



ENGINEERING THE FUTURE OF ENERGY

www.penspen.com

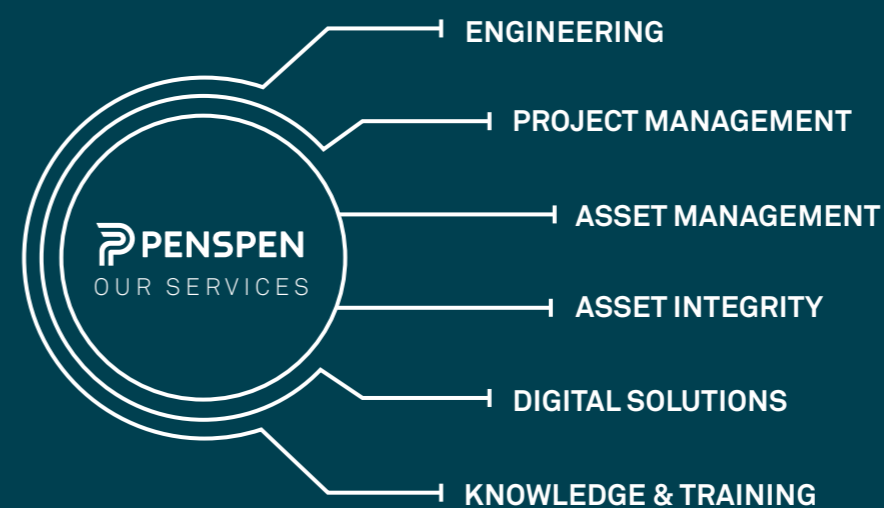
IMPROVING SECURE AND SUSTAINABLE ENERGY ACCESS

By helping communities access lower carbon fuels and extending the useful life of existing energy infrastructure through redevelopment, optimisation and repurposing, Penspen improves access to secure and sustainable energy.

Our teams design, maintain, and optimise infrastructure, helping meet the world's evolving needs by providing consulting, project, and engineering solutions across the entire energy project lifecycle.

Over the past 70+ years, we've delivered more than 15,000 projects in over 100 countries. Now, we're using that extensive expertise to engineer the future of energy.

EXPERTISE AND BEST-IN-CLASS INDUSTRY STANDARDS ACROSS THE ENTIRE PROJECT LIFECYCLE





Our people improve access to secure and sustainable energy for communities worldwide. We take enormous pride in pursuing success both safely and responsibly, ensuring that we operate sustainably and ethically at all times.

Peter O'Sullivan
Chief Executive Officer



ENGINEERING THE FUTURE OF ENERGY

We cultivate our considerable engineering heritage to deliver solutions across the entire project lifecycle, whilst challenging ourselves to define the best way to serve evolving future energy needs during a period of critical change. In all that we do, we are guided by our values:



Our People

Our people are our key assets. As a team of insightful people, we are dedicated to delivering value to our clients. We treat people as individuals by rewarding their successes, supporting their aspirations and empowering them to make a difference.



Working Safely and Responsibly

Safety is our number one priority and we are committed to the goal of zero harm. We work as a team to take care of each other and ensure everyone goes home safely. We pursue success safely and responsibly, ensuring that we operate both sustainably and ethically.



Technical Excellence

We value and cultivate our technical leadership in order to help our clients. We support each other by sharing knowledge across the business and the industry. Enabling critical knowledge to flow allows us to address our clients' complex challenges.



Commercial Success

We encourage profitable entrepreneurship and actively manage risk to drive sustainable and commercially successful growth of both Penspen and our clients' businesses.



Our Commitments

We deliver on our commitments to both our clients and each other. By working together as One Penspen, we ensure high-quality work, on time and within budget, every time.

