The Chemical Engineer

SOURCING EXPERTISE
How to select subject matter experts

CODE GREEN
Contractors need stability to execute climate change solutions

EXPERTS INSIDE
Comprehensive listings and profiles of consultants and contractors

Consultants & Contractors Guide 2023

OTTO SIMON

Independent engineering consultancy & project delivery company based in Manchester.

Otto Simon provides engineering, consultancy and project delivery services across all stages of project development. We work with Emergent Technology (including Hydrogen, Biotech, CCUS & Energy Storage), Chemical Processing Plants and Manufacturing Facilites, Thermal Industries, and Coke & By-Products.

- Process-led multi-discipline engineering team
- Process & Functional Safety specialists
- Regulatory compliance expertise
- Construction & Commissioning staff
- RoSPA Gold Award for outstanding H&S
- ISO 9001 & 45001 certification

Consultancy

Engineering

Project Delivery

Operation & Maintenance

Contact us:

Darryl Nevitt
0161 491 7440
DNevitt@ottosimon.co.uk

www.ottosimon.co.uk

Reflect and Project

ADAM DUCKETT welcomes you to this year's Consultants & Contractors Guide

2022 has been an important year for IChemE, with the Institution celebrating its one hundredth year. The Centenary has been an opportunity for our community to reflect on the contributions made and those still to make.

We're following suit in this year's Consultants & Contractors Guide. John Challenger looks at the history of IChemE's evergreen *Forms of Contract* and trails the new releases that are under development and coming soon. We also hear from Tracey Shelley about the challenges facing and opportunities available for contractors when it comes to supporting the push for decarbonisation.

As always, a huge thanks to the companies who advertise in this guide. Please do take the time to read their profiles and contact them to discuss how they can help you achieve success.

Contents

COLLECTIVELY OLG CAN DELIVER END-TO-END PROJECTS FROM FEASIBILITY, THROUGH CONCEPT DESIGN, FEED, DETAILED DESIGN, FABRICATION, CONSTRUCTION MANAGEMENT TO COMMISSIONING AND QUALIFICATION.

OLG bpe

T: 01962 717070
E: enquiries@olguk.com
www.olgconsulting.co.uk

EXCELLENCE IN ENGINEERING

Leading the way in project delivery for over 20 years, OLG Consulting is a UK leader in chemical and biochemical engineering design. Its deep knowledge of process engineering and the principles behind it is unrivalled.

It's why some of the most significant Process Industry Organisations in the world rely on our award-winning expertise from Start-ups to full-scale manufacturing plants to help make their processes as well-designed, efficient, economic, safe and compliant as they can be.

OUR CAPABILITIES

- Process systems design
- Capex project management
- Technology assessments
- Scale-up and process development
- Process safety and compliance
- Process simulation and modelling
- Process operational support and troubleshooting
- Process manufacturing strategy and master planning

Consulting Engineering Recruitment Media Support

OLG Consulting

Leading the way in chemical and biochemical engineering design

Part of OLG, www.olguk.com

ADDRESS

Headquarters
6 Wessex Business Park,
Wessex Way, Winchester
SO21 1WP

North West Office
The Innovation Centre, Daresbury,
Keckwick Lane, Daresbury, Cheshire,
WA4 4FS

TELEPHONE/EMAIL/WEBSITE

+44 (0)1962 717070
enquiries@olguk.com
www.olgconsulting.co.uk

NUMBER OF STAFF

40 directly (500+ across group)

SENIOR DIRECTORS

Chairman – Jeff Laird
Managing Director – Bill Warbey

ANNUAL TURNOVER

£3m directly (£24m+ across group)

SERVICES

OLG Consulting: Process Engineering Consultancy, Process design, Capital Project Management, Process Technology evaluations, Scale-up, Process Safety and compliance, Process Simulation, Process operations including optimisation and sustainability, Process Automation, Manufacturing strategy and Site master planning.

Wider OLG Capabilities: Multi-disciplinary engineering design, project management, surveying, pipework fabrication, installation, and technical recruitment.

CLIENTS

- Biotechnology
- Pharmaceuticals
- Fine/speciality chemicals
- Advanced materials
- Food and drinks
- Renewable energy and utilities
- Oil & gas
- Nuclear

PROJECTS

Process engineering design – Concept/feasibility studies, Front-end design and Detailed Engineering, Commissioning and Validation, Process optimisation, Site master planning, Process safety consultancy – ATEX/DSEAR, SIL/LOPA, HAZOP/HAZID

Multi-disciplinary engineering design including mechanical, piping, stress, electrical, instrumentation & control, civil/structural engineering and project management expertise in-house. Piping fabrication and installation from our dedicated facilities in Grimsby and Immingham.

Profile

OLG Consulting offers a full range of process engineering services and has developed a unique approach to concept studies, based on interactive workshops and iterative design steps. These workshops bring everyone together to efficiently look at every possible consideration of a project before deciding on the best approach. It's this informed decision making that ensures its clients' projects start off on the right path to meet the defined objectives.

OLG Consulting's team of flexible process engineering specialists can assist on any level – from simple one-off consultations to the design, installation and commissioning of complete projects. The company firmly believes sharing best practice helps the entire industry to progress and develop. It's why it's committed to sharing our Library of insightful whitepapers for free.

The research papers cover a range of topical issues in process engineering, including continuous processing, filtration, scale-up and LOPA/high containment. The full list is available to view at https://www.olgconsulting.co.uk/whitepapers/. There you can also request a complimentary digital copy of each whitepaper.

OLG is a privately owned group of businesses dedicated to providing the very best Integrated Engineering and Recruitment Solutions throughout the UK. OLG comprises of 5 companies – OLG Consulting, OLG Engineering, OLG Recruitment, OLG Media and OLG Support – all of which work independently and in collaboration to deliver valuable services to the Oil & Gas, Biotechnology, Pharmaceutical, Chemical, Utility, Renewable, Steel and Nuclear Industries.

Abbott Risk Consulting

KEEPING PEOPLE AND THEIR ENVIRONMENT SAFE.

ARC is an award winning and global supplier of Safety and Risk Engineering Consultancy to services in the Oil, Gas and Chemical, Nuclear, Defence and Transport sector.

ARC is entirely employee owned and committed to providing quality solutions whilst supporting sustainable solutions.

W: consultarc.com E: info@consultarc.com

Abbott Risk Consulting

Supporting clients with all aspects of projects from design to decommission

ADDRESS

Headquarters
11 Albyn Place,
Edinburgh,
EH2 4NG

EMAIL

info@consultarc.com

WEBSITE

www.consultarc.com

NUMBER OF STAFF

150

ANNUAL TURNOVER

£29m

SENIOR DIRECTORS

Managing Director – John Abbott
Operations Director – Zoe Sheavills
Finance Director – Alaistair Gillies

SERVICES

Safety Engineering, Cyber Security (IEC 62443), Assurance and Verification, Human factors and Ergonomics, Engineering Mechanics, Risk Management.

