

E&P opportunities & activities in the Netherlands

Harmen Mijnlief

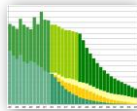
The logo for 'ebn' is displayed in white lowercase letters on a solid maroon square background.

ebn



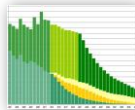
Ministry of Economic Affairs

TNO innovation
for life



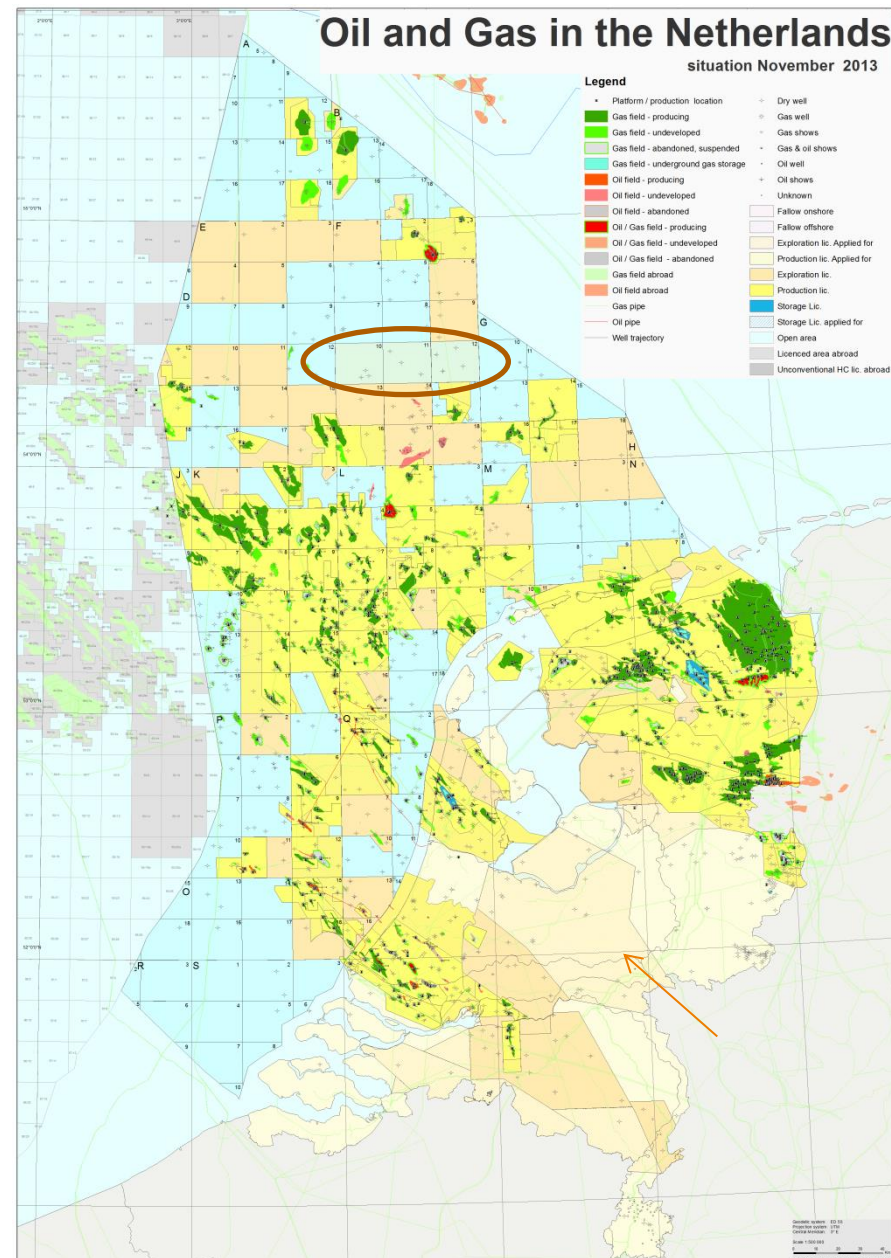
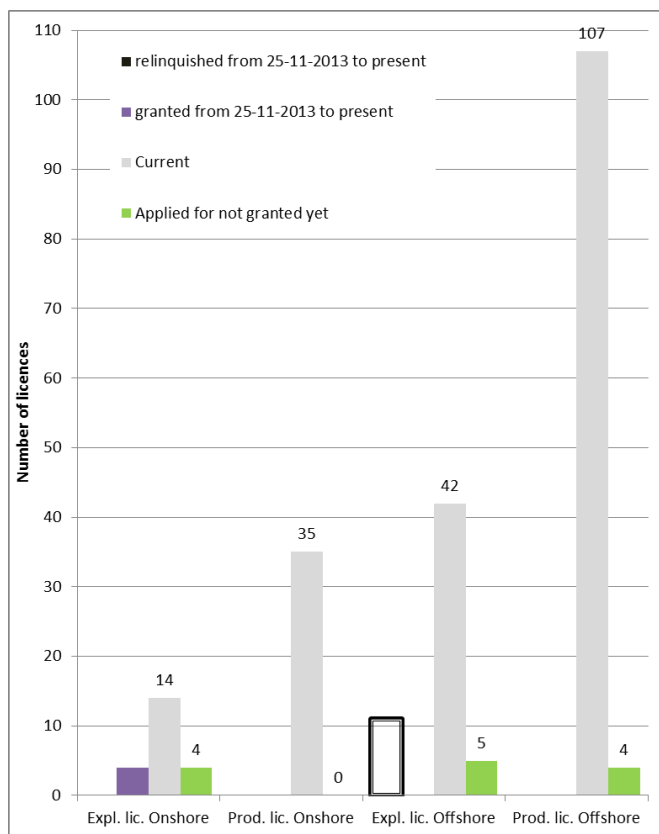
Outline of the presentation:

