Memo

To: To whom it may concern

From: Thorleif "Totte" Lager, CEO, Innowell Solutions

Date: August 2021

Re: How our DAR technology can help oil companies to fulfil sustainability targets

INTRODUCTION

Innowell Solutions AS in Porsgrunn, Norway develops a new downhole technology called Density Activated Recovery (DAR). It aspires to have a huge impact on future field developments and be truly game changing. This Memo discusses how this technology may fulfil the sustainability targets of its users, the oil companies, in their pursuit of recovering hydrocarbons.

The DAR technology is an emerging technology that concurrently provides:

- a significant contribution to decarbonization of upstream oil & gas activities
- increased oil volumes and cash flow for the operations
- accelerated and high recovery of petroleum deposits

The capabilities of the DAR technology are founded on patented ideas, which have been demonstrated in a six-year development and qualification program. The Research Council of Norway and six oil operating companies have supported the development technically and financially. Approximately 90 mill. NOK has so far been committed to the development.

From the above it follows that the DAR technology delivers on the most essential issues that oil companies are currently concerned with, in particular to provide a sustainable future for themselves, the market and the society they serve.

DAR CAPABILITIES

The DAR technology represents a new and unique solution to what is called Inflow Control Technology. The solutions used to date have under certain circumstances provided a very positive contribution to oil production and recovery, and they are regarded as a successful measure to improve well productivity for those oil companies that have used them. However, there are gaps in these technologies that have prevented a wider application and recognition in the market.

The patented principle of the DAR technology is the utilization of fluid density contrasts of reservoir fluids (water/oil/gas) to detect and automatically shut off unwanted inflow from the reservoir to the wellbore, e.g. to avoid water or gas in oil producers.

Incorporating the patented DAR principle in a well can result in capabilities that are unique and game-changing, where the ability to produce oil at high rates, whilst concurrently prohibiting excessive water or gas production, is the most essential.

The quantitative effects on reduced emissions by applying the DAR technology have been estimated in an independent study carried out by Rystad Energy, where they applied their proprietary databases covering the world's oil and gas fields, as well as their CO_2Cube database covering upstream emission profiles, Ref[2].

DAR VALUE PROPOSITION – REDUCED UPSTREAM EMISSIONS

Reduced water production

Why is controlling the inflow of water so important? The reason is that water production is by far the single largest volume waste stream associated with hydrocarbon recovery. As a matter of fact, the volume exceeds the oil production by a factor 4-5, which means that for every barrel of oil (approx. 100 mill bbls per day in the world) there are 4-5 barrels of waste water produced.

Not only are the associated costs of treatment and handling the water enormous, but it affects the oil production and cash flow very negatively.

From an environmental perspective the situation is even worse. If we are looking at the situation in Norway, we know that the gas turbines used offshore are Norway's single largest CO_2 emission source. 75% of their power (60% of the total CO2 emissions) is used for gas and water re-injection purposes, ref. Figure 1.

