From:	Pridham Robert (Energy Development)
To:	[redacted]
Cc:	Preesall Underground Gas Storage; Tom Carpen
Subject:	FW: Preesall Saltfield Underground Gas Storage - EN030001
Date:	14 May 2014 10:01:03
Attachments:	Yemen-South Korea.pdf Safety at Preesall could be compromised by.pdf

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From: Edward Greenwood [redacted]
Sent: 09 May 2014 10:14
To: National Infrastructure Consents
Subject: Preesall Saltfield Underground Gas Storage - EN030001

The Rt Hon Edward Davey MP
The Secretary of State
National Infrastructure Consents Team
Department of Energy and Climate Change
Dear Minister Davey

I refer to the email I received on 8 April 2014 from Giles Scott regarding the above and I make the following representations.

When ICI operated as a chemical company it safely stored volatile gas in salt caverns in Cheshire; as a consequence there is a belief that the same procedure can be applied at Preesall. However, unlike the salt in Cheshire, the Preesall salt is riddled with faults through which gas stored at high pressure could escape.

After Canatxx submitted their first Planning Application I was told by one of their Directors that there was a large price mark-up between buying and selling prices of natural gas. This appears to be confirmed by the attached Yemen/South Korea deal where there was a variation of several hundred percent in price paid for natural gas. Added to this, there is a normal commercial variation between wholesale and retail prices which probably explains the comment.

Given the market situation that existed undue haste to develop the site appears to have taken precedence over establishing that the geology of the halite is suitable for gas storage. The expert advising both Canatxx and Halite on the geology has now acknowledged that the original scheme was unsafe.

It is claimed by Halite that the risk from earthquakes is small and this is also the case regarding the Heysham nuclear plants. However, the UK nuclear plants are designed to be safe in the event of an earthquake of 6.5 to 7 on the Richter scale. This is a wise precaution as there have been earthquakes of 6 around the UK. As there can be an earthquake at Preesall of this magnitude or more should similar safety precautions to nuclear installations also be applied to gas storage?

There are other issues related to making the best use of the halite at Preesall and storing natural gas is probably not the best option for the general population of the Country.

Added to this it seems the plant at Stublach Cheshire is intrinsically much safer than that proposed for Preesall. The caverns in Cheshire are much further from faults and further apart from each other than those planned by the Halite Group. If the Stublach facility had used the Halite Group expert 4 times as much gas could have been stored or a smaller and cheaper facility could have held the same amount of gas. The attached schematic drawing of these facilities indicates the variation in the approach to safety.

Storengy Ltd the company constructing the facility at Stublach is a subsidiary of GDF which is controlled by the French Government. This organisation has extensive experience in natural gas storage and their Technical Director advised me that neither GDF nor Eon would form caverns within 300 metres of a fault if it extends beyond the salt strata. The British Geological Survey data shows faults starting below the salt and passing through the rock covering the salt. These faults are also shown on the Mott MacDonald drawings produced for Halite. In some cases planned caverns are too close to two faults than GDF would allow. Only if all the faults are within the salt strata would GDF relax the 300 metre rule. Based on the Mott MacDonald drawings only caverns 2, 4, 5 and 8 which are in the northern polygon would comply with the standards applied by GDF. This would reduce the estimated working gas volume from 600 to about 80 million cubic metres.

There is an argument that Professor Rokahr's formula creates an erosion of conventional factors of safety normally applied by companies operating gas storage facilities. Given the close proximity of the Preesall site to large population densities and the highly faulted salt, should the Halite Group be allowed to experiment using a formula other experts consider could be unsafe?

These facilities are relatively simple to manage with only minor staffing costs but the rewards can be outstanding. As a consequence in the UK there is an obscene aim to convert this bonanza to personal gain no matter what the risk. The plant at Stublach is 85% owned by the French Government and the general public in France will be the beneficiaries of any profit from gas transactions at this site. At Preesall it will not be the UK public that gain from this potentially risky speculation.

