000 hectares have been identified as contaminated, with over 34,000 hectares successfully remediated.

With a shortage of development space, the UK has become a world-leading expert in the re-use and regeneration of contaminated and derelict land, providing sustainable redevelopment and economic benefit. Prestigious sites and events such as the 2000 Manchester Commonwealth Games, the 2014 Glasgow Commonwealth Games, the Millennium Dome and the London Gateway port have been, or are due to be, developed on contaminated land. The ultimate regeneration project is the 312-hectare London 2012 Olympic Park, where over 800,000m³ of contaminated soil has been treated for re-use as part of the enabling works to provide a development platform. Over 90,000m³ of contaminated water has also been cleaned up to date.

THE UK HAS BECOME A WORLD-LEADING EXPERT IN THE RE-USE AND REGENERATION OF CONTAMINATED AND DERELICT LAND

UK EXPERTISE

The UK has expertise in remediating a range of contaminated industrial sites, either for regeneration or the reduction of environmental liability on working facilities. Such sites include:

- Landfills
- Oil refineries
- Steel works
- Heavy manufacturing sites
- Collieries and coke works
- Gas production facilities
- Chemical factories
- Scrap yards
- Petrol filling stations.

The UK also has very specific global expertise in the clearance of sites impacted with unexploded ordnance both on the ground and at sea, expertise that has been deployed in over 40 countries across the world.

INTRODUCTION

LEADING THE UK'S LOW CARBON TRANSITION

THE INDUSTRY

UK CAPABILITIES

REGULATION

INNOVATION AND PARTNERSHIP

CASE STUDIES

CONTACT US

Further evidence of the UK's regeneration and re-use expertise is provided by the Government-imposed target of having 60 per cent of all new housing constructed on brownfield land (land which has had a previous use but may not be contaminated). This is a target that has been consistently surpassed, with 80 per cent re-use being achieved during 2008.

As part of the UK's drive to a low carbon economy and its obligations under EU environmental legislation such as the Landfill Directive, the UK Government has created an environment to encourage world-class technology-driven low carbon solutions for the remediation of contaminated sites. The UK has therefore developed a broad range of green technology providers offering physical, biological, chemical and thermal solutions for the remediation of contaminated land.

SOLVING GLOBAL PROBLEMS ON A LOCAL SCALE

Commercially driven and entrepreneurially minded, the UK contaminated land and remediation industry is ready to respond quickly to business opportunities overseas. Offering world-leading consultancy, as well as cutting-edge products and technology, its adaptable and innovative solutions can help to address any CLR challenge, wherever it may be in the world.



Above: Chemical oxidation by in-situ soil mixing on former chemical works.

INTRODUCTION

LEADING THE UK'S LOW CARBON TRANSITION

THE INDUSTRY

UK CAPABILITIES

REGULATION

INNOVATION AND PARTNERSHIP

CASE STUDIES

CONTACT US

The UK is well placed to advise and supply customers with bespoke low carbon solutions to manage their environmental liabilities, in a pragmatic and cost-effective way.

Thanks to the country's long industrial heritage, UK consultants have been exposed to a wide range of contaminating industries and the full spectrum of contaminants in both man-made and complex natural soil and groundwater settings. Industrial sites in the UK are historically built close to transport links, ensuring that through centuries of development the majority of sites have had a complex mixture of multiple historic and contaminative uses. The UK has therefore developed world-leading expertise in the investigation and assessment of large, complex multi-use sites, such as the London 2012 Olympic Park.

The UK has particular strengths in:

- Site investigation and soil and groundwater characterisation
- Certified sampling and analysis
- On-site rapid testing
- Data logging and interpretation
- Qualitative and quantitative risk assessment
- Conceptual model development
- Remediation options appraisal and selection
- Verification and validation.

The whole process, from investigation of the site to the selection of the most appropriate remedial options, is increasingly tied to achieving a more sustainable land management solution. Expertise in risk assessment against suitable-for-use criteria ensures the UK is comfortable in using Monitored Natural Attenuation – an approach that requires in-depth knowledge of fate and transport mechanisms and a true and pragmatic assessment of risk.