FOUNDED IN

1954



10+

GLOBAL OFFICES



70+

YEARS IN INDUSTRY

1,700+



GLOBAL EMPLOYEES

COUNTRIES WORKED IN

100+



GLOBAL PROJECTS DELIVERED



15,000+

THROUGH WORLD-CLASS CONSULTING, PROJECT MANAGEMENT & OPERATIONS



REACH NET ZERO

IT'S NOT OUR FIRST ENERGY TRANSITION

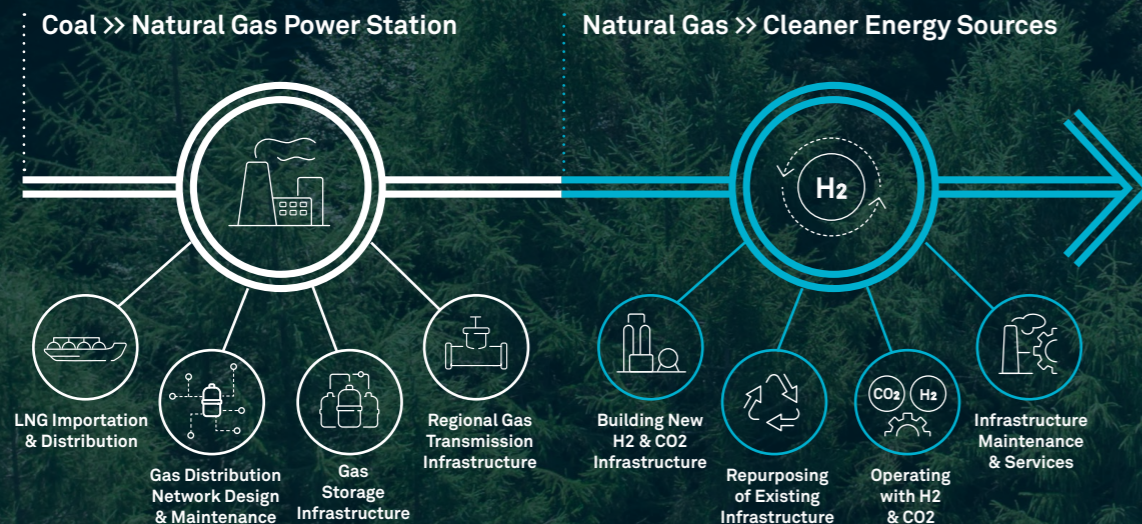
The energy industry as we know it is changing. Decarbonisation of the energy sector requires urgent action on a global scale. Our primary capabilities include engineering consultancy for the development of new hydrogen, ammonia, waste to energy & CO2 infrastructure, repurposing of existing infrastructure for hydrogen & CO2, operating with hydrogen & CO2, and infrastructure maintenance services.

ENERGY TRANSITION

For more than seven decades, our engineers have supported energy operators around the world to improve access to lower carbon fuels and by extending the life of existing energy infrastructure, we continue to deliver solutions to deliver cleaner energy to communities across the globe.

Our engineering consultancy services utilise our extensive experience in the delivery of thousands of hydrocarbon projects to inform the development of future fuels infrastructure, including repurposing existing infrastructure for hydrogen & CO2 transportation and processing.

NOT OUR FIRST TRANSITION: SUPPORTING THE FUTURE OF ENERGY



CCS CLUSTER PIPELINE, UNITED KINGDOM

Supporting the creation of the first large scale CCS cluster to enhance energy security and develop a low-carbon economy.

Having provided the feasibility study and pre-FEED of a new onshore pipeline to transport CO2 from Humberside, the UK's largest cluster by industrial emissions, to a former gas terminal for sequestration in the Southern North Sea.

Penspen were also engaged to provide project management consultancy and technical support for the development consent order of the 55km underground CO2 pipeline, a critical step in the development of the project which could deliver 1/3 of the UK government's 2030 CO2 storage target.

CASE STUDY



DEVELOPING SENEGAL'S ENERGY CITY

Feasibility and masterplanning for Senegal's flagship Energy City project.

