



Evaluation of the potential of shale gas in the Netherlands

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Since the discovery of the Groningen Gas field the Netherlands have been a large producer and consumer of natural gas. Current forecasts show that production from conventional on- and offshore fields will decline noticeably in the next decades, while the Netherlands have the ambition to sustain its prominent role in the northwestern European gas market and have to be able to meet the future domestic demand. Import of natural gas, either through LNG import (North Africa, Middle-East) or from the East (Nordstream) are therefore evaluated and planned. Following the developments in the U.S.A. , where about 50% of the internal gas production is now from shales, the question has arisen if there is also gas shale potential in the Netherlands that could add to the internal gas production. A first evaluation by TNO and EBN in 2009 confirmed this potential, although the uncertainties are huge. The follow-up work that is presented provides more detailed information based on extensive data evaluations and interpretations of potential shale gas targets in the Netherlands. The Netherlands have a long and intense exploration history which led to a very high data coverage which are largely in the public domain. A first assessment of possible shale gas reservoirs in the Netherlands was made using this unique dataset. The main target formations for shale gas are the Lower Jurassic Posidonia Shale Formation (PSF) and the Carboniferous (Namurian) Epen Formation (CEF), especially its basal part with high organic content.

The PSF is known to be present in the onshore West Netherlands Basin from many well penetrations and its distinct seismic character. Gas logs indicate the presence of gas. Fault-bounded tectonic blocks were identified on 3D seismics with relatively undisturbed deposits. GIIP calculations were performed for these individual blocks, based on TOC and porosity. TOC values were calculated from logs and cross checked on actual measurements. The deposit is probably brittle (and therefore susceptible for fracturing) throughout most of the area as indicated by log derived Young's Moduli. The evaluation showed favourable conditions for shale gas prospects, i.e. a proper TOC-content of about 6%, a porosity of 5-9.5%, and an average thickness of 30m. The evaluation of three example fault-bounded blocks indicated total gas volumes of 0.10-0.17 billion cubic meters (STP), which merits further investigation to the viability of this gas play. The evaluation of the CEF is more complicated because it is generally deeper. The Geverik Member (~50-70 m thick) is the lowest unit of the formation and is considered a main target for shale gas exploration because of its high organic content (TOC ~ 7%, Type II). Recent mapping and newly released wells indicate that instead of a uniform basin, the deposition of the formation was controlled by the existing palaeogeography that was probably formed by the presence of carbonate platforms. Exploration challenges of the Geverik Member are the scarce data due to limited well penetrations, its present-day depth, and its high maturity (>3 % Rr) for most of the Netherlands indicated by modelling and measurements.

In conclusion, the presented study will provide background information on the geological setting for potential shale gas developments in the Netherlands. The need for such information has become very relevant over the past two years, since as of 2010 a total of four exploration licenses have been granted to different companies, with the first exploration well to be drilled this year.