INDUSTRIES

- Oil, Gas & Chemicals
- Clean & Renewable Energy
- Nuclear
- Defence
- Transportation
- Cyber Security

PROJECTS

Providing safety assessments in design, operations and decommissioning. Combining multi-discipline engineering with broad operations experience ensuring plants are operating safely. Integrating human factors into the design and operation of facilities. Utilising advanced techniques to assess the response of structures to accidents or extreme loads. Application of formal risk management. Ensuring control system cyber security, throughout the facility lifecycle.

Profile

Abbott Risk Consulting (ARC) is an award-winning safety engineering and risk management consultancy, headquartered in Edinburgh and operating globally from offices throughout the UK and Australia. ARC operates across several highly hazardous sectors including oil and gas, nuclear, defence, rail and renewables and is expanding into cyber security and clean energies such as green hydrogen.

ARC supports clients with all aspects of a project, from design to decommission.

Since being founded in 2002 by Managing Director John Abbott, ARC has been committed to sustainable goals for the business, people and planet. ARC has partnered with Cool Earth, a charity that works alongside rainforest communities to halt deforestation and its impact on climate change. ARC has also donated to Yalari, a charity committed to providing education to children in indigenous communities throughout Australia and is looking to carve a pathway from education to industry.

John Abbott credits the success of ARC to its people: "We set out to achieve a successful, sustainable consultancy with happy people willing to go the extra mile for their clients."

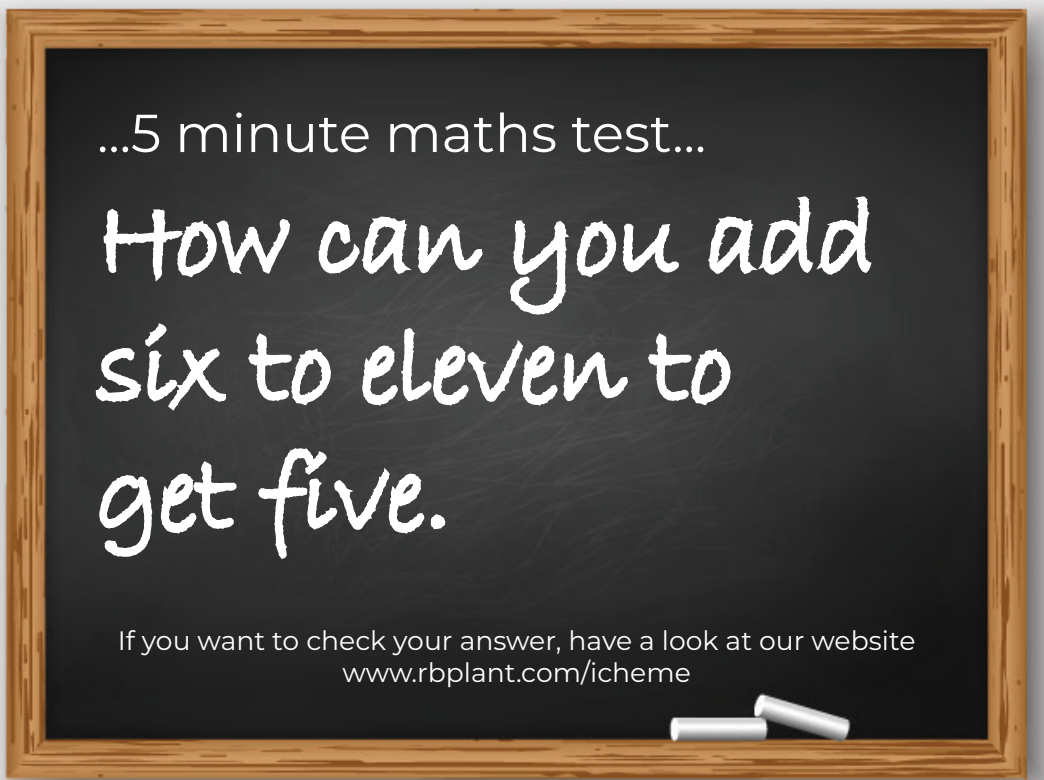
ARC's typical services include, Safety Engineering, Cyber security (IEC 62443), Assurance and Verification, Human Factors and Ergonomics, Computational Fluid Dynamics (CFD), Engineering Mechanics, and Risk Management.

ARC is an agile, friendly and thriving consultancy with a turnover of £29m in 2021 and 150+ employees in 2022.

ARC is 100% employee owned and recognised by the *Sunday Times* as one of the Best Companies to Work For in the UK, achieving a ranking of 1st in the Engineering and Construction sector and 4th overall in 2021.

Solving complex engineering problems for over 50 years.

RB Plant
SINCE 1969



We understand that

- all clients are different
- every internal team is different
- their requirements are always different
- and all projects are different
- so every solution we deliver is different

We create individually tailored engineering solutions through our biggest asset - our team.

Freeing you to focus on your biggest asset - your business.

RBPlant - engineering excellence for over 50 years.

mail@rb-plant.co.uk - 01622 858 387 - www.rbplant.com

RB Plant

Process led design, engineering consultancy and project delivery

ADDRESS
Headquarters
RB House, The Square, Lenham, Maidstone, Kent, ME17 2PG

TELEPHONE/ EMAIL/ WEBSITE
+44 (0)1622 858387
mail@rb-plant.co.uk
https://rbplant.com/about-us/contact/

NUMBER OF STAFF
50

ANNUAL TURNOVER
£4.5m

SENIOR DIRECTORS
Chairman – Geoff Raisbeck
Managing Director – Simon Denniss

SERVICES
EPCM, feasibility, concept and CAPEX studies, FEED, detailed design, project/construction, health and safety, construction management, procurement, validation, commissioning, COMAH, HAZOP, HAZID, SIL/LOPA, HAC/ ATEX/DSEAR, functional safety, environmental management.

Engineering
Process, mechanical, electrical, control & automation, instrumentation, civil & structural, 3D modelling, HVAC

Innovation
R&D, scale-up, technology transfer, plant optimisation, software simulation

SECTORS
- Alternative/green energy
- Oil & gas
- Chemicals
- Pharmaceuticals and life sciences
- Food and drink

PROJECTS & CLIENTS
Projects range from small scale consultancy to £100m capital projects. From single reimbursable resource through to complete project delivery with fees up to £5m.

Clients range from small/medium chemical manufacturers through to large blue-chip chemical, catalyst, and pharmaceutical companies.

Profile

RB Plant is a process-led, multi-disciplinary organisation and can provide individual or complete project team resourcing. We can fulfil all stages of a project lifecycle from start to finish or any elements in-between and this is why clients across a diverse range of sectors have repeatedly come back to us to support their businesses for over 50 years.

Quite simply, this is a result of RB Plant adopting a bespoke approach because we understand that each client's projects, challenges, ethos, systems, risks, and particularly their people, are unique.