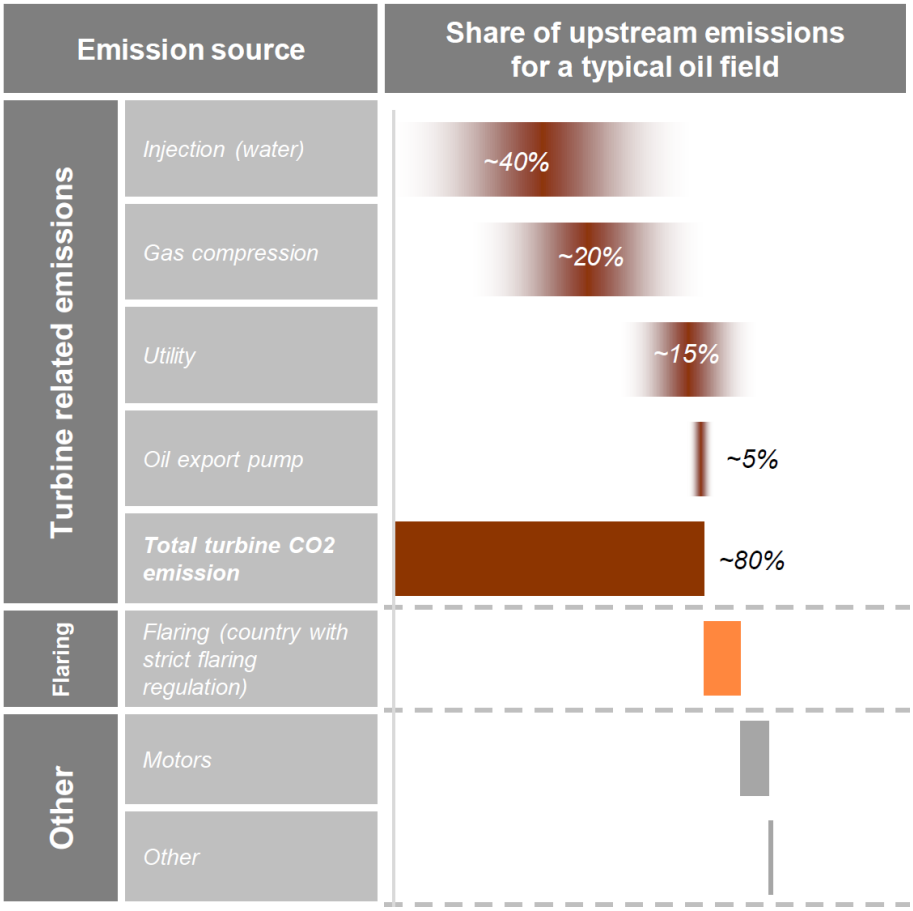

Figure 1, Emission sources in upstream hydrocarbon production, Norway

This is the reason why the Norwegian Government is enforcing power cables from shore on new field developments, to reduce the emissions from these sources. This is a costly undertaking that does not address the cause of the excessive re-injection of water and gas, but rather the consequences. It also complicates the profitability of marginal field developments.

The value proposition of DAR is obvious, as it is the only known technology that controls water production downhole without the technology gaps that existing technologies suffer from. A widespread deployment of the DAR technology could potentially reduce the water production, re-injection and need for power considerably. Innowell Solutions is at present engaged in a Low

emission Petroleum project Ref[1], where these environmental benefits are being analyzed through reservoir modelling.

Improved well productivity

There is another, yet even more important aspect of the DAR technology: it may reduce the time to recover the oil in place and thereby the total carbon footprint of a project. According to an independent study carried out by Rystad Energy on the DAR Technology, Ref. [2], this significantly reduces the overall carbon emissions for field developments.

The secret is increased well productivity, for all wells and fields worldwide where the DAR technology is implemented.

The ability of the DAR technology to provide improved well productivity is demonstrated in the qualification program carried out. It is based on the DAR capability to concurrently allow unrestricted oil production with the ability to control undesired inflow of water and gas. This leads to a "front loaded" production profile, which means that more of the oil is produced early in the fields' life cycle. Reference is made to Figure 2, where "Scenario 1" shows the example of how recovery targets could be achieved faster with the DAR technology.

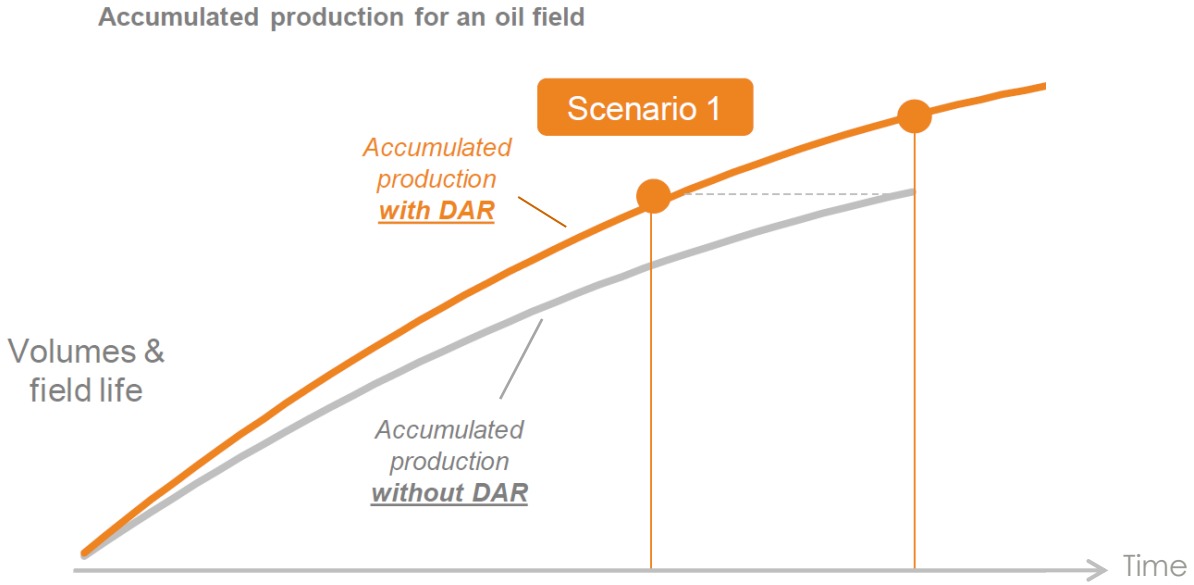

Figure 2, Illustrating how accelerated oil production can reduce time to recovery and emissions

Hence, the normal and very carbon-intensive "tail end" production period can be reduced in time, and lead to a significant reduction in overall carbon emissions.

The logic here is related to the fact that any field in the tail-end production period will experience a gradually worsening Carbon Intensity Factor (CIF) due to the reduction in oil production and the fact that more energy will have to be spent in getting the last pockets of oil out of the reservoir – primarily through water flooding and re-injection. Pls. refer to Figure 3.

This is good news for oil companies, where not only the low carbon targets are a challenge, but the risk of stranded assets is becoming alarmingly high. This is when the ongoing energy transition will start to affect the value of the oil companies' total assets (which in fact has already started), and the reduced demand for and price of oil in the future will prohibit the oil companies from recovering the costs of finding and producing their assets with an acceptable return on the investment.

