

Enhancing national energy security of supply through optimal solutions based on a long history of gas processing expertise.

## Challenges

With UK gas demand at an all-time high and import gas affected by supply outages, the ability to store large quantities of gas is essential to ensure security of supply and stability of gas price.

We have a wealth of expertise and experience in delivering underground gas storage and related surface facilities.

## Our approach

Costain is a prominent player in the development of gas storage projects, working with a number of European utility majors on projects in salt strata and depleted fields.

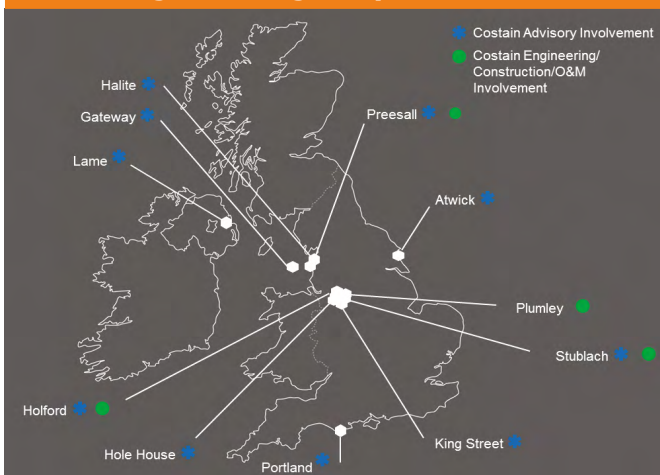
We have full capability across all phases of project lifecycle, from concept to front end design, planning development and consent, project delivery and asset/operational support.

Drawing on our technical excellence and rich heritage in complex challenging projects, our innovative approach creates improved value on gas storage projects. Our defined process for concept evaluation and quick and effective assessment of investment opportunities is based on strong experience of conducting business case optimisations and due diligence for projects in the development phase.

Our construction experience enables us to optimise our design and engineering for constructability and operability, whilst providing the highest standards of safety and quality.

Our expertise in storage extends to compressed air energy storage and hydrogen storage, where we have carried out conceptual studies to meet our clients' requirements.

## Costain gas storage experience



“ We have successfully designed and delivered complete infrastructure for major salt cavern gas storage projects across the UK, including engineering and construction of greenfield facilities in sensitive environments. ”

### Dave Richardson Project Director



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Dave has over 30 years' experience of project delivery in the energy/gas markets and developing and managing client relationships.

### Our services

- Business case optimisation.
- Consultancy services and conceptual studies.
- Planning and permits / consent development.
- Specialist capability at all levels of engineering and design, with custom designs and value-engineered solutions tailored to our clients' needs.
- Our design solutions cater for varying feed gas conditions, high turndown rate and low energy consumption.

### Benefits:

- Lifecycle cost reduction.
- Robust knowledge and experience to ensure successful complex project delivery.
- Design solutions that offer simplicity of operation and project cost savings.
- Collaborative working relationships with clients and subcontractors to generate solutions that deliver value.

## Example project experience

### E.ON Gas Storage, UK – Holford gas storage project

Development of underground salt caverns into gas storage facilities to increase the UK's gas storage capacity and balance daily gas market.

#### Solution

FEED, detailed engineering, procurement, construction management and commissioning of the gas processing plant and associated infrastructure. Completed modification works to eight wellsites to prepare caverns for gas trading, complete performance / reliability tests to improve plant operability, availability and efficiency.

Costain currently provides asset support to Uniper (formerly E.ON) on an on-going basis.

#### Outcome

- Installed three trains with 8MW centrifugal compressors and high pressure underground pipelines.
- Construction of eight underground salt caverns (600m below ground) with a capacity of 160 million m<sup>3</sup>.
- Injection and withdrawal rate of up to 22 million m<sup>3</sup>/day.
- Multiple modes of operation and high level automation with year-round availability.
- Rapid response to daily fluctuations in gas demand.



### Storengy (part of GDF Suez), UK – Stublach gas storage plant

Delivery of brine and water plant and design of gas plant infrastructure to allow storage of natural gas transported from the national transmission system (NTS).

#### Solution

Delivered conceptual studies, FEED, detailed design, procurement, construction management and commissioning support. Costain currently provides engineering support for phase 2, including specialist compression technology.

#### Outcome

- Full design and construction of brine and water facilities to leach caverns 600m below ground.
- Installation of 22,000m underground pipework and construction of first 10 wellsites.
- Injection and withdrawal rate of up to 33 million m<sup>3</sup>/day.
- Fast cycle storage with the ability to meet seasonal and peak market demand.



### Project development (confidential clients)

Development of business case for several gas storage schemes including optimisation of the storage volume and deliverability, and reducing overall project delivery and ongoing operational costs.

Development of phased delivery models for solution mining and gas operations phases.

Development of planning, permitting and consents for consented UK schemes.

#### Solution

Conceptual design, project estimate and schedule, project cash flow, project opportunities, risks and project execution strategies.

#### Outcome

- Costain concept solution consented via Development consent order process for major UK gas storage scheme.
- Gas storage scheme business case optimisation for investor.
- Phased development strategy for major UK gas storage scheme to improve business case.