Geophysical Education & Advice

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Memorandum

To: N. Rothengatter - Quintel
From: G. Diephuis
CC: W. Meyers, A. Wirtz - Quintel
Date: 26/02/2012
Re: Comments on the EGS spreadsheet

Overview tab

- I would be a bit more careful in coining the term "feasibility study". In my function as Senior Advisor to IF Technology I have seen the work done on the two projects mentioned. These projects certainly are a bit further than just an idea in a head, but have not yet reached the stage of a fully-fledged feasibility study
- I do sympathize with your list of Certainties and Uncertainties. It would be recommendable if you apply your findings to the numbers quoted below – in other words, adapt the number of reported decimals to their perceived uncertainties. The manner in which you report results here implies an uncertainty of well below 1 pro mille, which is highly unrealistic.

Notes tab

- Ouwehand et al, row 3: There is a mention of plastic casing being cheaper than traditional steel. I am not a well-design expert, yet I wonder what the state of the art is, in particular since I think the plastic-casing scheme has been abandoned in the DAP project – which is a conventional, low temperature project.
- ECN20100501, row 164: the sentence is not finished & I am very curious about its end
- Quintel 20080730, row 262:Obviously projects have progressed since this document was made (but not very much….)
- Energeia.nl, row 299 and following. It should be said that Mr Gankema, who is being cited, is a notorious optimist. His quotes & statements should be taken with a healthy pinch of salt
- Platform geothermie 20110131, row 453 and following: Highly optimistic statements – one should ask the question how much energy is being produced, not what the – design- capacity is of projects that are "completed" (but not yet producing!). Caution is due using this source
- NOPG-20110126, row 823: the statement "seismiciteit is nog niet 100% onder controle" suggests a certain amount of control at this moment. This is not the case. To draw a parallel with the gasindustry in this country, just study the report of the multidisciplinary team (1995) on the research after the micro-tremors around producing fields in Northern Netherlands. Caution is warranted – see also below.
- KEMA and IF Technology 20120124, row 1540: the cost estimation is unrealistic. Given the fact the the present seismic data is NOT fit for deep purpose, it being acquired for targets between 2 and 4 km, the question can arise whether dedicated 3D surveys are necessary in order to enhance the possibility of success/mitigate risks. Other than for oil/gas purposes, the answer is not straightforward at all. This issue is known, yet not yet addressed. The few publications about monitoring -

artificial and natural fracture - development all have adequate 3D coverage, hence it would seem that 3D coverage is needed, not quite for subsurface interpretation for targetting wells, but more for monitoring purposes. Please keep in mind that a dedicated 3D survey is very inefficient – a small subsurface target at great depth requiring large field lay-outs – and very expensive per km^2. A back-of-the-envelope calculation has indicated costs of at least 10 M€ for a case like Hoogeveen or Renkum. Add 20% for processing and interpretation. The second issue concerns the seismicity. Since fraccing is absolutely necessary to achieve producible reservoirs, a good monitoring system needs to be in place, amply before well operations start. Ever since the failed Basel experiments, public attention is focused on micro-seismicity, induced or not. For projects like Hoogeveen, the installation of a dozen or so shallow monitor wells equipped with multicomponent phones, is an absolute necessity. This sort of monitoring takes already place since 1997 around the producing gasfields in the North of the country, hence sufficient expertise exists in designing the stations and in the interpretation of results. A similar monitoring system needs to be operational at least one year before the start of fraccing operations. By doing so, enough evidence can be obtained about naturally occurring micro-seismic events. This knowledge is needed not only for public affairs purposes, but also for discrimination of fraccing induced tremors. Secondly, the monitor grid serves for the imaging of induced fractures, which orientation determines the position of the second –production- well. The investment costs involved should be budgeted at 1 – 2 M€, operating costs in the order of a few hundred thousand per annum, somewhat more in the beginning, somewhat less if the project is fully operational. Please note that public acceptance of fraccing presently is almost non-existentIn total, it is not exaggerated to add at least € 15 M to early investment costs, a figure of € 20 M would be more prudent. Watch lead times!

Conclusions and recommendations

The spreadsheet gives the impression of a solid piece of work. This review should not be seen as a fully-fledged peer-review, as warranted for ICI listed scientific journals. It could be an idea to submit a manuscript on this work to a reputable journal – once accepted it will give a solid foundation under your website.

Care should be taken in explicit mentioning that the EGS technology still is very much in its early stages of development worldwide and non-existent in NL, with its inherent uncertainties. As far as the upstream side is concerned, financial numbers are somewhat optimistic, in particular because some necessary "homework" is not included. Neither attention is paid to public acceptance of projects such as Hoogeveen, which do constitute major threats to their viability – the Basel experiment is not forgotten!