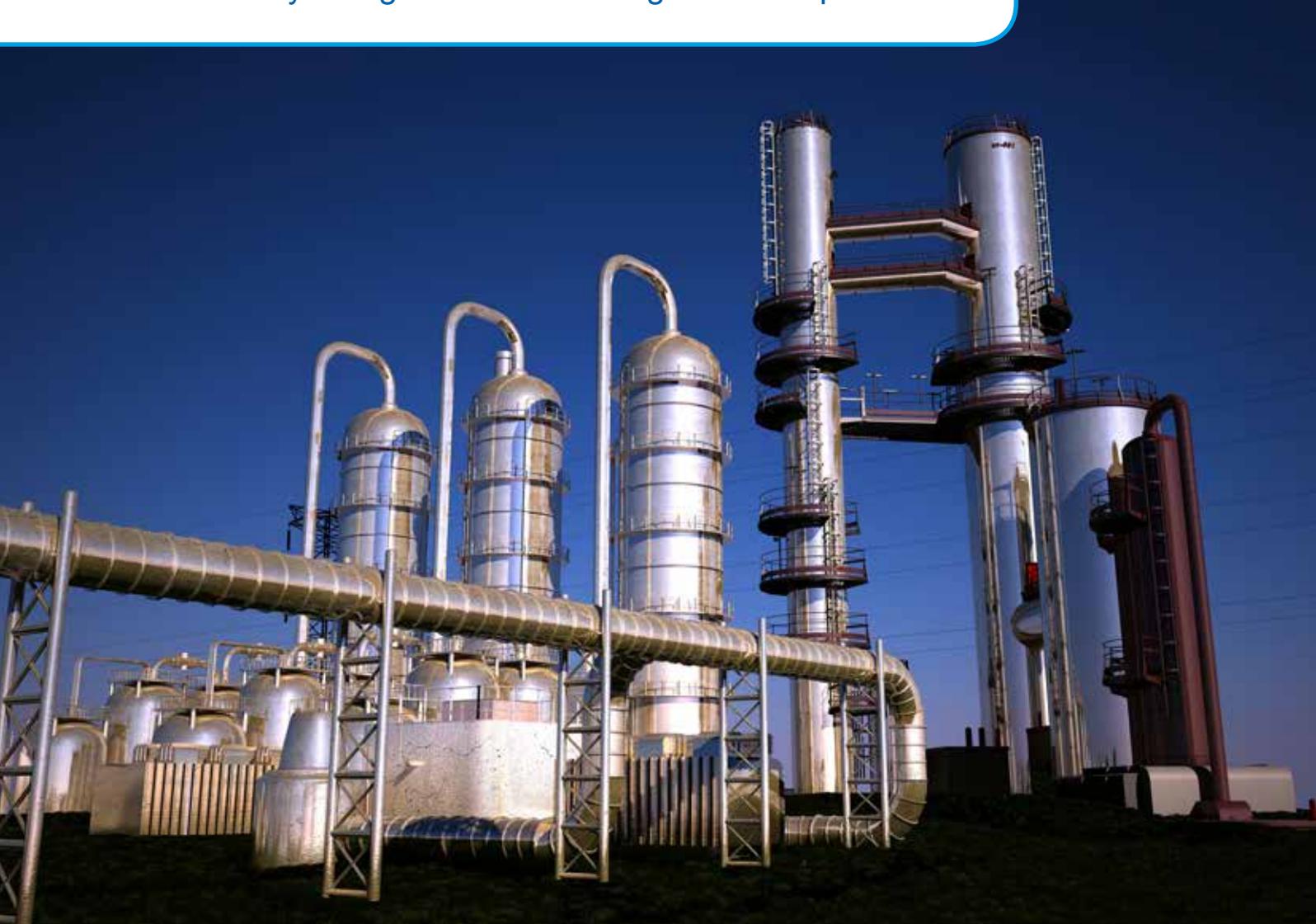




Process Safety Consultancy Services

Process Safety Designed In - Protecting What's Important



Consultancy



ENGIE Fabricom's consultancy business provides a wide range of process safety and engineering consultancy services to clients across the process industries.

Our team of professional engineers and process safety specialists have many years of hands on operational, project and design experience associated with high hazard operations. We are parented by ENGIE which has over 150,000 employees worldwide.

Our consultancy business is an integral part of our UK operation and delivered from our Engineering and Project Offices throughout the UK.

