E&P opportunities & activities in the Netherlands

Harmen Mijnlieff

Ministry of Economic Affairs
Outline of the presentation:

› Look back 2013
› Documented resources
› Opportunities
› Conclusions
Present day E&P map

- Wells
- Seismic acquisition
- Licences
Look back 2013, activities since Prospex 2012

› Wells => 48
› Seismic acquisition
› Licences
Look back 2013,
activities since Prospex 2012

› Wells
› Seismic acquisition
  › shot &
  › planned
› Licences
Documented Dutch resources

- POS @ 10%
- RVIR @ 0.1
- Wells: 3 @ onshore & 7 @ offshore
- Gasprice = 23ct/m

Prospex, 12-12-2013
E&P opportunities & activities in the Netherlands, Harmen Mijnlieff

<table>
<thead>
<tr>
<th>Supply</th>
<th>2013 – 2022</th>
<th>2013 – 2037</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small fields</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reserves</td>
<td>144</td>
<td>166</td>
</tr>
<tr>
<td>Contingent resources (dev. pending)</td>
<td>60</td>
<td>120</td>
</tr>
<tr>
<td>Still to be discovered</td>
<td>40</td>
<td>125</td>
</tr>
</tbody>
</table>
Creaming curves

Cumulative GIIP from fields discovered (bcm)

- Cum GIIP
- Cum. exploration wells

Year


1800 1600 1400 1200 1000 800 600 400 200 0

2000 1800 1600 1400 1200 1000 800 600 400 200 0

# exploration wells
How to postpone the decline and reverse the creaming

› Tax incentives
› Regulatory incentives
› Gas in under-explored areas
› Gas in new plays
› Challenging reservoirs
   › Tight reservoirs
   › Shallow gas-reservoirs
› Unconventional reservoirs
   › Shale gas
   › CBM
› Tail end production
› Synergy with Geothermal E&P
Reliable & Stable E&P investment framework

which constantly improves

› Small fields policy (long standing successful strategy)
  › Guaranteed off-take (GasTerra)
  › Guaranteed transport (Gas-Transport-Services)

› State Participation through EBN in Production

› Update of the mining act (2003)

› 40% State Participation through EBN in Exploration (2010)

› Marginal fields and prospects incentive (2011)

› Fallow acreage incentive (2011)

› Research & development incentive (2012)
Fallow acreage incentive

- 1 submission of a workplan by 3rd party in 2013 Fallow licences
- 2014 promotion activity foreseen
- Factsheets on [www.nlog.nl](http://www.nlog.nl)

Potential estimate
Marginal fields/prospect incentive

A gas field or prospect is marginal when:

- **Volume**, 
- **Productivity** and 
- **Distance to infra structure**

are below a threshold —► Then project screens for **25%** uplift.
Prospectivity review
Exploration potential MEA annual review 2012

Onshore

<table>
<thead>
<tr>
<th>Risked Volume (billion Sm³)</th>
<th>Number of prospects</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-0.25</td>
<td>10</td>
</tr>
<tr>
<td>0.25-0.5</td>
<td>20</td>
</tr>
<tr>
<td>0.5-1</td>
<td>30</td>
</tr>
<tr>
<td>1-2</td>
<td>40</td>
</tr>
<tr>
<td>2-4</td>
<td>50</td>
</tr>
<tr>
<td>4-8</td>
<td>60</td>
</tr>
<tr>
<td>8-16</td>
<td>70</td>
</tr>
<tr>
<td>16-32</td>
<td>80</td>
</tr>
<tr>
<td>32-64</td>
<td>90</td>
</tr>
</tbody>
</table>

EXP (bcm)

- Onshore @ zero cutoff: 129
- Offshore @ zero cut-off: 299
- Onshore @ EMV>0 cut-off: 120
- Offshore @ EMV>0 cut-off: 119
Studied, Proven & in development

(Under) explored

Under explored

Under explored to relatively mature

Study focus on pre-Zechstein

(Under) explored
Where is the fringe?
Under-explored area:

*Structural and sedimentological development of the Dutch Central & Step Graben*

Dinantian structural trends

Late Carboniferous structural trends

Platform/high basin

High-uplift

Low-subsiding
Source and reservoir

<table>
<thead>
<tr>
<th>Reservoir\source</th>
<th>New Stephanian coal</th>
<th>Traditional coal Maurit Fm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotliegend</td>
<td>Additional sourcing</td>
<td>Proven play</td>
</tr>
<tr>
<td>New Step Graben II Fm</td>
<td>New play concept</td>
<td>New play concept</td>
</tr>
</tbody>
</table>
Chemo- and biostratigraphical evidence

Biostratigraphy F10-2: unique palynoflora with Westphalian wetland elements combined with late Stephanian – Early Permian conifers and coal-forest vegetation on the edge of the Step Graben.