We have successfully applied this unique approach regardless of:

- Conventional or innovative approaches being required
- Project size and complexity
- Speed of response and flexibility required
- Extent of internal interfacing with clients' internal processes and operations
- Clients' internal resource capability and capacity
- Technology specialism – our diverse sector experience and cross-fertilisation of ideas has benefitted clients for over 50 years.

We start by assessing what stage a client's project is at. In the early stages, if more definition and evaluation is necessary, we adopt a concept scoping study. This would typically involve key team members from both the client and RB Plant engaging in a face-to-face workshop to scope out and define deliverables, timescales, risks, and costs.

The benefit of this is that key risks, confirmation of key data and anomalies can be addressed as early as possible. Accordingly, and by use of ranking and scoring techniques, the most technically and commercially viable option can be agreed and pursued, eliminating other options and minimising study costs.

Since 2017 alone, we have executed no fewer than 30 major FEED/feasibility/concept studies many of which we have managed through to completion.

We can provide any level of engagement from ad-hoc small-scale consultations through to complete projects: design and detail, construction, installation and commissioning, validation, and where required necessary start-up support.

So why not allow our biggest asset – our team, free you to focus on your biggest asset – your business?

How to Source Expertise

GRANT WELLWOOD offers up a method for selecting how you source subject matter experts

THE timeliness and quality of your decision-making characterise your success in today's business environment. Decisions are predictions about the future based on the knowledge of the past. Therefore, the quality of experience matters. Tapping into this experience is particularly important for cross-disciplinary technical decisions, so how can decision-makers access subject matter expertise when it is not available in-house?

OPTIONS

When it comes to accessing subject matter expertise, there are four broad options:

Insourcing:
Employing an expert as a full-time staffer who provides the service from within the organisation to internal clients. The expert reports to and is managed by the client organisation. This has often been the instinctive option, but there are others.

Outsourcing:
The expert is employed by a third-party organisation, such as a consultancy, and is made available on a per-assignment basis according to the contract terms. The expert in these situations reports to and is managed by a third-party organisation. Technically, original equipment manufacturer (OEM) expertise also falls under this heading, but this variation has not been considered as we look for independence. Note that this category also includes the emerging phenomenon of accessing professional services via the gig economy.

Crowdsourcing:
In this model, elements of the solution your company is seeking to develop are obtained by soliciting contributions from a large group of people, especially from online communities. Those involved may or may not be subject matter experts (SMEs), and the output is usually conceptual (thought bubbles) rather than developed and deeply-considered solutions.

RAS

RISK & HAZARD MANAGEMENT

Understanding and facilitating the effective management of risk is our core business. Our expertise covers the full range of risk assessment and management services.

SAFETY BUSINESS ENVIRONMENT

Only when the risk facing an organisation is well understood can it be effectively managed. Key to the successful identification, assessment and management of risk is engagement with the right people, using the right processes at the right time. We believe we are different to many of our competitors and our approach is distinctive, we don't always walk the well-trodden path but look at each client's particular risk context and develop a tailored solution, working in partnership with our client.

We work across all aspects of risk, from Quantitative Risk Assessments and Predictive & Consequence modelling, through to the 'softer' risks which may affect an organisation's reputation.

Cogent ASSURED PROVIDER

***Cogent assured providers** – Process Safety Management for Operations (PSMO)*

BowTieXP visual risk assessment

Wolters Kluwer

***Authorized distributor for Wolters Kluwer** – BowTieXP software*

+44 (0) 1244 674 612 · enquiries@ras.ltd.uk · ras.ltd.uk

Co-sourcing:
This more advanced version of outsourcing often creates long-term relationships built on the values of trust, excellent service, and quality. While still a third-party employee (often an independent contractor), the SME is usually assigned to specific clients, which leads to the mutual trust and understanding that differentiates it from the "next available consultant" contracting arrangement. There is also a degree of shared success and responsibility in attaining the goal(s).

Each option has its pros and cons and these depend on your perspective. Therefore, you will need to analyse your options before making a decision.

DECISION CRITERIA

Within the generally accepted framework of most business decisions (timeliness, quality and value), some common criteria for judging SMEs exist. Provided next as thought starters, each possible criterion is accompanied by probing questions to help you decide whether it applies to your situation and, if so, its relative importance.

Timeliness

Time is of the essence when developing processing solutions, especially those supporting existing value chains where the value is getting destroyed by the minute.

Engagement lead time: How long does it take you to access the solution provider and provide the briefing? Does your engagement of an expert need to be competitively tested via internal procurement processes that often involve lengthy discussions about intellectual property?

Availability: Will the expert be ready when you need them? Are they servicing other clients? How scalable is their ability to respond to short notice and high demand? Is engagement sustainable during an economic downturn (ironically, when expert input is most needed)?

Execution time: How long will it take the expert to solve your issues? Can the problem be parallel processed by a team, for example? What proportion of the expert's total time is available for technical problems? Can you get their undivided attention so that they can focus?

Iterations: Can the solution be completed in a single cycle?

History: When it comes to many problems, history often repeats, so recall can be a big timesaver. Does the expert have access to what worked and didn't in the past to avoid reinventing the wheel?

Solution quality

Let's evaluate the practical experience of the subject matter expert.

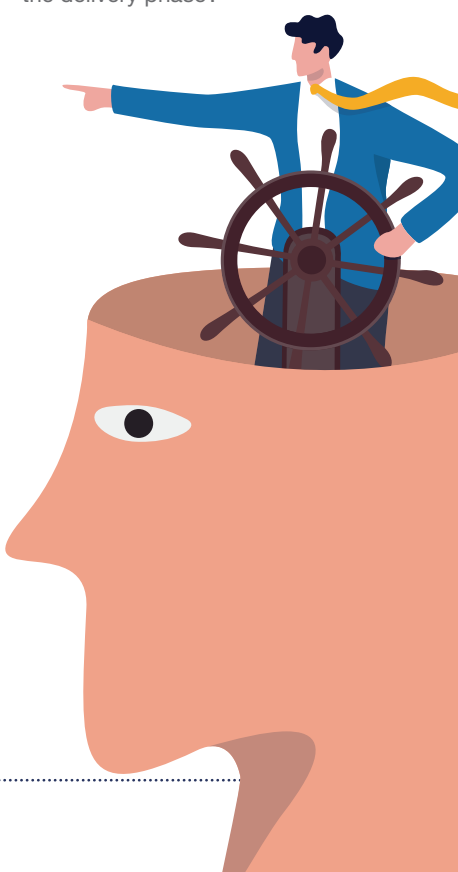
Currency: Is the expert actively plugged into the latest science and engineering developments, or is their expertise frozen in time? Are they a member of IChemE at a level commensurate with their experience?

Innovation *(defined as the conversion of knowledge into profit):* Is their knowledge comprehensive and expansive (international and/or multi-sector) or limited to one industry, or perhaps one operation? Are they familiar/comfortable with ambiguity and knock-on effects? After all, when it comes to process value chains, everything is connected.