GES-PETROGAZ, within the Ministry of Petroleum, appointed Penspen together with Dar to conduct a feasibility study and masterplan recommendation for a new Energy City on the Senegalese coast. Designed to support energy transition and economic diversification, the Energy City will concentrate primary, secondary, and tertiary energy-related activities in one location.

Our work includes assessment of two potential coastal site locations, market supply and demand analysis, financial and cost modelling, environmental and social impact studies, and a promotional strategy.

CASE STUDY



MAKE DATA MATTER

DIGITALISATION FOR MAXIMUM PERFORMANCE

Powering the world is becoming more and more complex. The integrity of midstream assets will play a critical role, as a greater focus on improving pipeline integrity management processes and procedures will be vital in ensuring energy supply effectively reaches customers and satisfies consumer consumption. Data holds the key to maximum performance.

DIGITALISATION

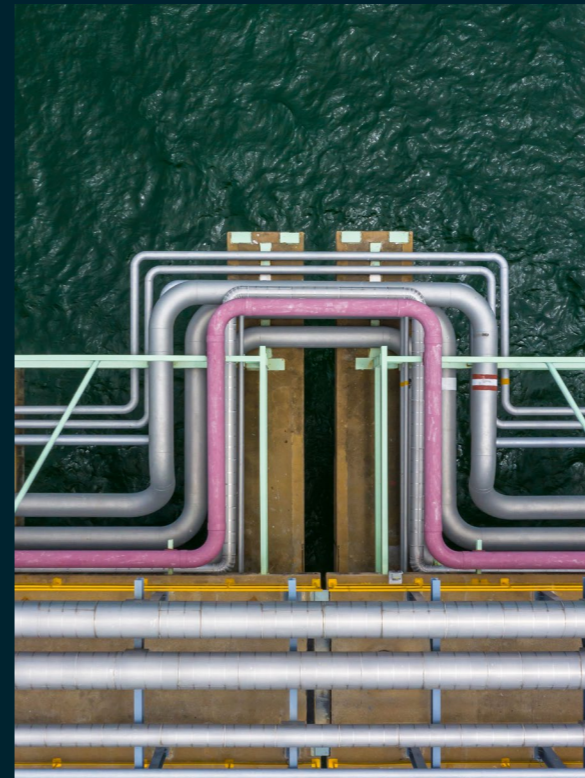
Digitalisation of the energy industry offers the progression and innovation required to reduce uncertainty, help minimise unforeseen failures, and provide operators with maximised pipeline performance.

Harness the full potential of your pipeline assets through the power of data with THEIA, Penspen's Pipeline Integrity Management Solution. Developed as part of our ongoing commitment to digital transformation, THEIA provides energy, oil, and gas operators with critical pipeline integrity insights required to optimise performance of assets.

Improved Decision-Making | Increased Pipeline Uptime

Reduced Inspection Frequency | Decreased OPEX

THEIA



OFFSHORE TO ONSHORE PIPELINE, MIDDLE EAST

Efficient execution of integrity assessments for a crude oil pipeline in the Middle East.

Penspen leveraged technical expertise combined with the THEIA tool to provide quick and efficient processing of vast amounts of data, fast-tracking project completion.

The scope of work included complete feature matching, corrosion rate calculations, and conduction of deterministic future integrity calculations based on ASME B31G/ DNV-F101 and Kastner method.

CASE STUDY



NATIONAL PIPELINE SYSTEM, LATIN AMERICA

Supporting the return to service of a decommissioned pipeline in Latin America.

Penspen utilised THEIA to process information records efficiently and easily for the client to refer to. The condition of the pipeline was analysed efficiently due to the statistics on the In-Line Inspection data provided. Mapping visualisations from the THEIA modules supported the client in the decision-making process related to the maintenance actions - ensuring the pipeline could re-operate safely once again.