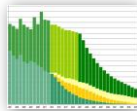
- › Look back 2013
- › Documented resources
- › Opportunities
- › Conclusions



Present day E&P map

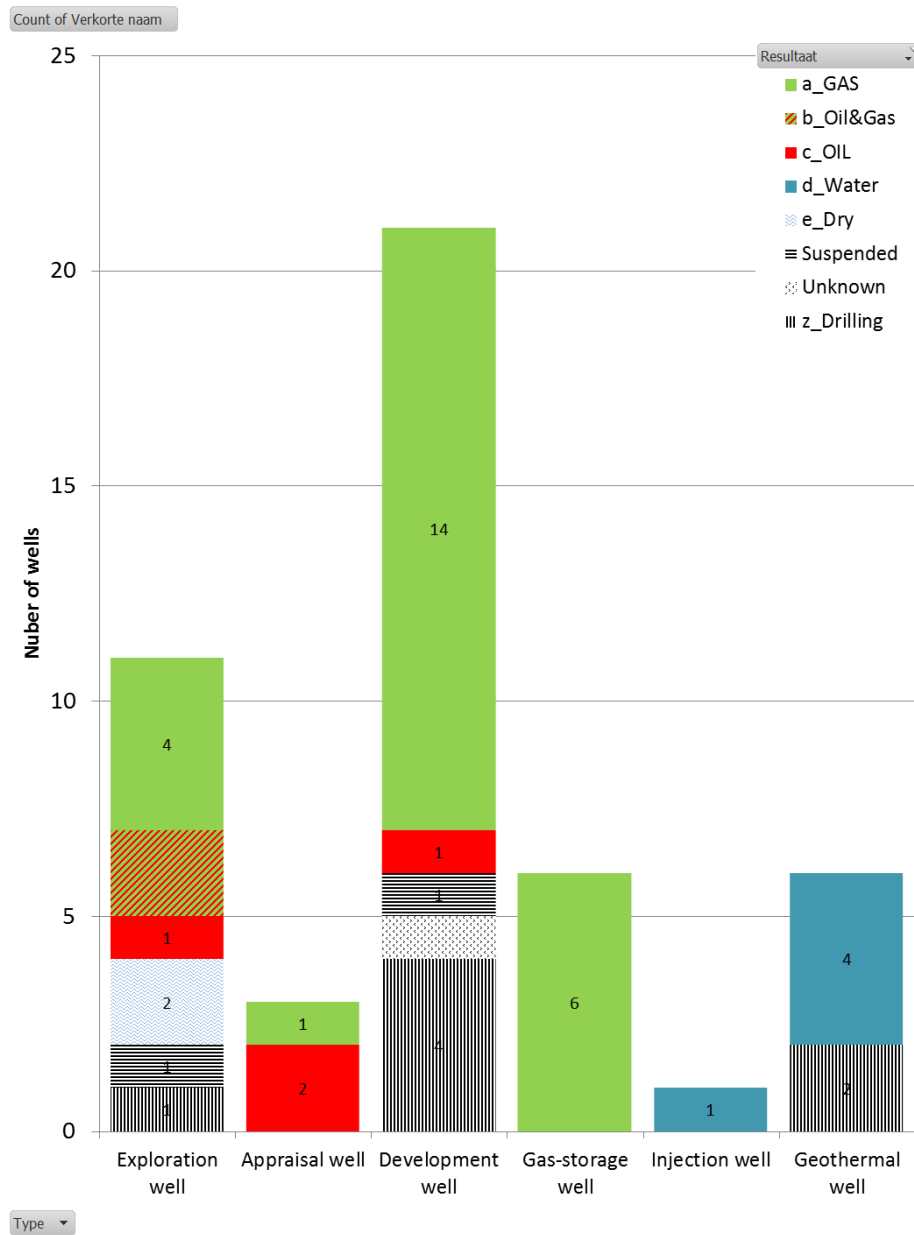
- Wells
- Seismic acquisition
- **Licences**