Above: Thermal enhanced vacuum extraction by radio frequency heating.

INTRODUCTION

LEADING THE UK'S LOW CARBON TRANSITION

THE INDUSTRY

UK CAPABILITIES

REGULATION

INNOVATION AND PARTNERSHIP

CASE STUDIES

CONTACT US

Many leading UK consultants have developed carbon calculators to allow their clients to make truly informed decisions in a global low carbon context. However, carbon calculating is only one part of the jigsaw when looking at sustainable practices. The UK has embraced the concept of sustainable land management and has formed the Sustainable Remediation Forum UK (SuRF-UK), under the leadership of CL:AIRE. SuRF-UK defines the assessment of sustainable remediation as:

“the practice of demonstrating, in terms of environmental, economic and social indicators, that the benefit of undertaking remediation is greater than its impact and that the optimum remediation solution is selected through the use of a balanced decision-making process.”

SUSTAINABLE LOW CARBON SOLUTIONS

The London 2012 Olympic Park has embraced sustainability and has set itself ambitious targets of lowering carbon emissions by at least 50 per cent, reducing potable water use by 40 per cent, importing over 50 per cent by weight of construction materials by water and rail, and obtaining 20 per cent of construction materials from recycled and secondary sources. The Park is making good progress towards achieving these sustainability goals. Its state-of-the-art Energy Centre, for example, includes biomass (woodchip) boilers and Combined Cooling Heat and Power plants (gas), that are 30 per cent more efficient than traditional generation methods.



Above: River diversion around contaminated lagoons on former coking works.

INTRODUCTION

LEADING THE UK'S LOW CARBON TRANSITION

THE INDUSTRY

UK CAPABILITIES

REGULATION

INNOVATION AND PARTNERSHIP

CASE STUDIES

CONTACT US

Contaminated land in the UK is regulated in accordance with Part IIA of the Environmental Protection Act (1990). This regulatory regime provides a system for the identification and remediation of land where historical contamination is causing unacceptable risks to human health, or the wider environment in the context of the current use and circumstances of that land. The regulation is based on the 'polluter pays' principle. The vast majority of contaminated land remediation in the UK is undertaken on a voluntary basis, the greatest proportion of which is via the planning process in relation to the re-use and regeneration of such sites.

The UK has developed a recommended approach to the assessment and management of land contamination. Detailed in *The Model Procedures for the Management of Land Contamination (CLR11)*, published by the Department of Environment, Food and Rural Affairs and the Environment Agency, it is a robust pragmatic methodology using a risk-based approach.

In support of this system, organisations such as CL:AIRE, CIRIA and ICE have assisted the Contaminated Land and Remediation industry by advising and reporting on the UK's best examples of innovation and remediation. They also provide guidance on the investigation, risk assessment, remediation and validation and verification of contaminated land.

- Guiding Principles for Contaminated Land
- Remedial Treatment of Contaminated Land, Volumes 1 – 12, CIRIA
- ICE Design and Practice Guides: Contaminated Land – investigation, assessment and remediation
- CL:AIRE Publications – including Technology and Demonstration Reports and bulletins.

The way that the UK approaches contaminated land management, working within a risk-based pragmatic regulatory regime, allows contamination to be dealt with in a more holistic and sustainable way, thus often providing simple and more cost-effective solutions.

A key strength of the UK contaminated land sector is the ability of its environmental consultants and lawyers to understand different regulatory regimes across the globe and how these can impact on liability. Thanks to the UK's status as a hub for international business, its consultancies have extensive capability in the global arena, ensuring that the UK is the world centre for corporate mergers and acquisitions involving environmental liability transfer.

INTRODUCTION

LEADING THE UK'S LOW CARBON TRANSITION

THE INDUSTRY

UK CAPABILITIES

REGULATION

INNOVATION AND PARTNERSHIP

— WORLD-CLASS INNOVATION

— WORKING IN PARTNERSHIP

CASE STUDIES

CONTACT US

REMEDIATION

When land has been identified as contaminated and posing a risk to humans and/or the environment then some form of remedial action must be undertaken. UK companies have remediated over 33,000 hectares of contaminated land in the UK alone, utilising a wide range of green technologies across physical, biological, chemical and thermal treatments for the remediation of both soil and groundwater.