CASE STUDY

DIGITAL PIPELINE INTEGRITY MANAGEMENT SOLUTION

CENTRALISE

Capture and analyse all of your pipeline data, current and historical, in one location

VISUALISE

Use data lakes to easily generate graphs, charts and maps of pipeline data

ANALYSE

Review data to quickly detect anomalies in your network and ensure regulatory compliance

THEIA enables pipeline operators to:

- ⦿ Extract value from historical and real-time data
- ⦿ Accelerate the assessment and decision-making process
- ⦿ Increase value by optimising asset performance
- ⦿ Build confidence in asset compliance and regulatory requirements
- ⦿ Enhance integrity engineering and continuous improvement
- ⦿ Integrate with parallel business processes and KPIs
- ⦿ Align data via customised data techniques

THEIA



AGEING ASSETS

AGEING IS INEVITABLE, MANAGE THE RISK

Having been involved in the engineering and design of many of the world's existing hydrocarbon pipelines and facilities, Penspen are ideally placed to support operators as these ageing assets present new challenges and opportunities beyond their originally intended design life.

AGEING ASSETS

Asset life extension needs to be effectively managed with several key factors to consider, including current and future risk, decommissioning, and hazard management.

Offering tailored solutions, Penspen's team of experts have a wealth of global experience across the full asset integrity and management lifecycle. By applying a range of techniques to assess and manage an ageing asset, our customers benefit from better decision making, less risk and enhanced knowledge – with cost, efficiency and safety at the very core.

Integrity & Risk Assessment | Inspection | Auditing

Regulatory Compliance | Pipeline Data Management

Repair & Rehabilitation | Geohazards | Decommissioning

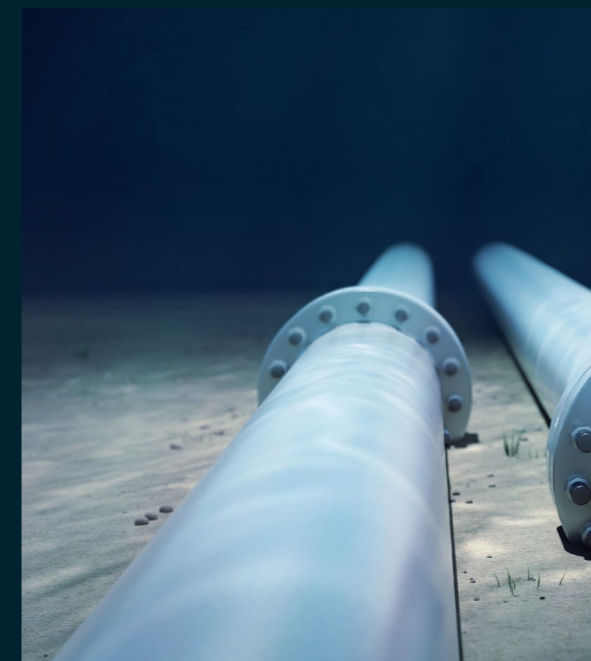


CORROSION ASSESSMENT FOR MASDAR BATTERY STORAGE PROJECT, KSA

Technical corrosion study to ensure 25-30 year durability of exposed and buried steel frameworks.

Penspen delivered corrosion consultancy for Masdar's large-scale battery storage project in Saudi Arabia. The study encompassed environmental data analysis, service life modelling, and corrosion protection strategies for both exposed and buried steel structures. Tailored coating specifications and mitigation measures were developed in accordance with relevant international standards.

CASE STUDY




FEA ASSESSMENT FOR SUBSEA PIPELINE REPAIR, MIDDLE EAST

Penspen was commissioned by one of the world's largest gas operators to perform a finite element analysis (FEA) and provide technical support for the repair of a subsea pipeline impacted by a vessel anchor.

The scope included detailed FEA modelling of the damaged and repaired states, crack growth assessments, and drop-object impact analysis. Penspen also supported the design and installation of a custom repair clamp to restore integrity and extend the pipeline's safe operating life.