With regard to the Halite Group estimate that the project will produce 3000 jobs there has not been this scale of employment at Stublach where a similar facility is being constructed. They are managing to carry out the work with less than 10% of that number of staff. The non-specialist and civil work element occupies only a small portion of the labour force. When the ICI ran the brine field it was staffed mostly by people living on the east of the River Wyre and to promote the gas storage project as a creator of significant employment for Fleetwood residents is in all probability misleading.

One has to question why the Applicant at Stublach chose the more expensive arrangement. Can it be that the Applicant was more concerned about safety than the Halite group?
At Stublach the salt removed in forming the caverns is not wasted by pumping it into the sea but it is used to produce useful chemicals. Other gas storage facilities could be formed in other salt deposits in Cheshire but there is a limited demand for feed stock salt.
However, when the Stublach facility is completed there are other companies that could satisfy the demand by forming more caverns which could be made suitable for gas storage. The rock salt unlike that at Preesall is free of faults and the sites are in rural areas and far from high population densities.
I am pleased to read that it is your intention to appoint an independent Geological Assessor.
At the moment in the UK there is no immediate need for additional gas storage and there is an option of creating other safe facilities in Cheshire to meet any increased gas storage requirements. Has this been considered as an alternative to the potentially high risk Halite Group project?
If it is considered safe to issue a Development Consent Order this should not be done unless the rules applying to the various conditions of the salt are clearly stated. **Without this precaution there is a risk that the Health & Safety Executive will have to justify its views in Court against a well-funded case brought by the Halite Group whose experts could justify reduced factors of safety.**
A safer and alternative use for the salt at Preesall would be for the caverns to be used for Compressed Air Energy Storage. Apart from the large offshore wind farms off our coast there is the potential to generate even more renewable energy from the tides. This form of energy storage would enable renewable energy to be generated on demand.
For obvious reasons the site could not be used for storing natural gas in caverns adjacent to those containing compressed air.

Renewable Energy Addendum

The latest United Nations report on Global Warming takes the view that it is still not too late to prevent the worst of Climate Change. In the UK we can make a contribution to avoiding this potential disaster by generating electricity with tidal range plants on the east side of the Irish Sea.
In 2009 one of the major power companies considered a Wyre Tidal Power Plant (WTPP) and I was given their estimate figures for the whole project. The cost per Mega Watt of installed capacity was just over £3 million. The company is based in Germany and the UK staff could not make a strong enough case for funding a WTPP against the short term advantages of investing in wind power.
Wind farms generate an almost immediate cash return for their owners enhanced by subsidies. On the other hand the higher return from more reliable tidal range takes longer to achieve and the management in Germany favoured a quick return on their investment.
In forming an opinion on the viability of tidal range power it seemed that we should consider the data and experience of the only company in Europe that has built and operated a large tidal range plant. With this in mind in 2009 I attended a conducted tour of the La Rance Tidal Power Plant hosted by Vincent de Lateu of EDF.
EDF estimated that the 2009 build cost of the La Rance Plant would be 580 million Euros. This equates to approximately £2 million per MW of installed capacity. The above mentioned WTPP was estimated to be 50% more expensive.
Disregarding this higher costing it has been argued that an Optimism Factor of 60% should be added to the estimated figure of £3 M raising the cost of a WTPP to £4.8 per MW.
Frontier Economics also produced a distorted view of tidal range power. Their report was funded by RSPB and other non-government organisations who are opposed to the concept of tidal range power. The report called - “Analysis of a Severn Barrage” advocated a 10% discount rate for tidal range even though other large infrastructure projects are based on 3.5% or less.
I have set out below in the first column the results for a WTPP Commercial Case based on a 3.5% discount rate. In the second column projections are based on the Frontier Economics suggestion of a10% discount rate together with the addition of an Optimism Factor. In both cases a 22% Load Factor has been used which is taken from the 1991 River Wyre Preliminary Feasibility Study. This is a conservative estimate compared with the 30% figure for small barrages on page 47 of the Frontier Economics report and the actual result for the La Rance Plant.

