Hydrocarbon resources, data and E&P in the Netherlands

a status update. Harmen Mijnlieff
Present day E&P map

- Outline of the presentation
- Status report on resources
- Fiscal & regulatory incentives.
- View on additional resources
- Data position
Documented Dutch resources

- Groningen field
- Producing small fields
- NP fields
- Prospects

Volume (bcm Geq)

Year:
- 2001
- 2003
- 2005
- 2007
- 2009
- 2011
- 2013
- 2015
- 2017
- 2019
- 2021
- 2023
- 2025
- 2027
- 2029
- 2031
- 2033
- 2035
Ambition for small field production:

Maintain yearly production @ 30bcm till 2030
How to reach the ambition

- Tax 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
Fiscal and regulatory incentives and framework

- Marginal fields and prospects incentive (2011)
- Research & development incentive (2012)
- Small fields policy (long standing successful strategy)
  - Guaranteed off-take (GasTerra)
  - Guaranteed transport (Gas-Transport-Services)
- 40% Participation of EBN in exploration and production (
- Update of the mining act (2003)
- Fallow acreage incentive (2011)
Fallow acreage incentive

September 16th, 2010: Covenant for the stimulation of exploration and development of hydrocarbon reserves and the storage of substances on the Dutch Continental Shelf.

January 10th, 2011: Release provisional classification of acreage to be declared fallow.

If appeal submitted by main licensee:
- Appeal accepted by Dutch government: YES

July 1st, 2011: Publication definitive classification: listing of fallow acreage. (Min. 3 months after publication provisional classification)

If work plan submitted or significant activity performed by main licensee:
- Plan accepted by Dutch government: YES

April 1st, 2012: 9 months after publication definitive classification.

If activity plan submitted by operator or co-licensee and no significant activity performed in license:
- Plan accepted by Dutch government: YES

July 1st, 2012: Submitting activity plan by others.

If work plan submitted by others and no significant activity performed in license:
- Plan accepted by Dutch government: YES

Every year around April 1st publication of the revised provisional classification fallow acreage.

If "NO" then it means that the license remains with the current main licensee.

* If license is transferred in this period then a 3 month extension is granted for submission work plan; all subsequent terms are postponed accordingly.
Resources in fallow licences

Prospective resources in Fallow acreage

- Gas expectation volume: 61 bcm
- Risked STOIIP: 21 mln m³

# 255
# 35

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Prospex 2011, Harmen Mijnlieff
Resources in fallow licences

Stranded gas fields in fallow acreage

Volume (bcm)

# 14
Upside?

HCIIP
Documented Reserves
Resources in fallow licences

Stranded oil fields in fallow acreage

<table>
<thead>
<tr>
<th>Volume (mcm)</th>
<th>HCIIP</th>
<th>Documented Reserves</th>
</tr>
</thead>
<tbody>
<tr>
<td>#6</td>
<td></td>
<td>Upside?</td>
</tr>
</tbody>
</table>

London, December 14, 2011
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.
This year's results of the marginal fields/prospect incentive
Example

 › Stranded field K4-Z
   › Discovered in 1974
   › 1 discovery well
   › 3 appraisal wells
   › Stranded for 37 yr

 › Now being developed aided by the marginal field incentive
### Stranded gas

<table>
<thead>
<tr>
<th>Resource Group</th>
<th>number</th>
<th>GIIP (bcm)</th>
<th>Reserves (bcm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stranded gas fields</td>
<td>67</td>
<td>90</td>
<td>40-50</td>
</tr>
</tbody>
</table>

**Legend**
- **Green** - Stranded gas field
- **Red** - Stranded oil field
- **Grey** - Declared Fallow (June 2011)
- **Yellow** - Production License
- **Light green** - Production License applied for
- **Pink** - Exploration License
- **Light pink** - Exploration License applied for

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Stranded (fallow) gas and oil fields

Within the Netherlands and the Netherlands sector of the Continental Shelf, a number of oil and gas accumulations have been discovered which, for a variety of reasons, have not been taken into production. A Shell analysis made in 2010 of 67 stranded fields showed that on average they contain 1.4 bcm of GIIP, resulting in an estimate of about 90 bcm in NL. It is estimated that the corresponding total reserves could range from 40 to 50 bcm, given fair to good economic conditions. More information on specific fields can be found in the fact sheets below. Once the relevant wells have been identified, the available well information can be downloaded or ordered from TNO (see footnote).

