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INVENTORY of UNCONVENTIONAL HYDROCARBONS in the NETHERLANDS

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In this presentation an inventory of unconventional hydrocarbons is given for the Netherlands. There is hardly any production of these resources from the Dutch subsurface yet but with declining production and aging infrastructure these resources can help to limit the decline in production from conventional resources. Only in recent years a few tight reservoirs and shallow gas were developed. These resources got little attention of operators up till recent. Although potentially large volumes of non-conventional gas are in place, these are generally difficult to develop. A first step of unlocking these resources is to have an overview where these resources can be expected and what potential volumes are involved. No public inventory of unconventional gas is available yet. This presentation will give a brief overview of five major categories of unconventional resources in the country. A summary of distribution and volumes of shallow gas, tight gas, coalbed-methane, shale gas and basin centred will be shown.

The presentation is based on a study of TNO research institute (reference). A summary was made for parameters split by formation that are crucial for the estimation of the possible (unrisked) volumes that could be potentially in place for the various categories of unconventional resources. These calculations are based on best estimates of the parameters from regional (public) information. For some resources very little data is available. All the calculated volumes are unrisked, which means that no chance is given to “failure” of one of the resource defining parameters. At this stage data and experience is not sufficient for a good estimate of the risks involved.

For the short term shallow gas and tight gas reservoirs have the most potential. The first shallow gas fields were already discovered offshore the Netherlands in the early 70’s, but it took more than 35 years before the first field came on production. The first field started producing in 2008 with the second following in 2009. Also tight gas fields were already discovered many years ago, but until today only a few fields within the ‘better’ reservoir quality range produce.

The recovery factor for these unconventional gas resources, especially for Coal Bed Methane, Shale gas and Basin Centred Gas, are not known for the Netherlands since there is no production from these resources yet. Only input data from other parts of the world can give an indication of the technically producible reserves.

Although there are a lot of uncertainties in the first volumetric estimates of these resources, EBN believes that the new inventory will contribute to maturing some of these unconventional gas opportunities.

Shallow gas

Shallow gas is defined as gas that occurs to a depth of 1000m. Its source can be biogenic and thermal gas. In the Northern part of the Dutch offshore many bright spots can be seen on seismic (see figure 1). The traps are generally low relief anticlines related to salt domes, with several reservoir sands containing separate gas columns. Unrisked shallow gas volumes in place are expected in the range of 36 - 120 bcm. Challenges for production from these shallow unconsolidated sands are sand and water production