Above: Thermal desorption plant for treatment of heavily contaminated soil from coking works.

The complex heterogeneous geological and hydro-geological nature of the contaminated ground in question has ensured that the UK has developed the following strengths:

- Adaptation and application of remedial solutions in difficult site settings
- Provision of a treatment train approach (switching between applications to achieve best outcomes)
- Thermal-enhanced soil vapour extraction utilising techniques such as steam injection, conductive heating and radio frequency heating
- Permeable reactive barriers.

UK COMPANIES HAVE REMEDIATED OVER 33,000 HECTARES OF CONTAMINATED LAND IN THE UK ALONE

As a result of its highly active and innovative technology sector, the UK has led the way in the licensing of technology providers and sites. The verification and validation of remedial technologies in the UK has been pioneered by CL:AIRE, which has reported on numerous technology demonstration projects showcasing new and innovative remedial treatment solutions.

INTRODUCTION

LEADING THE UK'S LOW CARBON TRANSITION

THE INDUSTRY

UK CAPABILITIES

REGULATION

INNOVATION AND PARTNERSHIP

— WORLD-CLASS INNOVATION

— WORKING IN PARTNERSHIP

CASE STUDIES

CONTACT US

Delivering client solutions in contaminated land and the associated environmental liabilities requires the coming together of many different areas of expertise:

- **Financial:** The UK financial services sector is experienced in the funding of even the most complex CLR projects. In particular, it has expertise in and knowledge of forming successful Public Private Partnerships to deliver regeneration.
- **Development:** UK development companies are well versed in dealing with contamination and legacy issues to bring land back into economic use.
- **Legal:** The UK has a wealth of legal experts qualified in offering advice on complex contaminated land issues and in the allocation of liabilities in association with differing regulatory regimes.
- **Insurance:** UK insurance companies have provided policies across the globe to provide risk cover for environmental liabilities and projects utilising a range of specialist products and solutions.

The UK's expertise across the spectrum of affiliated sectors ensures the country is **the global hub for the mergers and acquisitions markets** involving environmental liability transfer.

KEY ORGANISATIONS

CIRIA (Construction Industry Research and Information Association)

Operating across market sectors and disciplines, CIRIA delivers a programme of business improvement services and research activities for members and those engaged with the delivery and operation of the built environment.

www.ciria.org

CL:AIRE (Contaminated Land: Applications in Real Environments)

Aims to stimulate the regeneration of contaminated land in the UK by raising awareness of, and confidence in, practical sustainable remediation technologies and in the provision of training, qualifications and guidance on all aspects of contaminated land.

www.claire.co.uk

Environment Agency

Committed to protecting and improving the environment, and to promoting sustainable development.

www.environment-agency.gov.uk

Technology Strategy Board – Environmental Sustainability Knowledge Transfer Network

Brings together people from businesses, universities, research, finance and technology organisations to stimulate innovation in a specific environmental field through knowledge transfer.

<http://ktn.innovateuk.org>

DELIVERING COMPLEX INFRASTRUCTURE PLATFORMS IN A SUSTAINABLE WAY

INTRODUCTION

LEADING THE UK'S LOW CARBON TRANSITION

THE INDUSTRY

UK CAPABILITIES

REGULATION

INNOVATION AND PARTNERSHIP

CASE STUDIES

- DELIVERING COMPLEX INFRASTRUCTURE PLATFORMS IN A SUSTAINABLE WAY
 - IDENTIFYING OPTIMUM SUSTAINABLE SOLUTIONS
 - GREEN TECHNOLOGIES PROVIDES A LOW CARBON SOLUTION
-

CONTACT US

ATKINS

www.atkinsglobal.com

Working with the Olympic Delivery Authority (ODA), UK engineering and design consultancy Atkins has led the engineering and project managed the remediation of over two million cubic metres of soil to deliver a validated and stable platform for the construction of the London 2012 Olympic Park. It has also been helping to re-use over 80 per cent of soil on site to date in one of the largest remediation projects in Europe. All of this work is helping the ODA to achieve its sustainability objectives and to ensure London 2012 can meet its tough sustainability commitments.