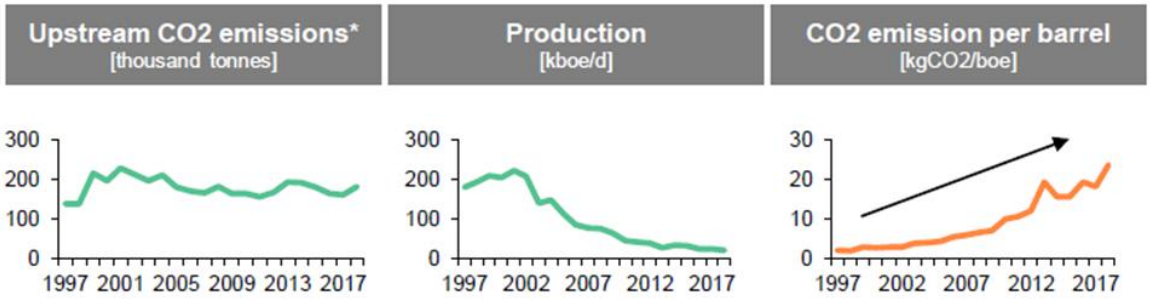

Figure 3, illustrating an increase in carbon emissions per barrel oil produced in mature fields

SUMMARY

There are two factors that improve the low carbon effects of implementing the DAR technology:

1. Reduced carbon emissions during operation
    a. The DAR technology reduces the production of water from the wells and improves the water re-injection efficiency, thereby reducing the need for water treatment and re-injection, pls. refer to Figure 4.
    b. Reduction in the need for gas reinjection in areas of the world where gas flaring is not an option.
    c. Flaring, where allowed, is one of the largest emission sources. It can effectively be reduced using the DAR technology, w/o reducing the lift capacity of the wells, since the DAR system operates with low differential pressure.

2. Reduction in overall carbon emissions due to shorter time to achieve recovery targets

    The ability of the DAR technology to frontload the production profile of the field, and thereby possibly reduce the time required to efficiently drain the field will also massively reduce the carbon footprint of the development.

This is illustrated in Figure 4.

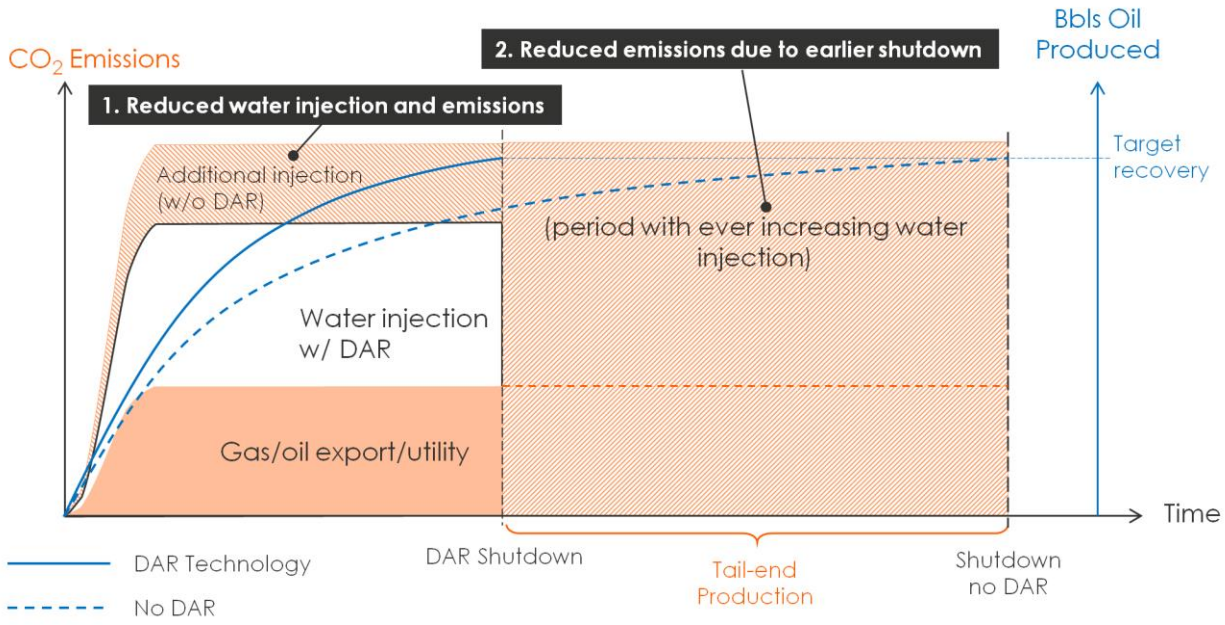

Figure 4, Illustrating reduced CO_2 emissions due to DAR implementation

REFERENCES

[1] Sintef, Low Emission Project SP7 – Energy Efficient Drainage

[2] Rystad Energy, DAR technology and Market study, April 2020