Readiness level: Will the solution they provide be a thought bubble or a fully considered, engineered and costed solution that is ready to go?

Objectivity: Can the expert operate without personal biases, emotions, and false beliefs? Will the expert be able to "call it as they see it" without political influence, career impacts, or commissions?

Connectivity: Is the expert connected to OEMs for a seamless transition into the delivery phase?



Are they willing to provide references?

Depth: What will be the residual risk/uncertainty? Will the solution consider uncertainty and incorporate sensitivity analysis? Will the solution be delivered in a manner others can directly use? Will the features be converted into benefits and communicated in a relevant, realistic, and easily understood way?

Completeness: Will the expert help capture lessons associated with the decision (what was considered, rejected, and accepted and on what basis) to enable them to be incorporated into corporate memory? This critical feedback loop is an investment in the future.

Breadth: What is the expert's ability to work across business unit silos to get input data and buy-in by transferring knowledge?

Accountability: Do they stand by delivering what was promised? Do they have any skin in the game? Is the role in the process deliverable, to which they will be held accountable, clear?

Value proposition

This is the cost of getting an expert solution or recommendation.

Total cost: The total cost of getting to a workable solution includes the access costs associated with the multi-iteration/trial-and-error iterations, which are often the hallmark of best endeavours-based "experts". Note that the hourly rate for internal experts is not zero; the actual spend can be significantly higher than externals, especially when realistic overheads and time fragmentation allowances are included. If the internal experts move on, the costs of onboarding them and training replacements in the ways of your organisation need to be included.

Rework: This is the process disruption and cost of failed solutions arising from multiple iterations

Replication/Re-use: If the solution provides a competitive advantage to your organisation, how secure is your investment? What are the chances of it being reprised by your competitor, destroying any competitive advantage?

Flexibility: What will be the utilisation of your expert's time? How easy is it to maximise utilisation given the often bumpy nature of demand for expert input? Having a full-time expert available for the occasional problem can be costly, and getting this balance right in practice is challenging.

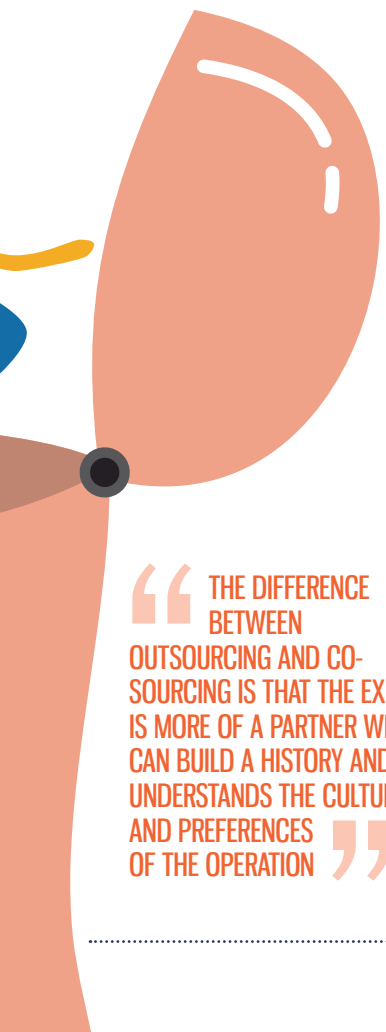
With the criteria identified, we need to weigh their importance to get our best option.

DECIDING

Multi-criteria decision analysis (MCDA) is a valuable tool for this task. In the worked example *(see Figure 1)* typical of many, co-sourcing scored the highest. But let's see why.

The difference between outsourcing and co-sourcing is that the expert is more of a partner who can build a history and understands the culture and preferences of the operation while still offering scalable and high currency resources to generate the best all-around solution. Such a relationship also shortens the engagement process, another highly-weighted criterion, with assignments taking the form of work schedules to a pre-negotiated master service agreement.

The main detractors from the insourcing option relates to true independence and the percentage of time an in-house expert retained within a company can spend on technical issues. In many consultancies, more than 80% of the available hours are available for billable activities.



> "THE DIFFERENCE BETWEEN OUTSOURCING AND CO-SOURCING IS THAT THE EXPERT IS MORE OF A PARTNER WHO CAN BUILD A HISTORY AND UNDERSTANDS THE CULTURE AND PREFERENCES OF THE OPERATION"

BUSINESS CONSIDERATION			ALTERNATE EXPERT ACCESS OPTIONS			
Decision theme	Criterion	Importance Weighting	Outsource	Insource	Co-source	Crowdsource
			Criterion Impact (Score 0–5)			
Timeliness	*Engagement lead time*	4	2	5	5	3
	Availability	4	4	3	4	5
	Execution time	4	4	3	4	1
	Iterations	3	4	2	4	2
	History	3	3	4	4	1
Solution quality	*Currency*	5	5	3	5	5
	Innovation	5	5	3	5	5
	Scope	4	4	3	4	1
	Objectivity	4	4	3	4	5
	Connectivity	4	5	3	5	2
	Delivery depth	4	5	3	5	1
	Completeness	4	4	3	4	1
	Breadth	4	4	3	4	1
	Accountability	5	3	5	4	1
Value proposition	*Absolute cost*	3	3	2	4	5
	Rework	4	4	2	4	1
	Replication/Re-use	4	4	4	4	1
	Flexibility	4	5	3	5	4
Outcomes		***Weighted score***	**291**	**231**	**314**	**183**
		Percentage of perfection	81%	64%	87%	51%

KEY	0	5
Importance weighting	*Low*	*High*
Impact score	*Low-negative*	*High-positive*

FIGURE 1: MCDA WORKED EXAMPLE

In contrast, an operation's administrative and compliance obligations can reduce the time available to work on solutions to less than 50%.

Crowdsourcing, which is very popular at present, scored low in this analysis but why? Even when the crowd involves technical experts, the best that can usually be produced under constrained conditions are thought bubbles. While they are the critical kernel of any solution, they are nevertheless only a minor step towards developing a workable solution. Plus, chasing down thought bubbles is resource intensive. It may provide quick and inexpensive access to expertise but what is provided is often a long way from an implementable solution.

> "THE SUCCESS OF THE CO-SOURCING MODEL ALSO DEPENDS ON HAVING SOMEONE WITHIN THE HOST ORGANISATION WHO CAN SPOT THE NEED FOR AND THEN INTERACT WITH THE EXPERT"

Finally, the success of both the in-sourcing and co-sourcing models also depend on having someone within the host organisation who can spot the need for and then interact with the expert. This link is essential as only someone inside an organisation can truly understand its machinations and constraints. Synergistically, only someone outside your organisation can be truly independent and maintain the experience required to make the best decisions possible.

IN SUMMARY

Co-sourcing is a useful way for organisations and consultants to engage subject matter experts. It is self-reinforcing, with the prospects of future engagements ensuring the consultant acts in the client's best interests. The ultimate value of the advice is also much easier to articulate, which helps the consultant negotiate a deal rather than price-based remuneration.

