

**Cluff Natural Resources plc ('CNR' or 'the Company')**  
**Awarded Additional Underground Coal Gasification Licences**

Cluff Natural Resources plc, a company founded by natural resources entrepreneur Algy Cluff, is pleased to announce that The Coal Authority, sponsored by the UK Department of Energy & Climate Change, has awarded the Company a further Conditional Underground Coal Gasification Licence, Option for Lease and non-exclusive Exploration Licence for an Underground Coal Gasification (UCG) prospect in the Firth of Forth, near Kincardine, Scotland. This award follows on from the award of two licences in The Dee Estuary on the border of Merseyside and North Wales and Lougher Estuary in Carmathenshire, Wales in January 2013 and are part of CNR's strategy to build a portfolio of Deep UCG licences.

**Overview:**

- Formal offer received from The Coal Authority for the award of 100% of a UCG Licence at Kincardine totalling 3,687 hectares
- CNR to apply for relevant planning and environmental permits in order to develop the project
- Target extended coal seams offshore UK in order to extract syngas through the UCG process
- Focus on supplying the resulting syngas to customers for a variety of uses and providing a carbon capture solution for carbon dioxide
- Experienced coal practitioner in place to lead development of the licence
- CNR now has 100% working interest in three UCG licences in the UK

Mr Algy Cluff, Chairman and Chief Executive of Cluff Natural Resources, commented: "I am delighted to be able to announce the award of this further licence at Kincardine. It is well known that coal seams extend into the offshore waters around the UK and with proven technology now available to utilise this energy source, we intend to embark on the process by extracting gas from these coal seams.

"It is our intention to seek the necessary planning and environmental permits to advance the project with a view to production. Deep UCG has the potential to do much to address the UK's future energy needs, avoids the use of fracking and enables the gas generated to be easily controlled by the supply of oxygen."