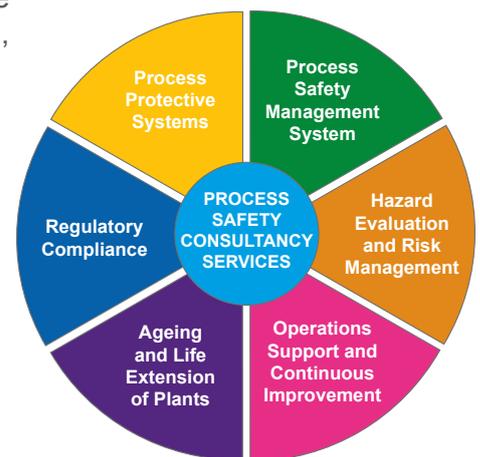
Service Areas We Work In

Process Safety Consultancy Services

At ENGIE Fabricom we recognise that targeted, proactive, client-driven process safety management reduces risks and in the long-term reduces costs. To assist in this, we have identified six service areas where we can support clients in developing, managing and reviewing their systems and procedures.

These are:

- Process Protective Systems
- Process Safety Management Systems
- Hazard Evaluation and Risk Management
- Operations Support and Continuous Improvement
- Ageing and Life Extension of Plants
- Regulatory Compliance



Process Safety Service Areas:

Our services cover the lifecycle of the plant from design to decommissioning. Our aim is to develop cost-effective and feasible solutions that demonstrate risks are being managed to the 'As Low As Reasonably Practicable' (ALARP) principle.

Process Protective Systems

These can be active or passive systems. They can be instrumented or non-instrumented and are required to prevent and / or mitigate impacts on personnel, the environment and assets from the development and effects of major accident hazards. The design, implementation and management of these systems needs to be regularly reviewed throughout the lifecycle of the plant to meet all stakeholder expectations, regulatory and business.



Process Safety Management Systems

Effective process safety management does not happen by chance. It needs to be planned and managed by competent people throughout the life-cycle of the plant. We can help clients to develop and improve their systems and foster a proactive process safety culture. This leads to safer operations, where clients better understand and manage the technical integrity of their processes.

Hazard Evaluation and Risk Management

Most operators recognise that hazards need to be evaluated. This may require specialist support and resourcing to gain best value.

At ENGIE Fabricom, our many years of hazard evaluation and risk assessment experience, gained in both design and operational environments, allows us to quickly identify suitable methodologies and techniques at an early stage. We identify and quantify credible hazards which can then be addressed by subsequent process safety activities.

Operations Support and Continuous Improvement



Plant operations are performed to satisfy a range of business objectives (commercial, technical, regulatory). The operational period of a plant's lifecycle typically carries the highest potential for a major accident.

Our experience can support clients to develop and improve effective operational management processes and procedures. We can provide engineers on secondment to work with clients as a specialist resource.

We have carried out short-term intensive studies to provide analysis and documentation in support of license to operate issues, e.g. fugitive gas leak assessment associated with ageing plant. We perform 'cold eye' reviews and audits to identify any gaps that could impact a client's license to operate. The outputs from such investigations can be used to identify areas for continuous improvement which support process safety.

Ageing and Life Extension of Plants

Management of ageing plant is always a challenge. In tight financial environments there is often pressure to reduce expenditure on equipment and fabric maintenance. However, failure to maintain equipment and structures in a serviceable condition can lead to unsafe plant, loss of process availability and more critically, loss of process containment. A common theme with ageing plant concerns is the reduction in mechanical integrity (loss of material thickness, local or generally) which leaves the plant susceptible to overpressure and structural failure. Similarly, obsolescence and technology change can give rise to ageing plant effects.



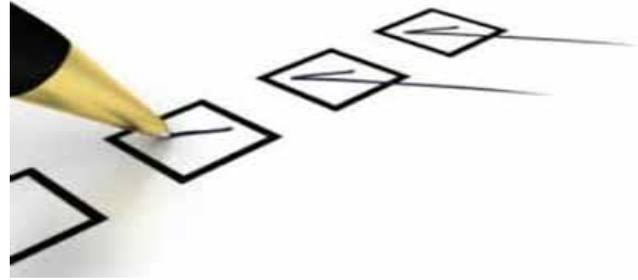
At ENGIE Fabricom, we have experience of many of the failure mechanisms associated with ageing plants, e.g. corrosion, erosion, temperature and pressure cycling, acoustically induced and flow induced vibrations, stress corrosion and undetected or dangerous failures associated with safety instrumented systems.