Chemostratigraphical correlation; report CC950
### Appendix B1: Stratigraphic Group boundaries

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Grain size</th>
<th>Main sedimentary structure</th>
<th>Lithology</th>
<th>Palaeo</th>
<th>Stratigraphic</th>
<th>Core photo</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-100</td>
<td>Sb</td>
<td>Non-laminar</td>
<td>Sandstone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100-200</td>
<td>Prs</td>
<td>Non-laminar</td>
<td>Sandstone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200-300</td>
<td>Sb</td>
<td>Non-laminar</td>
<td>Sandstone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>300-400</td>
<td>Prs</td>
<td>Non-laminar</td>
<td>Sandstone</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Well K02-02

**K2-2**

- **Sandstone clasts**
- **Mature soil**

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**Prospex, 12-12-2013**

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Prospectivity review: Yet unproven Play

Key elements of the Dinantian carbonates play. (Total, 2007)
Research and Development projects

- New petroleum systems in the Dutch Northern Offshore
- *Upper Jurassic - Lower Cretaceous*, a new approach to develop a tectono-stratigraphic framework for the in the Southern North Sea by using integrated novel stratigraphic techniques
- *Upper Jurassic sandstones*: detailed sedimentary facies analyses, correlation and stratigraphic architecture of hydrocarbon bearing shoreface complexes in the Dutch offshore
- Integrated *shale gas reservoir* characterization, improved sweet spot identification
- Shallow Petroleum system in the Southern North Sea (with GEUS-DK)
- *Chalk*, reassessing the hydrocarbon potential
Geothermal Energy in a proven oil & gas province

- 10 doublets & 1 Triplet drilled in the Netherlands
- 9 have seen hydrocarbons => very low saturations
  - 8 gas
  - 1 oil
  - 1 drilling

- Anticipated flow 150-200m³/h
  - Solution gas 1 -1.5 Nm³/m³ of gas => 3600m³ gas/d
  - Traces of oil => between 3 to 10m³ oil/d

- Not a hydrocarbon accumulation drilled yet.
Synergy with Geothermal energy

- Interesting opportunity for win-win situation
  - Economic project evaluation with upfront risk-integration
  - One geologic system two potential energy carriers
  - Shared investors
  - Tail-end production from the start
  - Relative easy access to drilling locations
  - Well data gathering in the lows.
Fallow acreage ⇔ synergy with Geothermal

- Example of the Rijswijk Concession
- Two stranded oil accumulations:
- One stranded gas accumulation
- Numerous greenhouses

<table>
<thead>
<tr>
<th>Name HC-field</th>
<th>type</th>
<th>remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nieuwerkerk</td>
<td>Oil minor gas</td>
<td>Marine Lower Cretaceous Oil STOIIP &lt; 1mln m3, Tight Bunter GIIP &lt; 0.2 bcm</td>
</tr>
<tr>
<td>Woubrugge</td>
<td>Oil</td>
<td>Terrestrial Upper Jurassic Schieland Oil STOIIP &lt; 1mln m3</td>
</tr>
<tr>
<td>Boskoop</td>
<td>Gas minor oil</td>
<td>Tight Triassic reservoir, low saturation, GIIP &lt; 0.2 bcm</td>
</tr>
</tbody>
</table>

Co-produced Oil in Geothermal Doublet
Subsurface Data and other E&P information

Welcome to the NL Oil and Gas Portal
This site provides information about oil, gas and geothermal energy exploration and production in the Netherlands and the Dutch sector of the North Sea continental shelf.

- **Dutch Oil & Gas Portal**: [www.nlog.nl](http://www.nlog.nl)
- **Well data**: >6000 wells
- **Seismic data**: 2D and 3D
- **Field data** (e.g. production data)
- **Licence information**
- **Legislation & administrative procedures**
- **Maps and digital datasets**
- **Bibliography Dutch Subsurface, papers and presentations**
- **Other subsurface use** (e.g. geothermal)

**Recent changes**
We keep this site continually up-to-date. Click [here](http://www.nlog.nl) for an overview of recent changes.

**News**
- 27-11-2013: Digital 2D seismic lines, provided by NAM (2012), now available
- 24-10-2013: Update address Ministry of Economic Affairs, Ministerie van Economische Zaken, Directie Economische Zaken, Postbus 20401, 2500 EK DEN HAAG
- 01-08-2013: Digital files of the Geological Map of the sub-regions Elbow Spill High, Steep Grabens and Dutch Central Graben (NCP2C) en Winterton High, Winterton Platform and Zeeland Platform (CP2P). Also the burial history reports for NCP2A, 2D, 2E en 2F have been updated or annexes are added.
- Overview of all published files for all sub-regions can be found on the page [Offshore sub-regions: NCP-2A, -2B, -2C, -2D, -2E, -2F en -2G](http://www.nlog.nl).
- 16-07-2013: Natural resources and geothermal energy in the Netherlands - annual review 2012
- 09-07-2013: Activity plan received for the fallow part of the production licence F03b.
- 05-05-2013: Approval of the amended production plan Anrun.
- 21-02-2013: Third opening of Garanteregeling / Ruleing SEI risico’s voor Geothermal Energy published in the Staatscourant. For more information (in Dutch) go to page [Aardwarmte en Geothermie](http://www.nlog.nl).
- 14-02-2013: Information on induced earthquakes in [Groningen gas field](http://www.nlog.nl) including 2009 TNO.
Conclusion

› The Netherlands not in complete creaming mode yet

› Opportunities in:
  › Fallow licences
  › Open areas
  › Proven / Mature plays,
  › Underexplored areas
  › New plays
  › Synergy with Geothermal Energy E&P

› Attractive E&P country
  › Stable fiscal and regulatory environment
  › Fit for purpose tax incentives
  › Extraordinary data-position
Oil Prospectivity

› See next talk

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