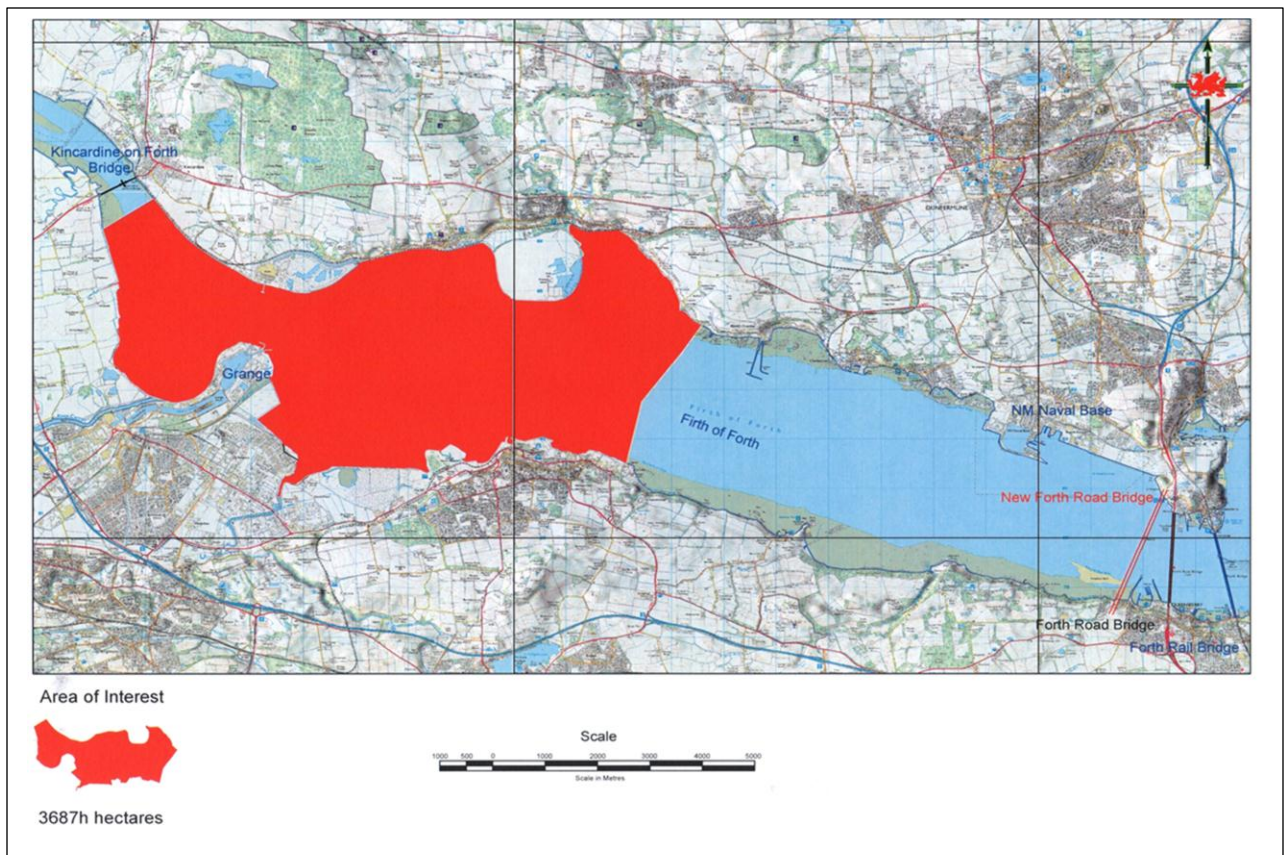
**Further Information**

Following a formal offer from The Coal Authority, sponsored by the UK Department of Energy & Climate Change, CNR has been awarded a Conditional UCG Licence, Option for

Lease and non-exclusive Exploration Licence for the Kincardine Project. The Project, located in the Firth of Forth near Kincardine, Scotland, consists of a 3,687 hectare licence. CNR has a 100% working interest in the licence.

Once planning and environmental permits are in order it is intended that the licence will be developed to production by a team led by Keith Leighfield, an experienced coal practitioner. Keith has 50 years' experience in mining at coal and metaliferous mines and has held various positions before becoming the Chief Surveyor and Minerals Manager for British Coal and the first Director of Licensing at the Coal Authority.

*Map of the Kincardine Project Area, Scotland, totalling 3,687 hectares*



UCG is a commercially proven industrial process which enables coal, in situ, to be converted into syngas, which is brought to the surface via a production well.

Syngas has a number of commercial applications; feed for power generation plants, iron and steel manufacturing, gas-to-liquids processes and fertilizer/methanol production.

In addition, the carbon dioxide ('CO<sub>2</sub>') produced as a result of the UCG process can be sold to mature oil fields as part of Enhanced Oil Recovery ('EOR'). EOR is a technique

used to increase the amount of crude oil that can be extracted from an oil field through injecting gas into the oil bearing stratum at high pressure.

While UCG has been researched and practiced for the past century, recent developments in directional drilling have been critical in enhancing the commercial viability of the extraction process. UCG technology has a commercial track record, with one facility in Uzbekistan supplying syngas to a power station for over 40 years. In addition, a number of projects in South Africa and Australia are moving into commercial production. The drilling techniques underpinning the development of UCG are not dissimilar to those currently used in the production of coal seam methane.

### ***Gasification***

The conversion of the coal to syngas is achieved through a controlled underground gasification process initiated by the injection and ignition of oxidants into the coal seam. The coal seam is ignited and gasified, generating a syngas consisting of methane, hydrogen, carbon dioxide and carbon monoxide.

The rate of gasification is controlled by the injection rate of air or oxygen, but this is typically 0.5 tonnes of oxygen for each tonne of coal gasified.

All UCG processes are similar in that they require a minimum of two boreholes that have to be connected, or linked, together to form a complete circuit for the gases to flow through:

- one to inject the gasifying agents and start ignition, known as the injection well; and
- the other to recover the syngas produced, known as the production well.

Historical UCG technology varied from driving underground roadways, or drilling in seam boreholes from underground roadways to vertical boreholes. Thanks to the advancements made with drilling technology in the oil industry it is now possible to perform directional drilling from the surface and the application of this technology is vital to the future development of UCG.

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