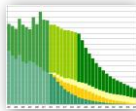




Look back 2013, activities since Prospex 2012

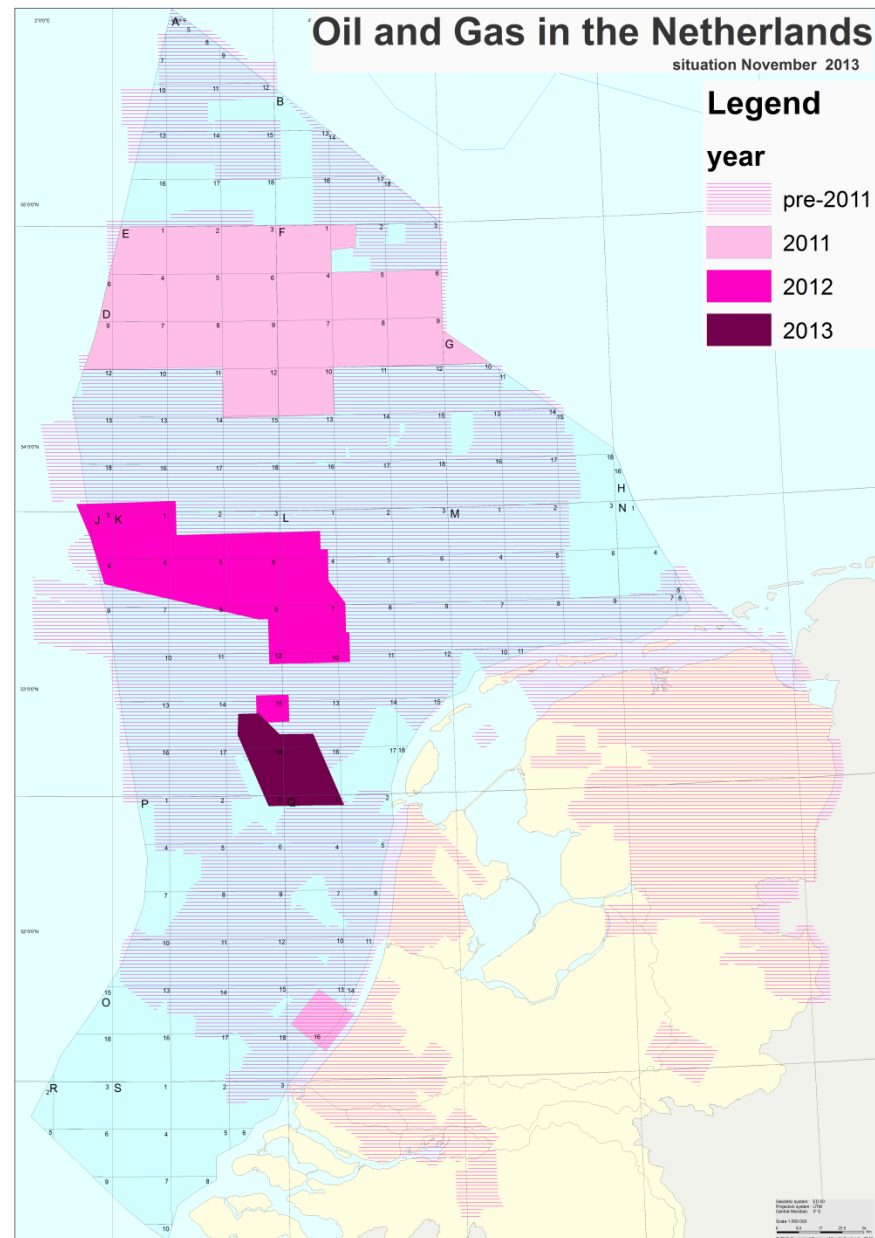
- › **Wells => 48**
- › Seismic acquisition
- › Licences