	WTPP Commercial Case	Frontier Economics case
Cost per MW of installed capacity	£ 2 M	£ 4.8 M
Optimism Factor	0.0%	60.0%
Discount rate	3.5%	10.0%
Estimated rate of inflation	2.5%	2.5%
Subsidy	2 ROC’s	2 ROC’s
Profit/Loss	Year 1 in profit	Loss for 13 years
Cash Flow	Year1 positive	Negative for 17 years
Result at end of first year	£8.5M Profit	£15.8 M Loss
Consolidated 40 Year Cash flow	+ £ 899 M	£285 M
Consolidated 40 Year result	£1093 M Profit	£596 M profit
Average return over 40 years	6.41%	3.97%

Approx annual profit after Year 40	£100 M	£100 M

The above analysis shows that the 60% Optimism Factor and the high discount rate have an unrealistically adverse effect on the estimated viability of tidal range power plant.

More efficient turbines have now been designed which together with modern methods of production and the economies of scale would enable tidal range installations to be built at a lower cost per MW than the La Rance plants.

Applying a 60% Optimism Factor to estimates for a nuclear power plant with a Whole Life Load Factor of 85% produce losses during the 10 years of operation. Clearly this formula gives a misleading view of all forms of power generation.

Whilst there is a case for applying an optimism factor to Government led projects, this is not the case for hard-nosed commercial estimates which normally include adequate contingencies. Adding large Optimism Factors to these estimates produces a meaningless result.

Much of the cost of tidal range plants is in the civil work and if construction is sufficiently robust, like the old structures in Egypt, Greece and Rome, they will last for thousands of years.

It is almost 50 years since the La Rance Plant was completed and it is still in sound working order. The original turbines are still in use and relatively little maintenance expenditure will be needed for the plant to go on producing electricity far into the future.

There are no nuclear plants of this vintage that are still operational and all that is left is a liability. On the other hand a tidal range plant will be a valuable asset for the foreseeable future.

As shown above the annual rate of financial return of a WTPP would after 40 years produce a return of 50% of the original cost and increasing as fossil fuel based electricity prices rise.

This rate of return assumes the whole of the cost of these installations are apportioned to power generation. No account has been taken of the other beneficial aspects such as sea defences or the boost to the economy that has taken place in Brittany since the La Rance plant was built.

The cost of decommissioning and replacing nuclear plants will be several times that of the original plant. Over a fifty year period wind farms would be into the second phase of replacement. Both wind and nuclear need a subsidy to make them viable but when the capital cost of a tidal range power plant has been recovered they are profitable from sales of electricity at the wholesale price of electricity from gas powered plants.

The period over which loan repayment can be achieved varies depending on the level of subsidy applied. In Scotland 3 ROC's are given per MWh opposed to only 2 ROC's in England. If the higher level of funding is applied the capital cost could be repaid over a shorter time scale leading to an early cancellation of subsidy.

Based on information produced by EDF for the La Rance plant the estimated cost of power is less than 10% of the rate EDF will charge for electricity from the Hinkley Point nuclear plants. The additional unavoidable liability of nuclear power is the long term cost of storing high level waste which will be a burden for many generations to come of UK Tax Payers.

Although a Wyre Tidal Power Plant would be a cheaper and better option than gas, nuclear or wind, it would be constrained by the current capacity of the River which like water channels in Somerset has silted up. Silting of the River Wyre is not a natural occurrence but man-made. Improved land drainage has increased the amount of silt carried downstream to block the river channels.

There was a time when ocean going sailing ships could moor against the quay at Wardleys. Now only on large spring tides is it possible for a sailing dinghy to reach the old harbour wall. There are no grounds for the assumption that this situation is in the best interests of wildlife or people.

Returning the river to its original natural state or further increasing its volume would be beneficial for all concerned if properly managed.