We can assist clients in identifying safety critical issues by performing a range of site surveys and specific equipment inspections. We can analyse historical data collected from operating plants (historical on-line instrumentation data, condition monitoring, fluid samples, inspection reports etc.) to advise on acceptable operational envelopes. If necessary, the resetting of alarm and trip functions can then be defined.



Regulatory Compliance

Regulatory compliance is a critical business objective. The granting and maintenance of a license to operate requires the operator to demonstrate that they have and are maintaining a 'safety review / safety case' document that meets and / or exceeds the regulators compliance requirements. Compliance (onshore) is demonstrated to the competent authority (HSE / EA / SEPA) through production of a safety report.



Offshore installations are managed under separate legislations by the HSE - the Offshore Installations (Safety Case) Regulations and the Offshore Installations (Safety Directive) Regulations. Non-compliance with the regulatory requirements or a marked variation from the safety report (safety case), can lead to legal action and suspension of an operator's license to operate..

How We Deliver

Our Works Packs

To support the services we provide, we have established five work packs which encompass a wide range of 'tools', assessment techniques and studies whose outputs enable our clients to make informed critical decisions about their businesses.

These work packs are:

- License to Operate
- Process Safety Review and Assessments
- Hazard Evaluation
- Documentation to Support Process Safety
- Risk Analysis and Management



License to Operate

National Governments require companies to comply with many statutory requirements (regulations) before they can be granted a 'license to operate'. To achieve the required level of compliance, companies must demonstrate that they have an acceptable level of competence, backed up by systems, procedures and training, which are commensurate with the risk profile of their business.

- Safety case reports: OISC and COMAH
- DSEAR / ATEX / PFEER compliance
- Expert advice on HSE / legislative issues
- Safety case demonstration – gap analysis

At ENGIE Fabricom we have assessment capabilities which can assist operators meet required compliance levels in support of obtaining and maintaining their license to operate.



Process Safety Reviews and Assessment

At ENGIE Fabricom, we can assist our clients throughout the lifecycle of the plant to ensure that safety measures in place are robust, reliable and function on demand in line with regulatory requirements.

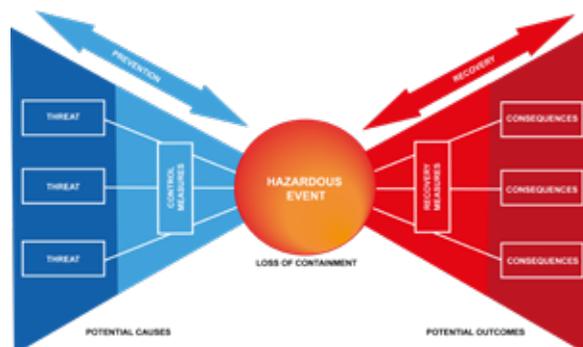
- Process safety site surveys
- Process safety-in-design verification studies
- Functional safety management
- Pressure relief load and flare systems design / verification
- Best available technique review
- Instrumented Protective Functions (IPF) verification studies
- Safe Isolation and Reinstatement of Plant (SIRP)
- Development and review of codes, standards, practices and procedures
- Root cause analysis



Hazard Evaluation

ENGIE Fabricom applies a range of tools and techniques to evaluate risk. We employ professional engineers with wide-ranging experience across a variety of industry sectors. Our facilitators / chairs and independent engineers have extensive design, operations and process safety experience and are versed in the interpretation of regulatory requirements.

- Process hazard reviews: HazOp studies, Hazid, LOPA, FMEA, etc.
- Quantitative risk assessments: Fault tree analysis, event tree analysis
- Consequence modelling
- Bowtie analysis



Documentation to Support Process Safety Management

Plant operators need to demonstrate to stakeholders that they understand and can control the hazards and risks associated with their operations. A structured set of documents articulates the management systems, both safety and operational.

- Process safety management policies and procedures development
- Development of process safety training packages
- Process safety Key Performance Indicators (KPIs)
- Development of performance standards
- Operating procedures, reviews and updates
- Management of change procedures
- Development / review of codes, standards, practices and procedures



ENGIE Fabricom works with their clients to develop and support a safety management system that provides:

- An information infrastructure for clients to allow them ease of access to procedures and documentation in an emergency
- Development of a 'process safety culture' to contextualise the dangers of loss of containment with a view to prevent major accidents
- Client capability to control and manage both the daily and long-term plant operations envelope



Risk Analysis and Management

Poor planning, ill-defined risk assessment methodologies and risk tolerability criteria can adversely affect risk analysis and management outcomes. These can subsequently impact on decision making relating to safety critical and operational issues.



