

1 Executive Summary

In the coming decades, extending natural gas consumption is likely to become the most important means of reducing CO₂ emissions, while renewable technologies being further developed are marketed and widely used. By-products of all processes have now to be commercialized or segregated and safely disposed of in the reservoir or elsewhere. All the issues (technical, economical, environmental) are closely interconnected and cannot any more be investigated independently from one another. Conventional energy sources are indeed indispensable and should be viewed as a bridge to a cleaner future, perhaps realized through use of hydrogen and fuel cells. For the foreseeable future we do, however, need to enhance recovery, develop new finds and do this energy-efficient and minimize the long term effect on the environment and in view of smaller findings, in a cost efficient way.

The quest for security of supply needs to be technology and cost driven as far as it concerns marginal and dormant discoveries or tail end production. The (larger) operators in most cases do not develop such fields, due to high overhead cost, increased taxation and higher production targets. Furthermore they are largely focusing on large fields with returns that meet their company criteria.

Usually said operators do not develop the technology themselves, but rather buy it on the world market, exploiting the fierce competition between suppliers from different countries.

Since most resources are outside Europe, operators have only a limited interest for the European market in general and for the Dutch market in particular. In general the fields in the Netherlands are mature and are producing at a declining rate. Hence operators are withdrawing from the scene and smaller players are becoming more and more active.

The supply industry needs a home market in order to be able to compete on the international market. By taking a more prominent role in the development of marginal and dormant fields this will create continuity. This is especially true when considering gas production which is directly coupled to electricity production at site. New specific technologies and methods need to be applied. In many cases the acquired knowledge can be further developed and used in the future renewable energy sector, both in the Netherlands as well as in other mature areas.

XYZ Partners and **CathFish Holding** have jointly conducted a study called **Smart Gas Pockets Opportunities**. The objectives of the study are to demonstrate that it is feasible to develop on an economical and environmental friendly basis, hitherto considered not interesting marginal and/or dormant natural gas discoveries, using state of the art techniques. By applying non conventional finance techniques together with a profit sharing role for the major suppliers of knowledge and equipment (contractors) a win-win situation can be created.

A lot of effort was put into the identification of gaspockets. Not in vane, since a considerable number of gaspockets were identified onshore The Netherlands (see enclosed sheet). From the 399 proven gas discoveries, 206 are producing and 3 are used as an underground storage facility. Up to now 39 fields have been abandoned after production. It is expected that from the remaining 151 discoveries 34 will be taken into production within the coming 5 years. What will happen with the remaining 117 discoveries is at present unknown and unclear.

Of these 117 fields, 53 are located onshore. Presently fields with a reserve less than 300 million Nm³ onshore and 700 million Nm³ offshore are considered not to be viable.

A thorough engineering analyses, as part of this study, indicates that much smaller fields can be developed on a economical basis if the concept of "Verstromen" is applied. "Verstromen" means to produce electricity directly at the well site using a gas turbine or gas engine in combination with a generator set. Not having to install expensive gas pipeline infrastructure and elaborate nitrogen injection plants and mixing facilities reduces the **CAPEX** and consequently the **OPEX** considerably. Using skid mounted and reusable turbine and process facilities, designed for longevity, increases the **CAPEX** only marginally.

Another important cost factor is the drilling part. In most of the older gaspockets new boreholes need to be drilled. With modern techniques and with smaller diameter pipes (gas to electricity requires less gas throughput) fields as small as even 70 to 80 million Nm³ could be exploited.