Economic Development Committee **EDC 05-03(p5)**

Date:	**20 March 2003**
Time:	**9.00am – 12.30pm**
Venue:	**Committee Room 1, National Assembly for Wales, Cardiff Bay**
Title:	**Presentation to Economic Development Committee, 20 March 2003**

Introduction

Valleys Energy Ltd are currently seeking to consent a 480MWe power station near Onllwyn in the centre of the anthracite production region to utilise local Welsh coal. The Integrated Gasification Combined Cycle technology to be used in the station is a step change in the conversion of coal to electricity. It has excellent environmental performance with very low emissions compared to existing coal power stations. The potential to produce almost 'green energy' from coal at a later date by removing the carbon dioxide is built into the design. As well as providing electricity, the station can provide low cost hydrogen to fuel hydrogen transport and static CHP applications that are emerging as part of the 'hydrogen economy'

Context of the Project

UK Energy Policy is set out in the Energy White Paper "Our Energy Future – creating a low carbon economy" published in February 2003. Dominant themes are

a) the acceptance of a need to restrict the emission of greenhouse gases to limit climate change, and
b) the need to manage a switch from self-sufficiency in gas supply to an increasing dependence on imported gas sourced from Russia and the Middle East and
c) the recognition that between now and 2020 the UK will require up to ~36,000 MW of new generating capacity as existing power stations are retired (DTi energy paper 68)

The Drym station design concept provides an effective response to these concerns:

- by retaining diversity in the energy mix used to generate electricity, mitigating the trend towards the use of gas as a dominant primary fuel for electricity generation.
- by achieving this with greenhouse gas emissions which are comparable with those from a gas Combined Cycle Gas Turbine (CCGT) using imported gas.
- it can cost-effectively capture the carbon dioxide produced, positioning the station to produce close to 'green energy' once geological storage of carbon dioxide is established as a route for long term disposal.
- it can supply hydrogen for 'hydrogen economy' applications, particularly transport and stationary Combined Heat and Power (CHP) applications. This hydrogen, again, being close to 'green energy' to the extent that the CO_2 produced is not released to atmosphere.

The emerging energy policy in Wales reflects UK Government policy meeting local needs whilst fully utilising the particular natural resources and advantages of the region. The contribution of the Drym project in this context include:

- Closure of 2,000 MW of plant at Pembroke has resulted in a shortage of generation in South Wales with substantial net inflows of electricity from England. The proposed Drym Power Station provides bulk generation capacity locally increasing system supply security to electricity users in South Wales and reducing energy transmission losses. It will also provide electricity in bulk well beyond the foreseeable life of the large conventional coal power station at Aberthaw

- South Wales is a major coal producing area and retains considerable reserves of coal as well as a continuing mining industry providing employment. This power station will make use of this indigenous coal resource in a clean, environmentally benign manner, and will provide long-term sustainable jobs in an area where unemployment is high, by providing a market for locally produced coal.

- The station converts coal into a hydrogen-rich synthetic gas. The availability of hydrogen in bulk provides the opportunity to divert increasing amounts from electricity generation to 'hydrogen economy' applications throughout the lifetime of the station. The station can help to prime the uptake of hydrogen transport, small scale CHP and other 'hydrogen economy' applications in South Wales. This could in time provide a second major market for coal beyond electricity generation

- Heat produced by the station is available for local use either on the Valleys Energy site or nearby. Hence the opportunity exists to attract agricultural or other users requiring such heat. Such users bring additional jobs which are add to those needed for station operation and support.

Alternative Generation Options

A very substantial amount of replacement generation capacity is needed in the UK between 2005 and 2020. The Energy White Paper seeks to encourage renewable generation and energy efficiency but recognises that substantial additional bulk generation capacity beyond this will be needed to meet the requirement. For example, the Drym Power station alone will produce ~ 3.5TWh per year, almost as much as the target for the total renewable energy in Wales. The options for bulk generation are gas CCGT, nuclear or coal using appropriate 'clean coal' technology

The UK will soon cease to be self sufficient in gas (the White Paper suggests 2006) and will become increasingly reliant on imports. Increasing reliance on imported gas raises issues of energy security given the limited number of supplier countries and their potentially volatile political situation. Some commentators have also highlighted the wasted energy and the environmental cost associated with transporting the gas over long distances either by pipeline or as a liquid in a bulk carrier.

Solid fossil fuels can be converted into a hydrogen-rich synthetic gas and used in a CCGT to give similar environmental performance to gas CCGT using imported gas. This method is called Integrated Gasification Combined Cycle (IGCC), and is proposed for the Drym power station. The emission of sulphur and nitrous substances - the constituents of acid rain - is

very low and at the same level as a gas CCGT. Once account has been taken of the carbon dioxide (CO_2) emissions associated with gas transport over large distances, the CO_2, emissions from gas CCGT and IGCC start to converge. Thus IGCC becomes a strong candidate for a new station. This is particularly so as the proposed station is 'capture ready', ie. the station has been designed to allow very cost effective capture of CO_2, allowing even these emissions to be eliminated at some point in the future.