CASE STUDY



ENERGY SECURITY

ENSURING RESILIENT SUPPLY, ENABLING A SECURE TRANSITION

In the transition to a low-carbon economy, traditional fuels will continue to play a significant role in our energy system for years to come. Penspen supports operators to meet decarbonisation commitments whilst maximising existing network infrastructure, enhancing secure, reliable and efficient domestic energy production and transmission.

ENERGY SECURITY

Decarbonisation requires a smooth, measured transition to net zero. Key to the success of this is a resilient energy infrastructure.

Penspen extends the life and improves the efficiency of existing production, transmission and distribution assets, adding capacity so operators can meet growing energy demand whilst ensuring ongoing integrity for safe, affordable, and secure operations.

Additionally, our energy transition consultancy works with operators to not only engineer the infrastructure required to produce, store and transport low carbon energy, but to assess the viability of critical assets for repurposing to support a home-grown energy transition.

- Maximise supply
- Maintain and secure capacity of existing networks
- Increase system resilience and efficiency
- Repurpose infrastructure
- Develop innovative low-carbon technologies



TERMINAL REDEVELOPMENT, UK

Feasibility of future operation of existing methane terminal to 2050.

Supporting a recommendation to a government regulator, Penspen delivered a large techno-economic study for a major utility company on the future safe, reliable and compliant operations of a large gas terminal.

The scope included estimation of CAPEX and program to an accuracy of +/-30%, OPEX Estimate, as well as key risks, forming a FEED report and Engineering Justification Paper. The resulting study identified best value solutions for the site, ranging from abandonment to reassignment as an electricity production site and use for H₂/CO₂, with resulting output fed into cost estimation scope for methane only or renewable compatible design.

CASE STUDY



AL MAKTOUM JET FUEL MASTER PLAN, MIDDLE EAST

Strategic planning to support the world's largest airport development.

Penspen was engaged to validate and update the jet fuel infrastructure master plan for Al Maktoum International Airport (AMI), set to become the world's largest passenger airport.

Our scope included detailed data analysis to assess current and future fuel demands, master plan evaluation to ensure alignment with operational growth, and development of a comprehensive fuel facilities strategy. This work safeguards key areas for expansion and supports AMI's long-term operational efficiency and capacity needs.

CASE STUDY



ENGINEERING & PROJECT MANAGEMENT

COMPLETE, CUSTOMISED SOLUTIONS

Bringing international engineering experience to local project requirements, we have been delivering onshore and offshore engineering services to the energy industry for more than 70 years.

We help clients to develop new energy assets and repurpose existing infrastructure through customised engineering solutions. As a multi-discipline company, we combine quality and technical excellence with agility, providing an extensive range of pipeline and facility services over the full lifecycle of a project.

ENGINEERING & PROJECT MANAGEMENT

Employing industry-leading engineering and project management methodologies, we provide a structured and efficient approach to the complex process of planning, executing, and completing projects, helping our clients optimise resource allocation, monitor project progress, and mitigate risks effectively.

Our areas of expertise include conceptual and feasibility studies, basic and front end engineering, detailed design, operability, and risk assessment as well as project management services, procurement services, and engineering support to main works contractors under the EPC banner. In addition to development projects, our technical skillset enables safe and cost-effective execution of decommissioning projects for hydrocarbon assets that have ceased production.

Additionally, we provide customised project management teams that are tailored to suit client practices, procedures and standards, ensuring seamless communication and coordination throughout the entire project lifecycle.

PROJECT CAPABILITIES FOR COMMERCIAL SUCCESS

Feasibility and Concept | Pre-FEED & FEED | Detailed Engineering

PMC & PMS Services | Subsea Production Design | Facilities Design

Customised Solutions | Project Teams Provision | Advice & Supervision





ASSET INTEGRITY

OPTIMISE ASSET LIFE, MINIMISE RISK

Asset integrity management is a formal process for protecting people, the environment, and the operator from the consequences of asset failure.