Grant Wellwood CEng FIChemE is the Principal of Wellwood Associates

WE BUILD
A BETTER WORLD

Fluor bring passion for innovation and over 100 years' of unrivalled experience and expertise to safely and sustainably solve its clients' greatest challenges.

We are working in partnership with our clients on their journey through energy transition to meet society's demand for cleaner, lower carbon energy, fuels and products.

Start your journey with Fluor today by visiting our online resources at www.fluor.com and find out what we can do for you.

Energy Transition

Battery Chemicals | Hydrogen | Renewable Fuels | Asset Decarbonisation | Carbon Capture Utilisation and Storage

Energy Storage | Green Chemicals and Chemicals Recycling | Gasification | NuScale™ Small Modular Reactor | Offshore Wind Energy

www.fluor.com

FLUOR®

ADFB222722

Forms of Contract: 50 Years and Still Going Strong

JOHN CHALLENGER recounts the development of IChemE's *Forms of Contract* and trails the launch of a new *Blue Book* covering EPCM contracts

IT'S appropriate that in IChemE's centenary year, we celebrate the continuing success of the Institution's *Forms of Contract,* which are among its oldest publications. It's 54 years since the publication of the first edition of the *Model Form of Conditions of Contract for Process Plant suitable for Lump Sum Contracts,* now commonly known as the *Red Book*. This set a trend for a series of publications that covers most of the established methods of contracting for the design and construction of chemical plant. This form of contract was one of the first truly specific performance-based contracts which dealt with the full execution of engineering, procurement, construction, commissioning and performance testing of complex chemical manufacturing facilities. It proved so popular and successful that it prompted IChemE to prepare an equivalent set of conditions initially for use on reimbursable contracts, which ultimately led to the complete suite of contracts that is available today.

HOW IT ALL STARTED

It should be remembered that prior to the 1960s, there were few standard forms of contract that fully dealt with

the complex requirements of chemical plant design, procurement and construction, let alone the essential element of performance testing. In the UK, the first standard contracts were all developed for the building industry. The first form that resembled the modern range of contracts was published under the sanction of the Royal Institute of British Architects (RIBA) in 1902. This was followed in 1931 by a building contract published by the Joint Contracts Tribunal (JCT) and in 1945, the Institution of Civil Engineers released the *Conditions of Contract for Works of Civil Engineering Construction*. The International Federation of Consulting Engineers (FIDIC) also commenced publication of a contract for civil works in 1957. These forms were primarily for general building projects that had been drafted by independent organisations. Some of the major manufacturers had developed bespoke forms to service their own corporate requirements but nothing was available to the wider chemical industry.

The Institution recognised that the chemical industry needed an independently-published contract with balanced terms and conditions for process plant projects. In 1964, IChemE appointed a special committee to review the question of contract conditions for chemical industry. A committee of experts from industry and academia

> “PRIOR TO THE 1960S, THERE WERE FEW STANDARD FORMS OF CONTRACT THAT FULLY DEALT WITH THE COMPLEX REQUIREMENTS OF CHEMICAL PLANT DESIGN, PROCUREMENT AND CONSTRUCTION”

were brought together to start the drafting process and this was completed in 1968. The logical drafting and integrated structure of the new form was recognised as being ideal by the chemical industry. Importantly, the sequence of clauses and the inclusion of the specification and schedules were arranged to mirror the sequence of development of a typical chemical industry project and the inclusion of guide notes helped to pilot users through the various stages of drafting and execution. As a result, the 1976 publication of the *Green Book* for reimbursable contracts followed closely the principles established in the *Red Book*. Pressure from the industry led to a subcontract form, the *Yellow Book*, which was introduced in 1992 and provided a "back-to-back" subcontract for use with the main forms.

> "FURTHER EXPANSION OF THE ICHEME'S SUITE OF CONTRACTS IS UNDERWAY WITH TWO NEW FORMS UNDER DEVELOPMENT"

These three contracts attempted to deal with the complex way in which purchaser, contractor and subcontractor divide the responsibility for creating a new process plant, providing a fair and balanced framework where each party could understand its responsibilities and achieve its objectives in a cooperative manner. It is great credit to the foresight of the original drafting panel that the general structure of these contracts has changed little over the intervening 50 years of their application.

The increasing use of the *Forms of Contract* by industry led to the publication of a minor works contract known as the *Orange Book*; a subcontract for civil engineering works called the *Brown Book*; and a target cost contract named the *Burgundy Book*.

International versions of the *Red, Green, Burgundy and Yellow Books* were published in 2007. The formation of a separate group, the Disputes Resolution Committee, was established to draft supporting rules to be followed in the event of a dispute arising under a contract.

Up to 2013, the IChemE Contracts Committee devoted itself to the general revisions required to the *Red, Green, Burgundy, Yellow* and *Brown Books* resulting from changes to UK legislation.

RECENT AND FUTURE DEVELOPMENTS

There was a recognisable gap in the existing suite of contracts and in 2017, the *Professional Services Contract*, named the *Silver Book* was published. This covers the provision of consultancy, project management, design, contract management and other professional services applicable to the process and related industries. This form was drafted to cover the essential work necessary as a precursor to the main forms of contract, from project inception and concept development to project definition, in addition to providing a contractual mechanism for general project management and technical services.

Further expansion of IChemE's suite of contracts is underway, with two new forms under development. The first, which is in the final stages of review, will cover engineering, procurement and construction management contracts (EPCM), known as the *Blue Book*. Following this will be contract forms that are aimed at providing independent and balanced contracts for the procurement of equipment and materials. These new contracts will maintain the tried and tested approach adopted for the existing contracts published by IChemE.

John Challenger FIChemE is Chair of the IChemE Contracts Committee

IChemE Forms of Contract

An internationally acclaimed series of model forms of agreement, developed to reflect best practice for project delivery in the process industries. Drafted by a team of legal and industry professionals, these contracts address the complex way in which the purchaser, contractor and subcontractor divide responsibility for creating new process plants and working on existing structures.

The Red Book – Lump Sum Contract
The Green Book – Reimbursable Contract
The Burgundy Book – Target Cost Contract
The Yellow Book – Subcontract
The Brown Book – Subcontract for Civil Engineering Works
The Orange Book – Minor Works
The Silver Book – Professional Services Contract

Available in PDF and editable Word document formats at www.icheme.org/shop

Learn more about contracts

We offer two courses that are ideal for anyone involved with engineering and construction contracts

What Engineers Need to Know About Contracts

Examine contract law for engineering and construction contracts and learn how it is used to help deliver successful projects.
www.icheme.org/live-contracts

IChemE Forms of Contract

You will look at the structure, main provisions and features of the IChemE forms and learn how best to apply them to your projects.
www.icheme.org/live-foc

www.icheme.org/shop

IChemE ADVANCING CHEMICAL ENGINEERING WORLDWIDE

A Tricky Client called Planet Earth

TRACEY SHELLEY says engineering contractors need stability to execute climate change solutions

CAST your mind back to a faraway place where the world appeared to reach a consensus on the need for unified action on climate change.