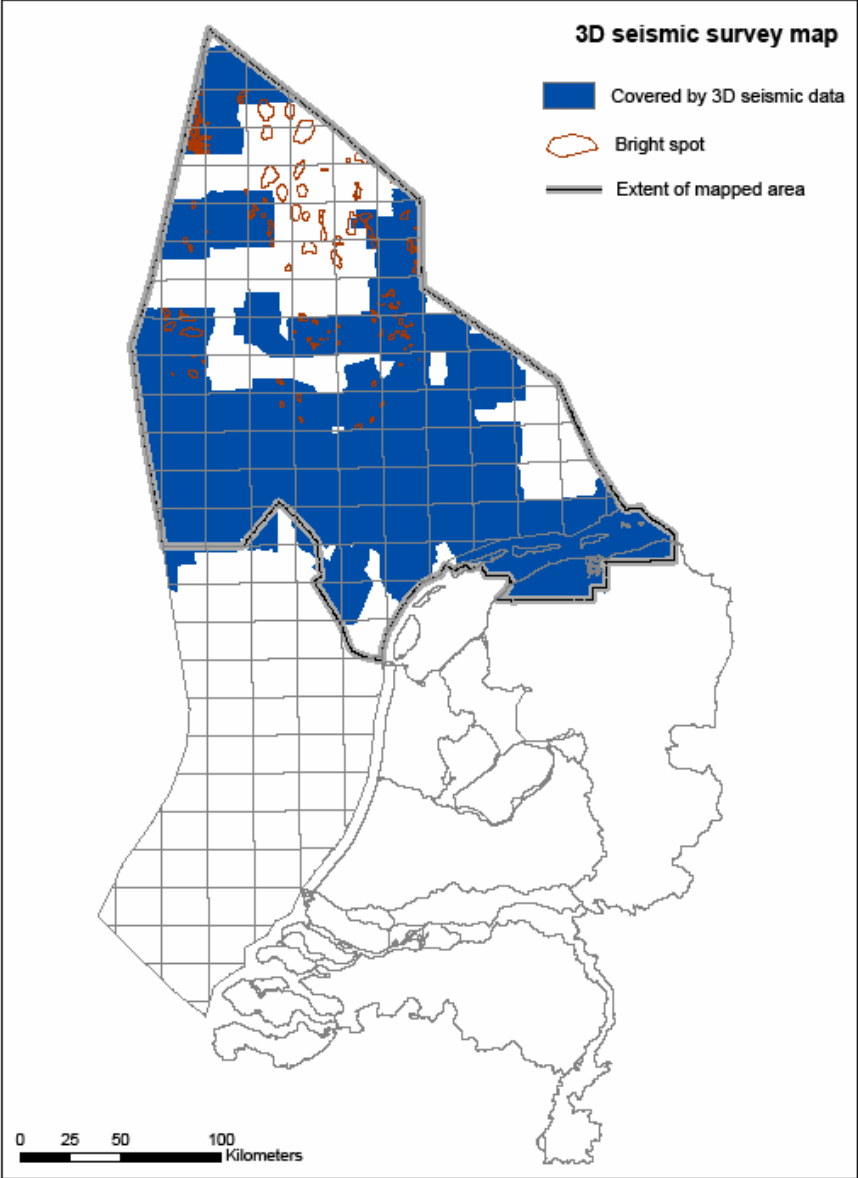


Fig. 1. Occurrence of shallow bright spots in the northern Dutch onshore

Tight gas

Tight gas can be defined as natural gas that cannot be produced at economic flow rates nor in economic volumes without a hydraulic fracture treatment or special drilling techniques such as directional or multilateral drilling as a result of low permeability of the reservoir rock. For the two most important gas bearing reservoirs: Permian Rotliegend Slochteren and Triassic Buntsandstein areas can be outlined that have a high risk for reduced permeabilities. For

example tight gas reservoirs are expected in the area of the inverted basins and with burial depths of more than -4000m. In the Netherlands tight gas unrisked volumes in place are expected in the range 150 to 230 bcm

Coal-bed methane

There is no current coal bed methane production in the Netherlands. The inventory takes in account the thickness of the seams and the paleo burial of Carboniferous, Jurassic and Tertiary coals. Regional mapping was used to outline potential areas (Figure 2) and estimate unrisked in place volumes ranging between 1000 and 3000 bcm.