Since 2010 specific fiscal measures are in place to stimulate the production of marginal fields. Fact sheets have been compiled on behalf of the Ministry of Economic Affairs, Agriculture and Innovation. These fact sheets are for information and interest parties about the main characteristics of the accumulations.

**Overview stranded fields**

- Stranded gas and oil fields in the Netherlands (April 2010) (excel sheet)

**Listing fact sheets of stranded fields (April 2010)**

<table>
<thead>
<tr>
<th>Onshore</th>
<th>Offshore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field</td>
<td>Licence type</td>
</tr>
<tr>
<td>Admiral</td>
<td>Production licence</td>
</tr>
<tr>
<td>Events</td>
<td>Production licence</td>
</tr>
<tr>
<td>Open area</td>
<td></td>
</tr>
</tbody>
</table>
Prospectivity in proven plays

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Prospectivity in proven plays

Legend
- Gas field
- Oil field
- Satellite platform
- Production platform
- Subsea
- Explo. Lic. HC Applied for
- Explo. Lic. HC
- Prod. Lic. HC
- Prod. Lic. HC Applied for
- Storage Lic. Applied for
- Storage Lic.

Under-explored area
Mature exploration area
Unconventional Gas
Prospectivity in proven plays

Prospect portfolio fingerprint as reported =>

![Graph showing prospectivity distribution](image-url)
Rotliegend: main carrier of Dutch resources

THE PERMIAN ROTLIEGEND IN THE NETHERLANDS

Edited by
Jürgen Grötsch & Reinhard Gaupp

www.sepm.org
Gas in under-explored areas & new plays

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Shallow Gas

Shallow Gas: gas in Tertiary unconsolidated strata at max 1000m depth

Why now?

1. First shallow gas fields in production
2. New 3D seismic 2012
3. Marginal field tax incentive always applicable
4. Significant shallow gas potential in northern offshore
Shallow Gas bright spot evaluation

Where does bright spot fit in the regional model?

Petrophysics

Reservoir properties

Bright spot mapping

Exploring for shallow gas

Reservoir model

Seismic interpretation

Volume calculation

Factsheets

Crystal Ball sheet available to probabilistically calculate volumes using Monte Carlo Simulation.
Bright spot evaluation results

Nr. of bright spots

- A12-FA type BS: 88
- F02a-Pliocene type BS: 18
- Flat medium size BS: 7
- Flat small size BS: 34

Bright spot area (km²)

- A12-FA type BS: 139
- F02a-Pliocene type BS: 44
- Flat medium size BS: 148
- Flat small size BS: 40
Unconventional reservoirs

- Shale gas in:
  - Posidonia
  - Basal Namurian hot shales
E&P and Geothermy

❯ 5 doublets drilled in the Netherlands
❯ 4 have seen hydrocarbons=> very low saturations
 ❯ 3 gas
 ❯ 1 oil
❯ Anticipated flow 150m³/c
 ❯ Solution gas 1 -1.5 Nm³/m³ of gas => 3600m³ gas/d
 ❯ Traces of oil 0.00005m³/m³ of oil => 0.18m³ oil/d ≈ 1 barrel/day

❯ Intresting opportunity for win-win situation
 ❯ Economic project evaluation with upfront risk-integration
 ❯ One system two energy carriers
 ❯ Shared investors
 ❯ Tail-end production from the start
Subsurface Data
Seismic Data position

- 3D-seismic coverage
  - 75% of the offshore
  - 40% of the onshore

- Still improving
  - eg DEF spec survey of FUGRO
Well Data position

- Some 4500 wells
- of which 1452 exploration wells
Data availability

- All public domain data freely available through:
  - The Dutch (NL) Oil & Gas Portal
  - www.nlog.nl
Conclusion

- Lot of exploration and production potential in the Netherlands
- Stable fiscal and regulatory environment
- Fit for purpose tax incentives
- Extraordinary data-position

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