If the river is dredged the extra river volume equal to that of a house would generate more electricity than a house could consume, a situation which for all practical purposes would go on indefinitely. The eventual retail value of this electricity could be £1M or more at a cost of a few hundred pounds worth of dredging.

The same logic could be applied to tidal lagoons which could be built around our coast enabling cheap power to be generated equal to the output of several nuclear power plants. There would be only little change to the environment within a tidal lagoon and if there are sufficient turbines it would enable the rise and fall of the sea level to be similar to the natural cycle.

If the environmental groups can be persuaded to allow these less significant changes to take place, we could produce the electrical output of several nuclear plants at a rate that is lower than that of gas fired plants and at the same time considerably reduce flood risks.

Clearly the estimate of £4.8 million/MW for a WTPP tidal range plant is grossly overstated. These estimates should not be used to take a view on the viability of tidal range plants and the benefits they would bring!

A company exists to make a profit but on the other hand the economy has to develop in the best interests of its citizens and this is the Government's responsibility.

As fossil fuel rises in price our industries could benefit with cheap electricity from tidal range plants and this opportunity should not be lost by default.

The amount of electricity that could be produced from around our coast is sufficient to provide at least the electricity used in the Northwest. By developing the efficiency of Compressed Air Energy Storage we can make even better use of this resource.

Compressed Air Energy Storage

Salt deposits at Preesall could be used for Compressed Air Energy Storage (CAES) in conjunction with the vast amount of energy that could be generated just offshore from this site

Not only could tidal power be stored and sold at times of peak demand but it would eliminate the need to pay wind turbine operators not to produce electricity when there is surplus generating capacity.

These techniques are being developed by various organisations including one funded by Bill Gates. Here in the UK Storelectric Ltd are investigating and developing this technology which can be viewed on the internet.

The present plants are commercially viable but it is reasonable to anticipate that as with all forms of power generation from steam to wind power, the efficiency will increase as it is developed.

A CAES plant using the Preesall salt caverns would make a valuable contribution to the UK economy.

This would be a safer use of the Preesall halite and any further natural gas facilities that may be required could be built in Cheshire.

Yours faithfully

Edward Greenwood

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Yemen Natural Gas Sold at One Third of Market Price: $193/ton vs. $689/ton

Filed under: Corruption, Donors, UN, Investment, LNG, Oil, Yemen — by Jane Novak at 9:05 pm on Saturday, June 19, 2010

Huge losses to the Yemeni treasury, I wonder who got the graft? In 2006 the South Korean delegation came home crowing about the excellent deal with Yemen. After recently threatening to renegotiate the contracts, Yemen now says it will stand by them. This is a very interesting article, one of the contracts has a floor and ceiling price.

Businessweek

une 18 (Bloomberg) — Yemen LNG Co. will honor its liquefied natural gas contracts with buyers including Total SA, GDF Suez SA and Korea Gas Corp., an official said, after the Middle Eastern state proposed to review them.

"They are long-term contracts which are binding and will continue to be respected," François Rafin, managing director of Yemen LNG, said by telephone from Paris today. "The three contracts are priced at market prices." He declined to give details on the prices, citing confidentiality agreements.

Yemeni President Ali Abdullah Saleh ordered a review of LNG contracts signed between Yemen LNG and customers to bring them in line with current gas prices, the official Saba news agency reported on June 15.

Yemen has turned to gas as an alternative to oil, the source of 75 percent of its income. Crude production may drop to 260,000 barrels a day this year from 440,000 barrels a day in 2001, according to U.S. Energy Department data.

GDF Suez is the plant's biggest customer at 2.55 million metric tons of the fuel a year, followed by Korea Gas and Total at 2 million tons each, according to data on the website of Yemen LNG.

Total owns 39.6 percent of the 6.7 million ton-a-year Yemen LNG plant, with other major stakeholders including state-run Yemen Gas Co. having 16.7 percent, Dallas-based Hunt Oil Co. 17.2 percent and Korea Gas 6 percent, according to Yemen LNG's website.