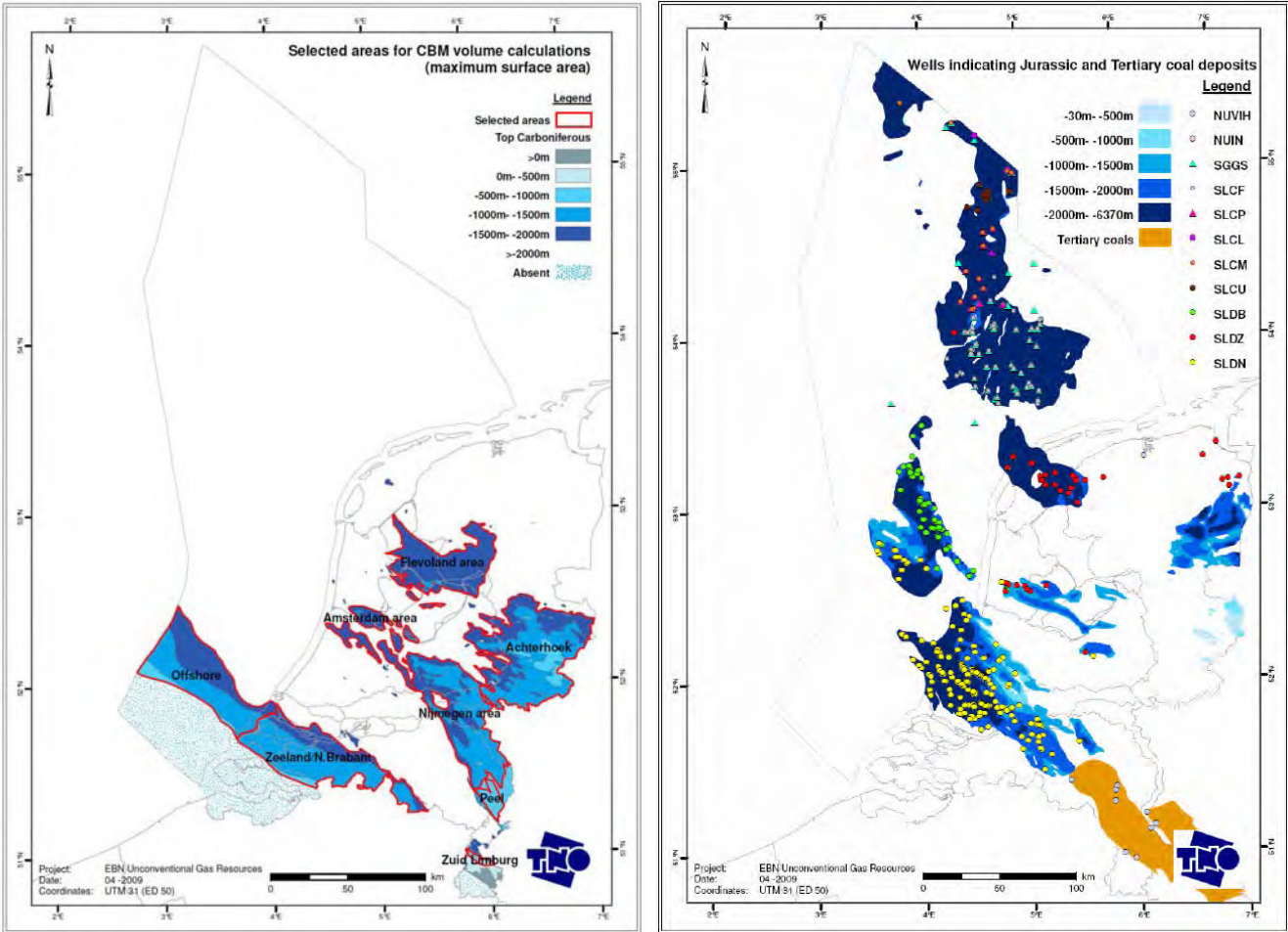


Figure 2 Potential areas for Coal-bed methane

Shale gas

The inventory shows that there are a number of formations with shale gas potential in the Netherlands (Figure 3). Shales in the Carboniferous (Epen shale) and the Jurassic (Posidonia and Kimmeridge shale) are thought to have the highest potential. It is assumed that the gas occurs adsorbed (in clay minerals and organic matter) and as free gas (in fractures and pores). Potential unrisks in place volumes are in the range of 5×10^4 to 3×10^5 bcm.

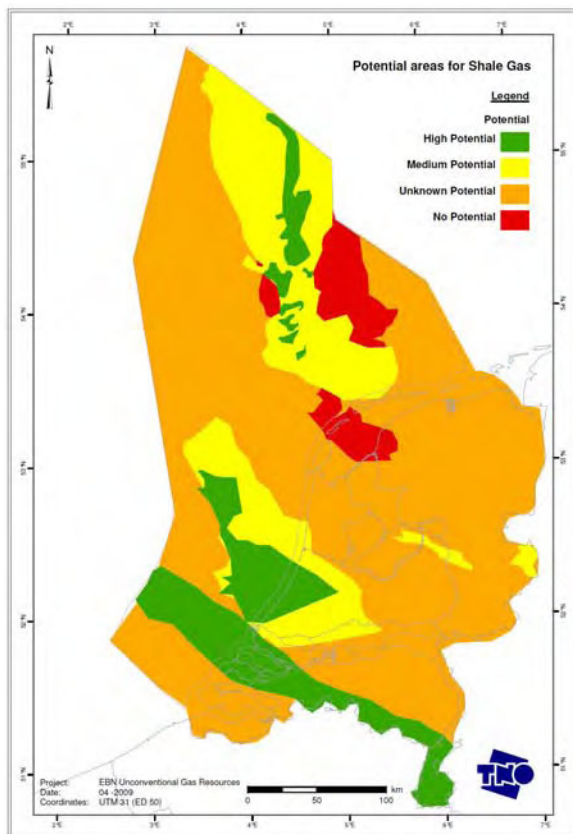


Figure 3 Potential areas for shale gas

Basin centered gas

Basin centered gas has been described in deep parts of foreland basins (Canada: Elmworth). Below conventional gas fields gas occurs without clear gas water contact. The Elmworth example shows gas over a large area with low permeability. No clear examples of basin centered gas were described up to now but reservoirs in the Jurassic and Pennsylvanian part of the Carboniferous are bound to be good candidates for such resources.

References

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