Transport in the UK is 98% dependent on oil, and UK oil reserves are dwindling. The primary source of supply for oil imports is the Middle East, raising questions of security of supply and the risk of price shocks. The use of oil products in the internal combustion engine results in major greenhouse emissions and the transport sector contributes 23% of the UK's CO_2 emissions. The Drym IGCC produces hydrogen very cost effectively, and some of this hydrogen could be used to supply fuel for hydrogen-based transport vehicles. This would open up the prospect of transforming the energy sector by adoption of a plant that supplies energy as electricity to some users, and as hydrogen to others. No other bulk generation option is able to offer this advantage.

The environmental performance of the Drym IGCC far exceeds that of alternative coal conversion technologies, and is dramatically better than any retrofit to existing coal stations that might be considered, eg. investment in Flue Gas Desulphurisation.

The attraction of the nuclear generation alternative is limited by high unit electricity generation costs compared to both gas CCGT and IGCC, and public concerns on radioactive waste disposal and the potential effect of terrorist action. Plant flexibility to respond to changing electricity demand is also an advantage in any bulk generation plant and again both gas CCGT and IGCC are superior in this regard.

The case for building an IGCC to meet the need for additional generation in South Wales is reinforced and put beyond doubt by the existence of substantial coal reserves in the area. In contrast, gas currently has to be pumped across England from the North Sea.

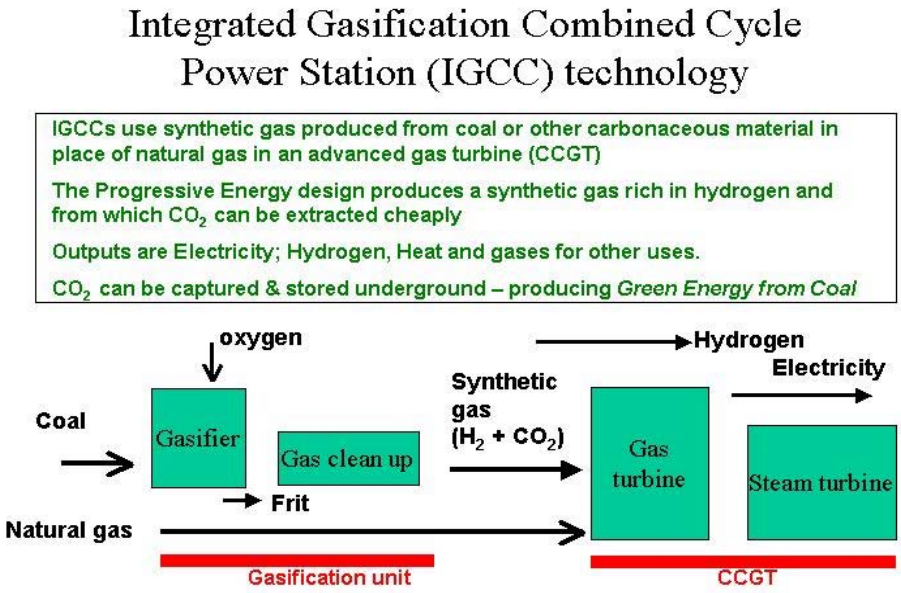
Location of project

The proposed site lies near the site of the former Drym Open Cast, near Onllwyn. The site offers particular advantages:

- the close proximity to the National Grid 400 kV system (it passes over the site) avoiding the need for any significant lengths of overhead lines
- the availability of a mineral railway line to deliver feedstock during operation, and to give the option of a route for construction materials,
- the proximity to local sources of coal, from the underground mines of Tower Colliery and Anthracite Mining Ltd, and existing consented open cast sites nearby
- ready access to a Natural Gas supply to the plant is available at reasonable construction costs
- the ready availability of sustainable supplies of water of suitable quantity and quality
- the availability of poor quality land sufficient to accommodate the new station
- being well separated from any private dwellings
- the existence of adjacent land available to attract other activities into the area which can benefit from the heat produced by the station.

The technology

The Integrated Gasification Combined Cycle technology makes use of modern Combined Cycle Gas turbine (CCGT) technology that has been widely used over the past decade to generate electricity from natural gas. Rather than piping natural gas from the North Sea or using imported gas this project converts a combination of coal and water into a synthetic gas on site and this synthetic gas is used in the CCGT in place of natural gas.