As authors of the Pipeline Defect Assessment Manual (PDAM), we are recognised globally for our pipeline assessment expertise. From pipelines to facilities, our services cover a broad range of asset integrity management requirements, providing a demonstrable minimisation of risk to people, the environment and business, as well as optimisation of inspection, maintenance and asset life.



ASSET INTEGRITY

Asset integrity solutions play a pivotal role in the energy industry, ensuring the reliability, safety, and optimal performance of critical assets.

Our experienced integrity teams employ advanced technologies and methodologies to monitor, assess, and maintain the integrity of assets throughout their lifecycle. By preventing equipment failures, leaks, and unplanned downtime, we help our clients enhance operational efficiency, reduce operational risks, and safeguard both personnel and the environment.

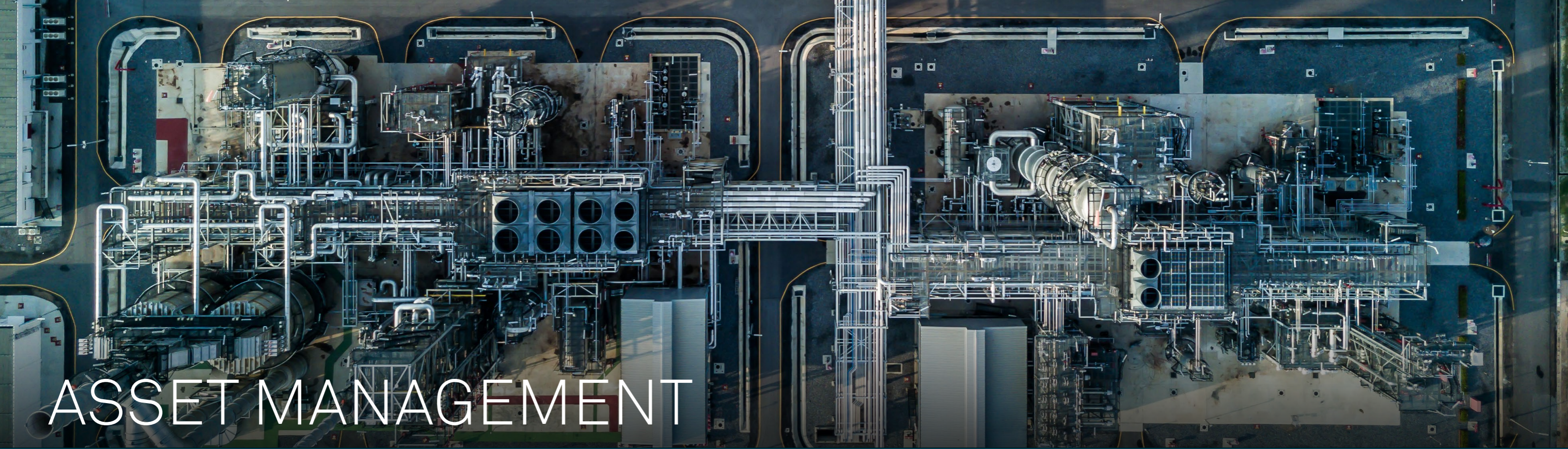
Additionally, we contribute to regulatory compliance and support sustainable practices, fostering a resilient and responsible approach to energy production.

INTEGRITY CAPABILITIES FOR CRITICAL ASSETS

Risk-Based Inspection | Corrosion Management | Asset Life Extension

Pipeline Data Management | AIMS | Audit | Integrity Assessment

Decommissioning | Emergency Response | Flexible Pipe Integrity



ASSET MANAGEMENT

CONFIDENCE IN CRITICAL INFRASTRUCTURE

Penspen helps owners and operators ensure reliability, optimum performance, and regulatory compliance for essential infrastructure used to produce, transport, process, store, and use energy.