Above: Creation of building platform for London 2012 Olympic Stadium on recovered land.

IDENTIFYING OPTIMUM SUSTAINABLE SOLUTIONS

INTRODUCTION

LEADING THE UK'S LOW CARBON TRANSITION

THE INDUSTRY

UK CAPABILITIES

REGULATION

INNOVATION AND PARTNERSHIP

CASE STUDIES

- DELIVERING COMPLEX INFRASTRUCTURE PLATFORMS IN A SUSTAINABLE WAY
 - **IDENTIFYING OPTIMUM SUSTAINABLE SOLUTIONS**
 - GREEN TECHNOLOGIES PROVIDES A LOW CARBON SOLUTION
-

CONTACT US

CHURNGOLD REMEDIATION LTD

www.churngold.com

Churngold Remediation, a UK provider of advanced technology solutions for the treatment of contaminated land, undertook remediation of a former waterside industrial area including landfills, petroleum storage yard, waste transfer stations, a scrap yard and railway. The remediation was part of a large scale infrastructure enabling works for the Cardiff International Sports Village in Cardiff Bay, South Wales.

A three phase programme was undertaken in order to treat the identified contamination comprising:

- Excavation, crushing and re-use of 12,000m³ of concrete
- Excavation and bioremediation of 27,000m³ of hydrocarbon impacted soils
- Chemical treatment and eradication of 18,000m³ of Japanese Knotweed infested soils
- Removal of floating diesel free product from exposed groundwater table

- In-situ treatment of 68,000m³ of groundwater impacted with dissolved phase hydrocarbons utilizing state of the art bio-electrolysis
- Slow release oxygen compound spread in the base of excavations to aid long term biological polishing of latent contamination
- Installation of leachate and gas collection trench for dispersal of landfill gas
- Dynamic compaction of landfill to reduce long term settlement.

The site works were completed in conjunction with re-profiling of the site involving the excavation, movement and validation of 280,000m³ of soils and the installation of 1.2km of sheet pile wall around the perimeter of the site, to create a new waterfront path around the development site.



Above: Control panel for in situ bioremediation system of direct oxygen infusion cells.

GREEN TECHNOLOGIES PROVIDES A LOW CARBON SOLUTION

INTRODUCTION

LEADING THE UK'S LOW CARBON TRANSITION

THE INDUSTRY

UK CAPABILITIES

REGULATION

INNOVATION AND PARTNERSHIP

CASE STUDIES

- DELIVERING COMPLEX INFRASTRUCTURE PLATFORMS IN A SUSTAINABLE WAY
- IDENTIFYING OPTIMUM SUSTAINABLE SOLUTIONS
- **GREEN TECHNOLOGIES PROVIDES A LOW CARBON SOLUTION**

CONTACT US

WSP GROUP

www.wspgroup.com

UK-based global consultancy WSP Group recently secured the environment and waste management permits necessary for the development of bioremediation plants and landfills in three facilities in Romania.

WSP performed the assessment of the possible environmental impact of the planned facilities; the development of mitigation measures where appropriate; and the issuance of the environmental agreement required for the development to proceed.

All the necessary reports and supplementary studies were successfully completed, including geotechnical and environmental intrusive investigations. The reports were then submitted to the appropriate local authorities in pursuit of the relevant environmental permits.



Above: Ex-situ bioremediation of contaminated soils from former fuel depot.

HOW UKTI CAN HELP

INTRODUCTION

LEADING THE UK'S LOW CARBON TRANSITION

THE INDUSTRY

UK CAPABILITIES

REGULATION

INNOVATION AND PARTNERSHIP

CASE STUDIES

CONTACT US

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UKTI offers expertise and contacts through its extensive network of specialists in the UK, and in British embassies and other diplomatic offices around the world. We provide companies with the tools they require to be competitive on the world stage.

UKTI is committed to helping companies across the globe enhance their awareness and understanding of the many products and services offered by UK suppliers.

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