Barack Obama has flown in from Washington. David Cameron has crossed the English Channel, and Angela Merkel has just got in from Berlin. Oil prices are around US$50/bbl and falling. Interest rates are hovering just above zero, and discussions about inflation are confined to economic history articles. The CO2 level in Earth's atmosphere is below 400 ppm on a good day. It's a time before Covid, before Brexit, before Trump, and before the invasion of Ukraine.

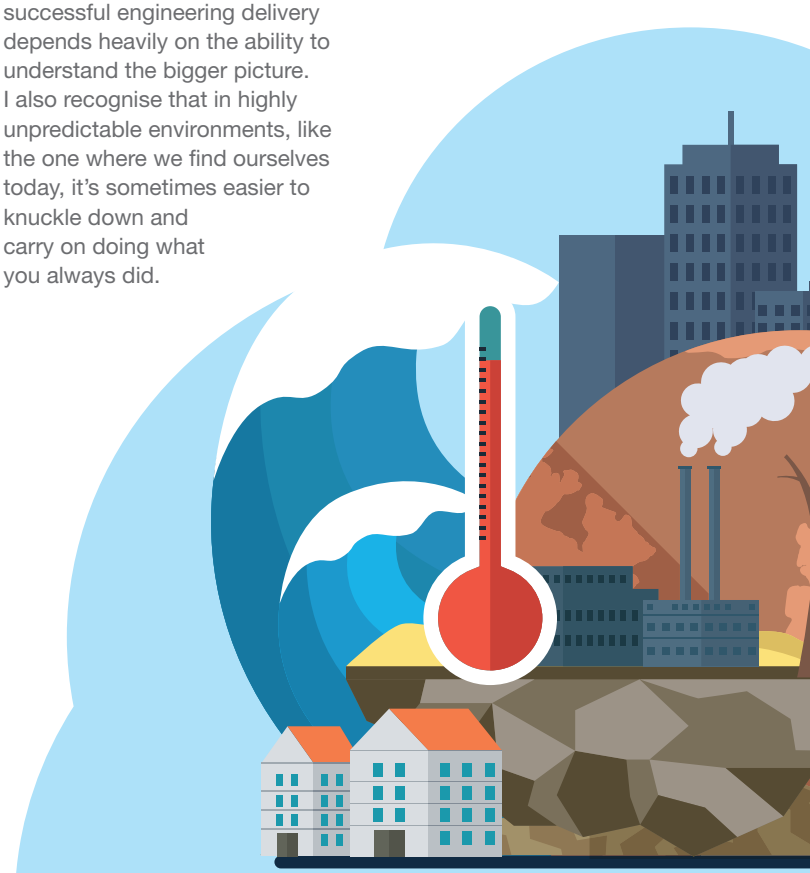
This was the backdrop to the "historic" climate change conference at which world leaders agreed that human economic activity must change to restrict the global temperature rise to 1.5°C. This faraway place was Paris in 2015.

> "FOR SOME PEOPLE, DECARBONISATION IS AN INCONVENIENT OBLIGATION; BUT I THINK THE PARIS CONFERENCE CALLED THINGS RIGHT. SO WHAT WENT WRONG?"

Seven years on, it's been impossible to look at serious news websites without being confronted with gloomy analyses of climate change policy failures. Inevitably, this happens when a policy is agreed without a practical plan to deliver that policy; but what do I know? I'm just an engineer.

What I do know is that successful engineering delivery depends heavily on the ability to understand the bigger picture. I also recognise that in highly unpredictable environments, like the one where we find ourselves today, it's sometimes easier to knuckle down and carry on doing what you always did.

This is an increasingly risky strategy in any sphere of industrial activity, and at BCECA, we try to steer clear of falling into that trap. Engineering contractors understand the importance of sticking a head over the parapet now and then. It's vital to garner the fullest possible explanation of what's happening around you. Whilst a change of direction can



be a pain, it's generally a smart move, particularly when all the signals tell us that disaster is imminent.

For some people, decarbonisation is an inconvenient obligation; but I think the Paris conference called things right. So what went wrong?

A DIFFICULT CLIENT CALLED PLANET EARTH

Before attempting an analysis and advancing some solutions, it's important to clarify the scope within which engineering contractors – large and small – must operate. BCECA members have been delivering world-scale energy infrastructure for over half a century, but we don't decide what gets built. That decision ultimately lies with the client. We can offer advice and support based on our extensive knowledge and experience in project design and delivery worldwide. Still, the client ultimately decides what they want to build, the location and timeframe in which it should be built and how much they are willing to pay for it.

However, in this case, the client appears to be a thing called "Planet Earth" and whilst our politicians often claim to know what's best for the planet, it's a sobering fact that no one has yet come up with a form of contract that can quickly and effectively deliver a project solution to this client's particularly tricky problem. The solution may be summed up in two words: "energy transformation", but the challenge is a good deal more complex than that.

> "WHILST OUR POLITICIANS OFTEN CLAIM TO KNOW WHAT'S BEST FOR THE PLANET, IT'S A SOBERING FACT THAT NO ONE HAS YET COME UP WITH A FORM OF CONTRACT THAT CAN QUICKLY AND EFFECTIVELY DELIVER A PROJECT SOLUTION TO THIS CLIENT'S PARTICULARLY TRICKY PROBLEM"

In October, BCECA brought a wide variety of stakeholders together for its second virtual annual conference to discuss the energy transformation challenge. We'll be publishing a detailed report before year end, but in the interim, here's a brief snapshot of the key themes that emerged from the conference.

We're engineers, and whilst acknowledging that you cannot eliminate uncertainty, it isn't easy to get things done without stability. In the UK context, BCECA groups stability under three broad headings:

POLICY

There is a pressing need to get the Energy Bill that has stalled in the UK Parliament out of the long grass and onto the statute books. We need a coherent legislative framework to make things happen. BCECA will be making representations to BEIS. We know that governments are wary of picking winners, but if it doesn't double down on supporting the delivery of decarbonisation, the UK will be the loser. We downplay the risk of delay at our peril.

> WE NEED MUCH MORE FLEXIBILITY IN RECRUITMENT AND WORKING PRACTICES IF WE ARE TO HIRE AND RETAIN THE PEOPLE NEEDED TO DELIVER DECARBONISATION

FINANCE

The future for hydrogen looks promising, but we need workable off-take agreements and certainty around capital allowances. All parties must get used to being a lot more uncomfortable. This means we must work more collaboratively to agree on mechanisms to share risk. BCECA will continue facilitating discussions with investors, financiers, and potential operators. Hydrogen may be in its infancy, but UK-based engineering contractors will help it come of age.