- Quantified risk assessments
- Consequence modelling
- SIL determination – LOPA and risk graph
- OBRAs and reviews
- Human factors assessments
- Inherent safety reviews
- DSEAR assessments
- Loss of containment studies – mechanical integrity, HP/LP interface studies
- Incident/Accident Investigation
- Emergency response and preparedness
- Alarm management studies
- Safety critical element review
- Plant siting and layout
- Prevention of fire and Explosion and Emergency Response (PFEER)

At ENGIE Fabricom, we can help our client to define the problem statement by:

- Identifying what the credible hazards are following a process hazard review
- Evaluating the risks by assessing the consequences and frequencies of the hazards
- Identifying inherent risk control measures against unmitigated conditions to include recommendations where such measures are inadequate
- Performing further work, if required, to meet risk criteria through layer of protection analysis, consequence modelling, etc.



Analytical Tools

At ENGIE Fabricom, we employ a number of tools and techniques to support our clients in making informed decisions and appropriate management of risk. We use industry recognised packages such as PHA Pro, HazOp Manager, ABB TRAC, and PHAST, but also supported by a suite of in-house tools and methods which provide for a consistent approach. Our engineers and consultants are well trained in the application of these tools and techniques ensuring that they are applied appropriate to the task in hand. We continue to invest in the development of our people, providing them with the most up to date information and techniques and maintaining our thinking in line with industry developments and current best practice.



ENGIE Fabricom Consultancy Process Safety Services			Service Areas					
			Process Protective Systems	Process Safety Management System	Hazard Evaluation and Risk Management	Operations Support and Continuous Improvement	Ageing and Live Extension of Plants	Regulatory Compliance
Work Packs	License to Operate	Safety Case Reports		♦	♦			♦
		Safety Case Demonstration		♦	♦			♦
		DSEAR/ATEX/PFEER	♦	♦	♦	♦	♦	♦
		HSE Queries	♦	♦	♦	♦	♦	♦
	Process Safety Review and Assessment	PS Site Surveys	♦	♦	♦	♦	♦	♦
		Design Verification	♦	♦	♦	♦	♦	♦
		Functional Safety	♦		♦	♦	♦	♦
		Pressure Relief / Flare	♦			♦	♦	♦
		IPFs	♦		♦	♦	♦	♦
		SIRP			♦	♦	♦	
		Codes and Standards	♦	♦	♦	♦	♦	♦
		RCA		♦	♦	♦		
		BAT Reviews	♦			♦	♦	♦
		Pressure Systems	♦			♦	♦	♦
	Hazard Evaluation	HazOp Studies	♦	♦	♦	♦	♦	♦
		LOPA	♦		♦	♦		♦
		Bowtie Analysis		♦	♦			♦
		FMECA	♦		♦	♦		♦
		Fault Tree	♦		♦	♦		
		Event Tree	♦		♦	♦		
		Hazid	♦	♦	♦	♦	♦	♦
	Documentation to Support Process Safety	Policies and Procedures	♦	♦	♦	♦	♦	♦
		Training	♦	♦	♦	♦	♦	♦
		Performance Standards	♦			♦	♦	♦
		Management of Change			♦	♦	♦	♦
		KPIs		♦		♦		♦
	Risk Analysis and Management	QRAs	♦		♦	♦		♦
		Consequence Modelling	♦		♦	♦		♦
		SIL Determination: LOPA, Risk Graph	♦		♦	♦	♦	♦
		OBRA's	♦		♦	♦	♦	♦
		Human Factors	♦		♦	♦		♦
		Inherent Safety	♦		♦	♦	♦	♦
		Loss of Containment	♦	♦	♦	♦	♦	♦
Incident / Accident Investigation			♦	♦	♦		♦	
Emergency Response		♦	♦	♦	♦	♦	♦	
Alarm Management		♦	♦	♦	♦	♦	♦	
Safety Critical Elements		♦	♦	♦	♦	♦	♦	
Plant Siting and Layout	♦	♦	♦	♦	♦	♦		



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