Our Asset Management services help manage risk, minimising the impact of unscheduled downtime on critical assets. Through the provision of skilled and qualified IP/HP gas and pipeline technicians, we support our clients in assuring a reliable supply to their end users.

ASSET MANAGEMENT

Asset management solutions are instrumental for the safe maintenance of energy assets, offering a strategic approach to maximise the lifespan and performance of these critical assets.

From total asset management to tailored packages, our technical teams provide solutions that involve systematic planning, tracking, and optimisation of maintenance activities.

Our specialist operations and maintenance technicians operate a 24/7 call out service for emergent asset management issues, ensuring that equipment and facilities operate at peak efficiency, minimising downtime, and enhancing reliability, safety, and cost-effectiveness.

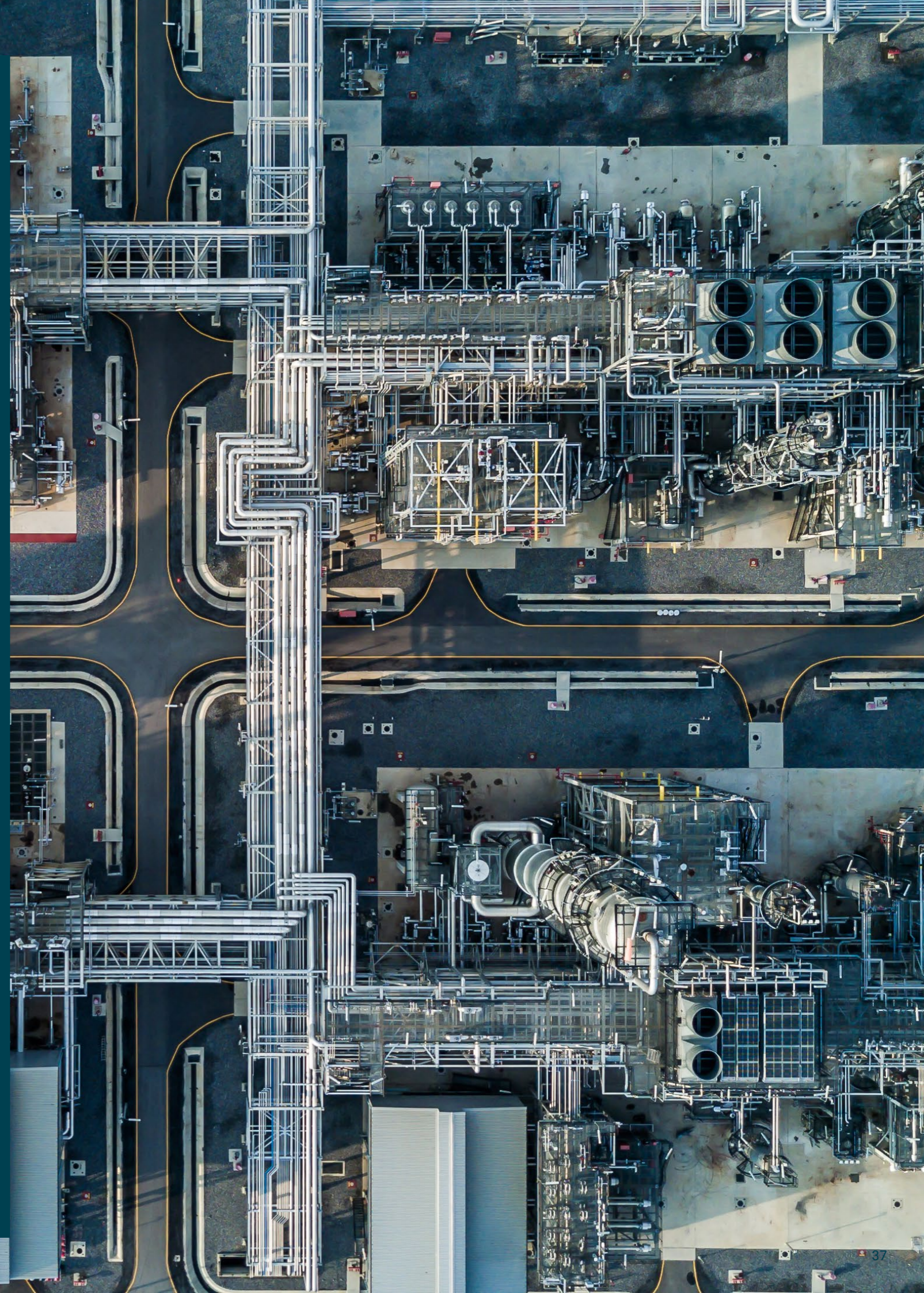
With considerable experience in extending asset life, Penspen's technical solutions support improved operational efficiency, and the ability to adapt to changing industry dynamics, fostering sustainable and resilient operations.