WORKFORCE

Skills supply is a significant barrier to progress. BCECA member companies already recognise this, and interesting solutions are being explored. Nonetheless, we need much more flexibility in recruitment and working practices if we are to hire and retain the people needed to deliver decarbonisation. The opportunities for the next generation of engineers, technologists and scientists are terrific. BCECA will press ahead in its work with young professionals – especially women and those from BAME communities.

These were our initial findings, but don't take my word for it. Please find time to listen to the conversation and formulate your conclusions and ideas for the road ahead.

As I write this, we're enjoying an unusually warm Autumn in the UK. Maybe that's just "weather", but the atmospheric CO2 level is 416 ppm and climbing. By the time you read this, world leaders will have met again in Egypt, and we may have heard more warm words on the need for unified action. That action will not happen without the engineering contracting communities' professional design, procurement, and construction expertise in the UK and elsewhere. Without stability, progress will be further delayed.

Tracey Shelley is the CEO of BCECA, the trade organisation representing UK-based engineering contractors and their supply chain partners. To get involved, and access a range of free resources, including a recording of the proceedings at BCECA's second virtual annual conference, *The Energy Transformation Challenge*, visit **www.bceca.org.uk**

Consultants listings

From independents to major consultancies, these companies help bring your projects to life

Company name & location	Telephone	Email & web address	Contact name	No. of staff
ARC – Abbott Risk Consulting	+44 (0)131 220 0164	info@consultarc.com www.consultarc.com	Matt Vickers	130
Advisian Group Ltd (Worley Group Companies)	+44 (0)7917 241 614	inna.ivkova@advisian.com www.worley.com www.advisian.com	Inna Ivkova	2,000+
Allen Associates (HPE) Stirling, UK	+44 (0)1786 448777	enquiries@allenhpe.co.uk www.allenhpe.co.uk	Scott Allen	17
Axiom Engineering Associates Ltd Stockton-on-Tees, Grangemouth, Runcorn, Saltend, UK	+44 (0)1642 732745	peter.hunt@ax-ea.co.uk www.axiomengineeringassociates.com	Peter Hunt	80
Axis Innovation Ltd Sheffield, UK	+44(0)7801 005 143	george.rees@axisinnovation.co.uk www.axisinnovation.co.uk	George Rees	1
BakerHicks Warwick, UK	+44 (0)161 873 2500	mark.dickson@bakerhicks.com www.bakerhicks.com	Mark Dickson	1,100
BakerRisk Europe Chester, UK	+44 (0)1244 792041	rmagraw@bakerrisk.com www.bakerrisk.com	Rob Magraw	4
BellBridge Stockton-on-Tees, UK	+44 (0)1642 548 975	info@bellbridge.co.uk www.bellbridge.co.uk	Leighton Evans	20
BES Ltd Rochdale, Milton Keynes, UK	+44 (0)1616 553344 +44 (0)1908 488713	zebahmed@besltd.org suzysmith@besltd.org www.bestld.org	Zeb Ahmed Suzy Smith	185
Booth Welsh Scotland, UK	+44 (0)3450 344 344	laura.maley@boothwelsh.co.uk www.boothwelsh.co.uk	Laura Maley	250+
Briggs of Burton UK, USA, Mexico, China, Australia	+44 (0)1283 566661	sales@briggsplc.com www.briggsplc.com	Kevin Leach	300
DEKRA Organisational and Process Safety Southampton, Aberdeen, UK	+44 (0)23 8076 0722 +44 (0)1224 766713	craig.sproul@dekra.com www.dekra-uk.co.uk/en/dekra-organisational-and-process-safety/	Craig Sproul	150
Electrostatic Solutions Southampton, UK	+44 (0)23 8090 5600	jeremys@static-sol.com www.electrostatics.net	Jeremy Smallwood	1
Engenda Group (t/a Clark Eriksson Associates) UK	+44 (0)1324 611294	info@engenda-group.com www.engenda-group.com	Scott McMartin	290
Genesis London, UK	+44 (0)207 585 5555	enquiries@genesisenergies.com www.genesisenergies.com		1,000+

Technical expertise	Industry sector									Regions of operation							
	Biotechnology	Energy	Food & drink	Inorganic chemicals	Oil, gas & petroleum	Organic chemicals	Pharmaceuticals	Water treatment		Africa	Asia	Australasia	Central & South America	Europe	Middle East	United Kingdom	North America
Auditing & assessment	✓	✓		✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓
Energy management		✓		✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓
Environmental management				✓		✓		✓			✓	✓	✓	✓	✓	✓	✓
Expert witness		✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓
Health & safety management		✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓
Legal arbitration & expert witness		✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓
Manpower & recruitment		✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓
Plant commissioning		✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓
Plant construction		✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓
Plant design		✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓
Plant optimisation		✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓
Process development/evaluation		✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓
Project management		✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓
Quality management		✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓
Training		✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓

Consultants listings

From independents to major consultancies, these companies help bring your projects to life

Company name & location	Telephone	Email & web address	Contact name	No. of staff
HSD Safety UK	+44 (0)7540 186628	paul.dewhirst@hsd-safety.co.uk www.hsd-safety.co.uk	Paul Dewhirst	3
Kent Aberdeen, Bristol, Edinburgh, Epsom, Glasgow, London, UK	+44 (0)1224 620202	unitedkingdom@kentplc.com www.kentplc.com	Les Newman	10,000
Manderstam International Group London, UK	+44 (0)207 730 9224	migl@manderstam.com www.manderstam.com	Peter Lumley	15
Method Safety & Security Ltd Hitchin, UK	+44 (0)1462 713313	support@methodprosafe.com www.methodprosafe.com	David Sparkes	10
OLG Consulting Immingham, UK	+44 (0)1469 577695	enquiries@olguk.com www.olgconsulting.co.uk	Andy Stevenson	500
Omex Environmental Ltd Kings Lynn, UK	+44 (0)1553 770092	environmental@omex.com www.omexenvironmental.com	D Theodoridis	19
OSL Consulting Engineers Ltd Hull, UK	+44 (0)1482 626400	robin.etherington@oslconsulting.com www.oslconsulting.com	Robin Etherington	75
Otto Simon Manchester, UK	+44 (0)161 491 7440	eng@ottosimon.co.uk www.ottosimon.co.uk	Darryl Nevitt	100
RAS Ltd Chester, UK	+44 (0)1244 674612	enquiries@ras.ltd.uk www.ras.ltd.uk	Jo Condon	25
RB Plant Kent, UK	+44 (0)1622 858387	genghis-p@rb-plant.co.uk www.rbplant.com	Genghis Perriman	50
Risktec Solutions UK, Europe, Middle East, SE Asia, North America	+44 (0)1925 611200	enquiries@risktec.tuv.com www.risktec.tuv.com	David McDade	310
Safety Engineering Solutions Ltd	+44 (0)7808 889684	info@safetyengineeringsolutions.com www.safetyengineeringsolutions.com	Alastair Millard	1
Sigma-HSE (UK) Ltd	+44 (0)1962 840570	info@sigma-hse.com www.sigma-hse.com	Samuel Ayres	12
WSP UK, Ireland and Worldwide	+44 (0)20 7314 5000	faye.ward@wsp.com www.wsp.com	Faye Ward	7,500
Xodus Group Ltd Aberdeen, UK	+44 (0)1224 628300	enquiries@xodusgroup.com www.xodusgroup.com	Rachel Mair	300

