

**AAPG European Region Annual Conference
Paris-Malmaison, France
23-24 November 2009**

**GAS in the NETHERLANDS:
The VITAL COMBINATION of MANY SMALL FIELDS and a GLOBAL GIANT**

Barend J. Botter, Vice Managing Director NAM B.V.

Many small fields and one giant

The discovery by the Nederlandse Aardolie Maatschappij (NAM) of what later proved to be the giant Groningen gas field - on 22nd July 1959 in the Dutch province of Groningen - sparked the Dutch and subsequently the North West European gas markets. The geological characteristics and the enormous volume of the gas field were such that the gas markets could be amply supplied.

The Groningen gas field, at a depth of around 3 kilometres, consists of Rotliegendes porous sandstone, with gas filling 18% of the volume. This sandstone layer is around 130 to 140 metres thick and measures 45 kilometres North to South and 25 kilometres East to West. Originally, the gas field contained about 2800 BCM. There is now approximately a third of that volume left. Currently, the Groningen gas field holds the 9th position in the world top ten of producing fields. Moreover, the Groningen gas field is 30 times larger than number 10 on the list.

Production started in 1963 after intense work on the construction of production facilities, the adjustment of tens-of-thousands of cookers in Dutch households and the building of a national gas transportation network. The geological structure of the Groningen field is ideal: the size, connectivity and permeability enabled the production of big volumes and provided significant capacity to the market in the first decades. The arrival of natural gas as the cleanest fossil fuel meant an energy revolution in a society previously dependent on coal and oil. The production in the first decade amounted to as much as 100 BCM per year. This significant level of production was largely based on the societal assumption that nuclear power would soon replace all other fuels. The energy crises in the 1970s led to a revision of this policy. The Dutch government shifted its focus to the smaller gas fields. Priority was to be given to producing and selling this gas, thereby preserving the Groningen gas field volumes for future generations (1974: the Dutch Small Fields Policy). This proved to be a successful strategy: in the past few decades the volume of gas produced from the small fields both onshore and offshore The Netherlands has amounted to more than half the volume of the Groningen gas field. Today, the Dutch small fields account for around 40% of total Dutch gas production. Innovations, standardisation, new operating philosophies and enhanced gas recovery methods enable NAM to develop even the smallest of the small fields.

Over the years, the natural pressure in the Groningen field has gradually declined from 347 bar to 130 bar. In order to ensure that gas supply could meet demand on the coldest days, in the 1990s NAM decided to build two underground gas storages in the Northern Netherlands, which are filled in the summer and produced during periods of high capacity demand in

winter. In addition, the NAM 2 billion Euro Groningen Long Term programme was initiated in 1996: all production locations on the Groningen gas field were fully modernised and extra compression has been installed. The project was completed in September 2009. The installations on the gas field, which are unmanned during normal operations, can be operated from one single control room and be started up automatically. The gas field will be able to produce current volumes up to 2020. After that, the field will be in gradual decline. NAM believes a recovery factor of 97% of the original volume of the Groningen gas field is achievable.

The 50th anniversary of the discovery of the Groningen gas field was celebrated this summer. The Groningen Long Term project, the construction of underground gas storages as well as future compression and UGS extension projects will contribute to extending the life of the Groningen gas field by at least another 50 years. Back in 1959, all those involved in the discovery and development of the field would probably never have thought that it would meet gas demand for so long. The effective management of production from the many small fields and the giant Groningen gas field is at the heart of reliable gas supply to The Netherlands and the North West European gas markets.

Barend J. Botter (1950) joined Shell as a Research Petrophysicist in 1978 after obtaining a PhD in Physics from the University of Leiden. In 1982 he was seconded to Maersk Oil & Gas in Copenhagen as their first Petrophysicist. Thereafter, he went to the UK where he held various technical management positions with Shell Expro between 1986 and 1998. He then returned to The Netherlands and fulfilled several Project Leader positions in Shell's upstream organisation. From 2000 he worked as a Senior Business Advisor in the Shell Netherlands Natural Gas department. In 2005 he was transferred to the NAM (Nederlandse Aardolie Maatschappij, a 50/50 joint venture between Shell and ExxonMobil and the largest producer of natural gas in The Netherlands), where he took up the position of Corporate Affairs Manager. In addition to his responsibilities in this role, he became Vice Managing Director on 1st August 2009.