Revenue Security

One of the three 20-year LNG contracts has a floor and ceiling price, which was sought to ensure security of revenue to repay the loans for the project, Rafin said. He declined to talk about "market prices" and said that these are "markers" that are quoted on a daily basis.

Korea Gas spokesman Lee Kwa Hyung was unable to comment yesterday on the Yemen government's decision as he couldn't reach the LNG import team. Korea Gas paid about $193 a ton, or about $3.67 per million British thermal units, for a cargo from Yemen this year, according to customs data. That compares with an

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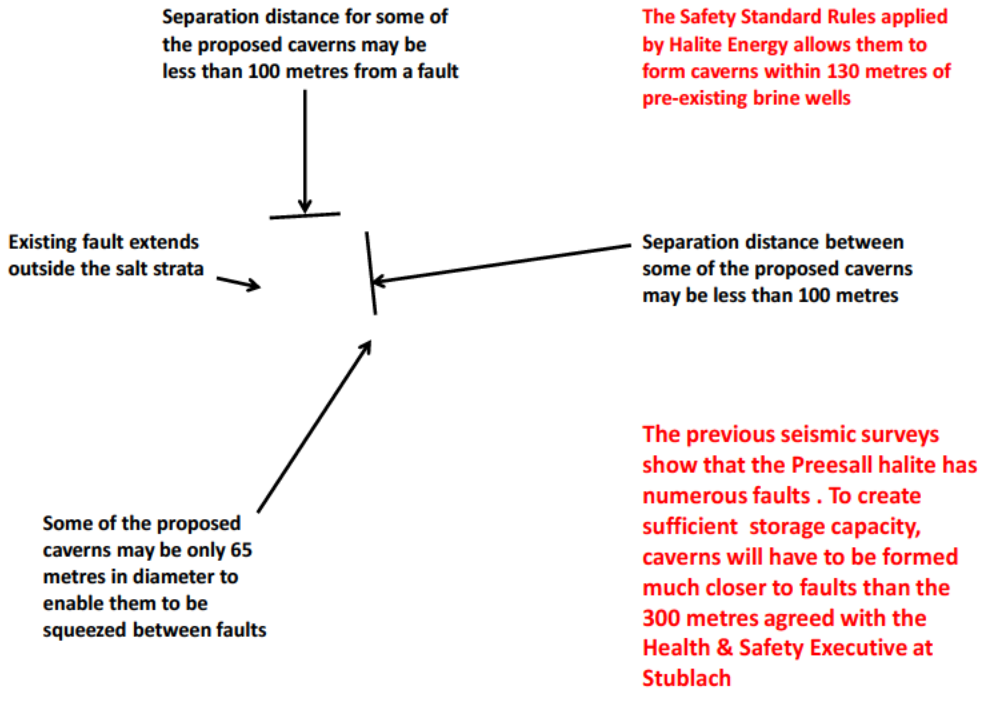
HOOD documents 1000 disappeared Yemeni activists
Federalist southern expatriates undermine calls for independence, exclude residents from talks
Yemen bought $95 mil from Serbian arms dealer Tesic in 09
Yemen gov't aided Gimto detainee al Nashiri before the USS Cole attack, sheltered him after
Journos singled out for death in Yemen
Yemen denies Syrian pilots killed were tasked with attacking protesters
Tensions Houthis/Dammaj students in Saada, Yemen (Updated)
Free homicide through global decisions
Yemen's revolutionaries letter to the world
Invariably
Fox News only reports al Qaeda activity in Yemen while millions march in child's funeral
Yemeni opposition leader mowed down in "accident"
The un-mentionableness of Ali Mohsen
Sanaa regime steals corpse, offers victim's family 2m/YR to accuse opposition
More AQAP fighters arrive in Abyan

Yemen Revolution Sites

Safety at Preesall could be compromised by cavern spacings distances being too small

Schematic layout of the Halite Energy Group Proposed Gas Storage Caverns at Preesall



Schematic layout of caverns to conform with the Safety Standard Rules at Stublach