Technical expertise	Industry sector									Regions of operation							
	Biotechnology	Energy	Food & drink	Inorganic chemicals	Oil, gas & petroleum	Organic chemicals	Pharmaceuticals	Water treatment		Africa	Asia	Australasia	Central & South America	Europe	Middle East	United Kingdom	North America
Auditing & assessment	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓		✓	✓	✓	✓
Energy management	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓
Environmental management	✓	✓	✓	✓	✓	✓	✓	✓			✓	✓		✓	✓	✓	✓
Expert witness	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Health & safety management	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Legal arbitration & expert witness	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Manpower & recruitment	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Plant commissioning	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Plant construction	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Plant design	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Plant optimisation	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Process development/evaluation	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Project management	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Quality management	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
Training	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓

Contractors listings

From independents to major contractors, these companies help bring your projects to life

Company name & location	Telephone	Email & web address	Contact name	No. of staff
Advisian Group Ltd (Worley Group Companies)	+44 (0)7917 241 614	inna.ivkova@advisian.com www.worley.com www.advisian.com	Inna Ivkova	50,000+
Axiom Engineering Associates Ltd Stockton-on-Tees, Grangemouth, Runcorn, Saltend, UK	+44 (0)1642 732745	peter.hunt@ax-ea.co.uk www.axiomengineeringassociates.com	Peter Hunt	80
BellBridge Stockton-on-Tees, UK	+44 (0)1642 548 975	info@bellbridge.co.uk www.bellbridge.co.uk	Leighton Evans	20
BES Ltd Rochdale, Milton Keynes, UK	+44 (0)1616 553344 +44 (0)1908 488713	zebahmed@besltd.org suzysmith@besltd.org www.bestld.org	Zeb Ahmed Suzy Smith	185
Briggs of Burton UK, USA, Mexico, China, Australia	+44 (0)1283 566661	sales@briggsplc.com www.briggsplc.com	Kevin Leach	300
DEKRA Organisational and Process Safety Southampton, Aberdeen, UK	+44 (0)23 8076 0722 +44 (0)1224 766713	craig.sproul@dekra.com www.dekra-uk.co.uk/en/dekra-organisational-and-process-safety/	Craig Sproul	150
Engenda Group (t/a Clark Eriksson Associates)	+44 (0)1324 611294	info@engenda-group.com www.engenda-group.co.uk	Scott McMartin	290
Fluor Farnborough, UK	+44 (0)1252 291000	uk.sales@fluor.com www.fluor.com	Edward Vonk	620
HSD Safety UK	+44 (0)7540 186628	paul.dewhirst@hsd-safety.co.uk www.hsd-safety.co.uk	Paul Dewhirst	3
Kent Aberdeen, Bristol, Edinburgh, Epsom, Glasgow, London, UK	+44 (0)1224 620202	unitedkingdom@kentplc.com www.kentplc.com	Les Newman	10,000
OLG Consulting Immingham, UK	+44 (0)1469 577695	enquiries@olguk.com www.olgconsulting.co.uk	Andy Stevenson	500
OSL Consulting Engineers Ltd Hull, UK	+44 (0)1482 626400	robin.etherington@oslconsulting.com www.oslconsulting.com	Robin Etherington	75
Otto Simon Manchester, UK	+44 (0)161 491 7440	eng@ottosimon.co.uk www.ottosimon.co.uk	Darryl Nevitt	100
RB Plant Kent, UK	+44 (0)1622 858387	genghis-p@rb-plant.co.uk www.rbplant.com	Genghis Perriman	50
Risktec Solutions UK, Europe, Middle East, SE Asia, North America	+44 (0)1925 611200	enquiries@risktec.tuv.com www.risktec.tuv.com	David McDade	310
WSP UK, Ireland and Worldwide	+44 (0)20 7314 5000	faye.ward@wsp.com www.wsp.com	Faye Ward	7,500

Regions of operation								
Africa	✓		✓		✓		✓	✓
Asia	✓	✓			✓		✓	✓
Australasia	✓				✓		✓	✓
Central & South America	✓				✓		✓	✓
Europe	✓	✓	✓	✓	✓	✓	✓	✓
Middle East	✓	✓		✓	✓	✓	✓	✓
United Kingdom	✓	✓	✓	✓	✓	✓	✓	✓
North America	✓		✓	✓	✓	✓	✓	✓

Industry sector								
Biotechnology	✓	✓	✓	✓	✓	✓	✓	✓
Energy	✓	✓	✓	✓	✓	✓	✓	✓
Food & drink	✓	✓	✓	✓	✓	✓	✓	✓
Inorganic chemicals	✓	✓	✓	✓	✓	✓	✓	✓
Oil, gas & petroleum	✓	✓	✓	✓	✓	✓	✓	✓
Organic chemicals	✓	✓	✓	✓	✓	✓	✓	✓
Pharmaceuticals	✓	✓	✓	✓	✓	✓	✓	✓
Water treatment	✓	✓	✓	✓	✓	✓	✓	✓

Technical expertise								
Conceptual design/process feasibility	✓	✓	✓	✓	✓	✓	✓	✓
Engineering services	✓	✓	✓	✓	✓	✓	✓	✓
Materials handling	✓	✓	✓	✓	✓	✓	✓	✓
Modular construction	✓	✓	✓	✓	✓	✓	✓	✓
Operations services	✓	✓	✓	✓	✓	✓	✓	✓
Project management/execution	✓	✓	✓	✓	✓	✓	✓	✓
Safety	✓	✓	✓	✓	✓	✓	✓	✓
Site supervision/commissioning	✓	✓	✓	✓	✓	✓	✓	✓
Specification, bid analysis & procurement	✓	✓	✓	✓	✓	✓	✓	✓


DEKRA
We are your data driven
Safety Partner
moving you beyond compliance to safe production, by creating a Culture of Care.
We provide practical solutions to high hazard process industries in occupational safety, process safety and human reliability. Our people are motivated by a passion for life preservation, harm reduction, asset protection and performance optimisation.
• Process Safety Management
• Process Safety Consulting
• Process Safety Competency
• Process Safety Testing
• Supporting projects to deliver safely, on budget and on time
• Organisational Diagnostic Assessments and Development
• Workforce Engagement and Safety Leadership Training
• Safety Consulting
+44(0)23 8076 0722
dekra-ops.uk@dekra.com
www.dekra-uk.co.uk
DEKRA On the safe side
+44(0)23 8076 0722
dekra-ops.uk@dekra.com
www.dekra-uk.co.uk