MAINTENANCE CAPABILITIES FOR ASSET EXCELLENCE

Asset Management | Operations & Maintenance | Technical Services

Reliability Consultancy | Technical Manpower | Administrative Service

Transportation | Storage | Metering Capabilities





TRAINING

COMPETENCE ASSURED

- PIPELINE DEFECT ASSESSMENT (PDAC)
- HIGH PRESSURE GAS TRANSMISSION SYSTEMS
- PRESSURE CONTROL APPRECIATION
- LEVEL 3 NVQ DIPLOMA IN ENGINEERING MAINTENANCE
- UK OFFSHORE/ONSHORE PIPELINE LEGISLATION AWARENESS
- PIPELINE INTEGRITY MANAGEMENT
- REPURPOSING PIPELINES FOR HYDROGEN
- CO2 CAPTURE AND TRANSMISSION

As global leaders in engineering, asset management and integrity training, our courses are recognised by the foremost industry organisations for continuing professional development.

We have trained over 5,000 people, delivering public and private training courses worldwide.

Our trainers are highly knowledgeable, with extensive university lecturing experience and many years of service in the pipeline industry.

Courses can be custom-designed for client needs, or selected from a series of standard public courses.

Book online at www.penspen.com

In service of improving access to sustainable energy in communities across the world, we operate across a range of high-risk environments. We pursue success safely and responsibly, whilst ensuring that we operate both sustainably and ethically.

At Penspen, wherever we are working, the health, safety and wellbeing of employees and contractors is an area where we refuse to compromise. Our safety culture is built on a commitment that everyone who works for and with us gets home safe every day.

Our commitment - Think Safety, Work Safely, Home Safe - is one that we make to our employees when they arrive at every day. It's also a promise that we expect our employees, clients and contractors to make to each other.

Our HSE vision, Zero Harm, clarifies our intention not only to ourselves but to our clients and the communities we work in, with a focus on ensuring we cause no harm to people or the environment through the work that we do. Our goal is always to achieve the highest standard of environmental protection, in full compliance with our EN ISO 14001:2015 accreditation.

Zero harm is our top priority.



A SIDARA MEMBER

Penspen is a proud member of Sidara, a global collaborative of leading specialist firms that design for people and the planet.

Our 20,000 visionaries, thinkers, and innovators from over 300 offices across 60 countries offer clients a broad range of highly specialised services—from architecture and design, engineering, and project management to digital strategy, sustainability consulting, and energy innovation—all under one umbrella.



THE HOME FOR HUMAN ENDEAVOUR

Our global network of specialists elevates how people live, inspires global impact, and makes room for cultures to shine.

DESIGNING FOR A SUSTAINABLE FUTURE

Together, we help decarbonise the most challenging sectors in the built environment.

ADVANCING THE HUMAN EXPERIENCE

Our projects inspire, advance, change and touch the daily lives of people all over the world.

MAKING AN IMPACT WHERE IT MATTERS

We create an impactful future for all through livability, sustainability and digital innovation.



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