The station is more efficient that existing conventional coal fired stations and as a result produces ~20% less CO_2 per unit of electricity generated. Sulphur dioxide, nitrous oxide and particulate emissions are exceptionally low compared to conventional stations underlining that this is a step change in technology for the use of coal to produce useful energy. This excellent environmental performance is reflected in the environmental history from operating IGCC plants in the Netherlands, Spain and the USA and noted by the Environment Agency in their Guidance Note on Gasification Processes which quotes achievable levels for 'acid rain' pollutants from IGCCs as a small fraction of that achieved by conventional coal fired power stations even those fitted with the most modern clean up equipment.

Benefits and Environmental Impact

The Environmental Impact Study demonstrates that the project is environmentally benign: the project has low visual impact, local air quality is maintained at a very high level and local residents, the closest of whom is ~3/4 mile away, will not hear the plant. Additional road traffic is limited by preferential use of the existing mineral railway for transport of fuel for the station.

This project is a major investment in the area and it will bring substantial benefits. An economic study is included in the Environmental Impact Statement. Overall around £360M will be injected into the local economy over the lifetime of the station bringing real prosperity to the area.

The use of this 21st century clean technology offers the coal industry a long term market and hence a long term future. Around 500 jobs in the coal industry are at stake. The project offers continuing employment for local residents and new jobs for others. Without this project the medium term outlook for the anthracite mining industry in Wales and any such employment is in doubt and in the absence of other major employment opportunities unemployment in the area could well rise.

The project will create 120 new jobs directly at the plant and our policy is to seek to recruit locally. We estimate that around 80 of these new jobs could well be filled by people already living in the locality, particularly given that we intend to provide relevant training. Use of excess heat from the station for horticulture and other similar activities will bring further real local jobs.

In addition to these long lasting benefits, we estimate that during the construction period alone some £26M will be injected in wages into the locality with a wealth of opportunity for existing local businesses and employment associated with the project.

Project Extensions

Initially the station will provide an exemplar project demonstrating the use of IGCC technology to produce electricity in an environmentally sound way from local coal. The composition of the synthetic gas produced offers very real opportunities for the future:

CO_2 is concentrated and hence can be removed at very low additional cost. This opens the prospect of 'green energy from coal' once a suitable disposal site is available for the CO_2 extracted from the plant.

Long term storage of CO_2 in deep geological formations is well known – it occurs naturally and has been contained for millions of years. The technology to transport and inject CO_2 into suitable formations exists and is well established – around 30 Mt CO_2 is injected in this way already worldwide, mainly to enhance oil production from mature oil deposits.

Suitable sites include porous sandstones that may be flooded by saline water as well as spent gas and oil fields. The UK has a large quantity of suitable sites off its shores. For sequestration of CO_2 from the Drym Power Station we are exploring sites off the west coast. Large scale CO_2 sequestration in a similar saline formation in the North Sea has been taking place successfully since 1996. This initiative, the Sleipner project, is very well monitored and a considerable amount of work has been undertaken to fully characterise the increasing amount of CO_2 deposited. Valleys Energy has now signed an agreement with the European consortium that are undertaking this work to apply this experience to confirm and characterise a suitable sequestration site for CO_2 from the Drym Power station..

Identification and development of a large scale CO_2 storage site is driven by the desire to sequestrate CO_2 from the Valleys project but development of such a site provides a facility in which to dispose of other major CO_2 emissions from South Wales industry.

The other major constituent of the synthetic gas produced is hydrogen. A proportion of this hydrogen gas can be separated out at a very competitive cost prior to use of the bulk of the synthetic gas in the gas turbine to generate electricity. This offers the opportunity of supplying hydrogen for transport and stationary CHP applications. The existence of this plant can help to prime the introduction of such applications and the related infrastructure and Valleys Energy is actively seeking to develop a cluster of hydrogen related applications in the Neath/Swansea area. The plant can provide hydrogen competitively over much of South Wales and the intent is to initiate further clusters in due course. The aim is to promote a significant uptake of hydrogen economy applications over the lifetime of the plant creating a second market for Welsh coal in addition to use for electricity generation.

Project Timescales

Valleys Energy are seeking to consent a power station that has low emissions of acid rain pollutants and 20% less CO_2 than existing coal stations. The aim is to start construction on site in late 2004 with full operation in 2007.

Subject to successful completion of the technical study of offshore geological CO_2 sequestration sites and adoption of the EEC proposal for carbon trading, we propose to separate CO_2 from the plant and sequester it offshore. Whilst there are many challenges to overcome, is hoped that this could be in place ~ 5 years after station start up ie around 2012

We are actively seeking to promote the ‘hydrogen economy’ in South Wales starting with applications in the Swansea/ Neath area with the development of further clusters over the lifetime of the station. The intent is to have a number of applications in place by 2007 when the plant starts up.

Issues for Discussion

National Assembly support in promoting ‘Green Coal’ Projects with the UK Government

Championing of the production of an offshore geological store for CO_2 from South Wales

Support for initiatives to develop sustainable technology clusters utilising hydrogen based energy technologies

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