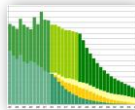




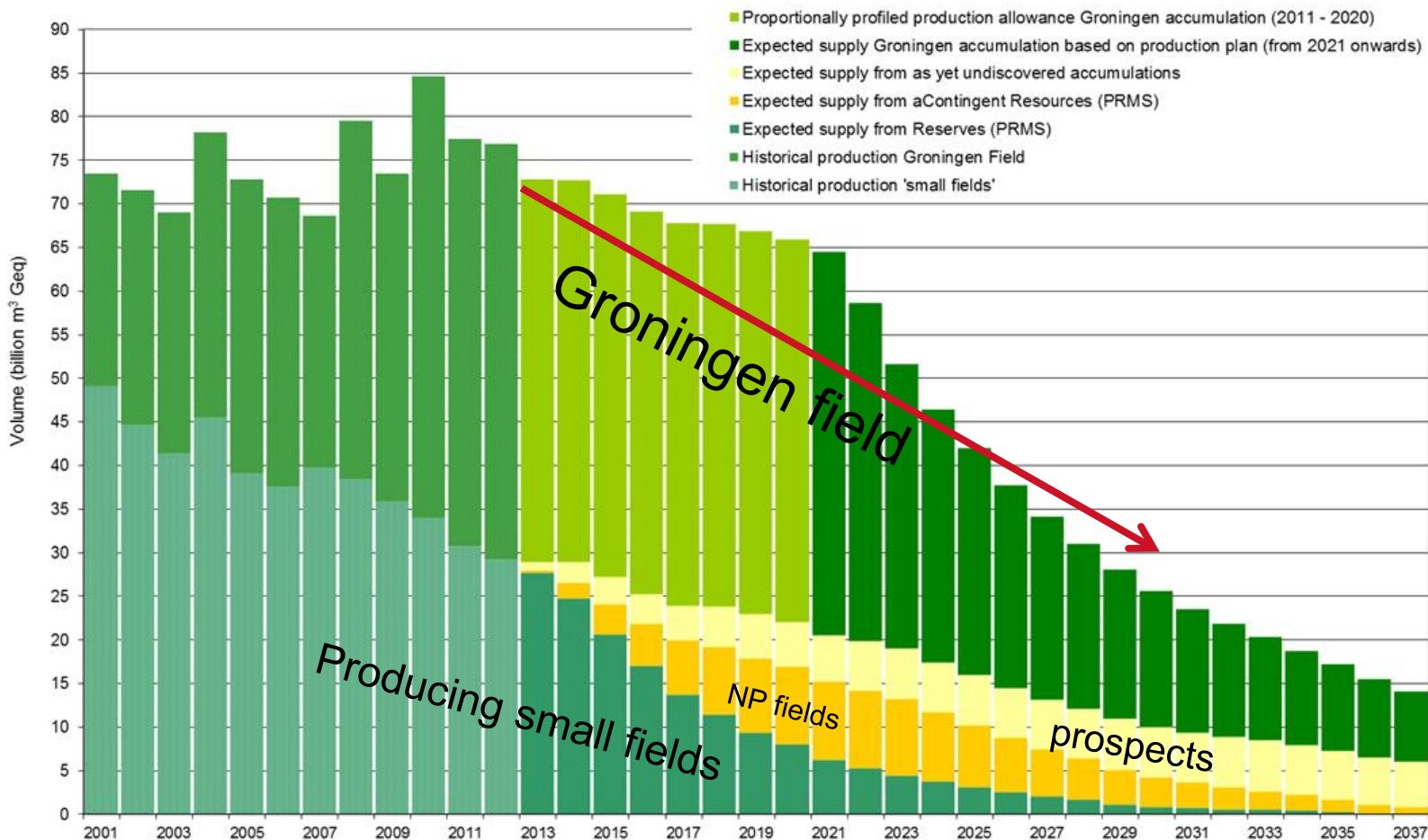
Look back 2013, activities since Prospex 2012

- › Wells
- › **Seismic acquisition**
 - › **shot &**
 - › **planned**
- › Licences

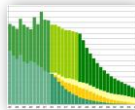




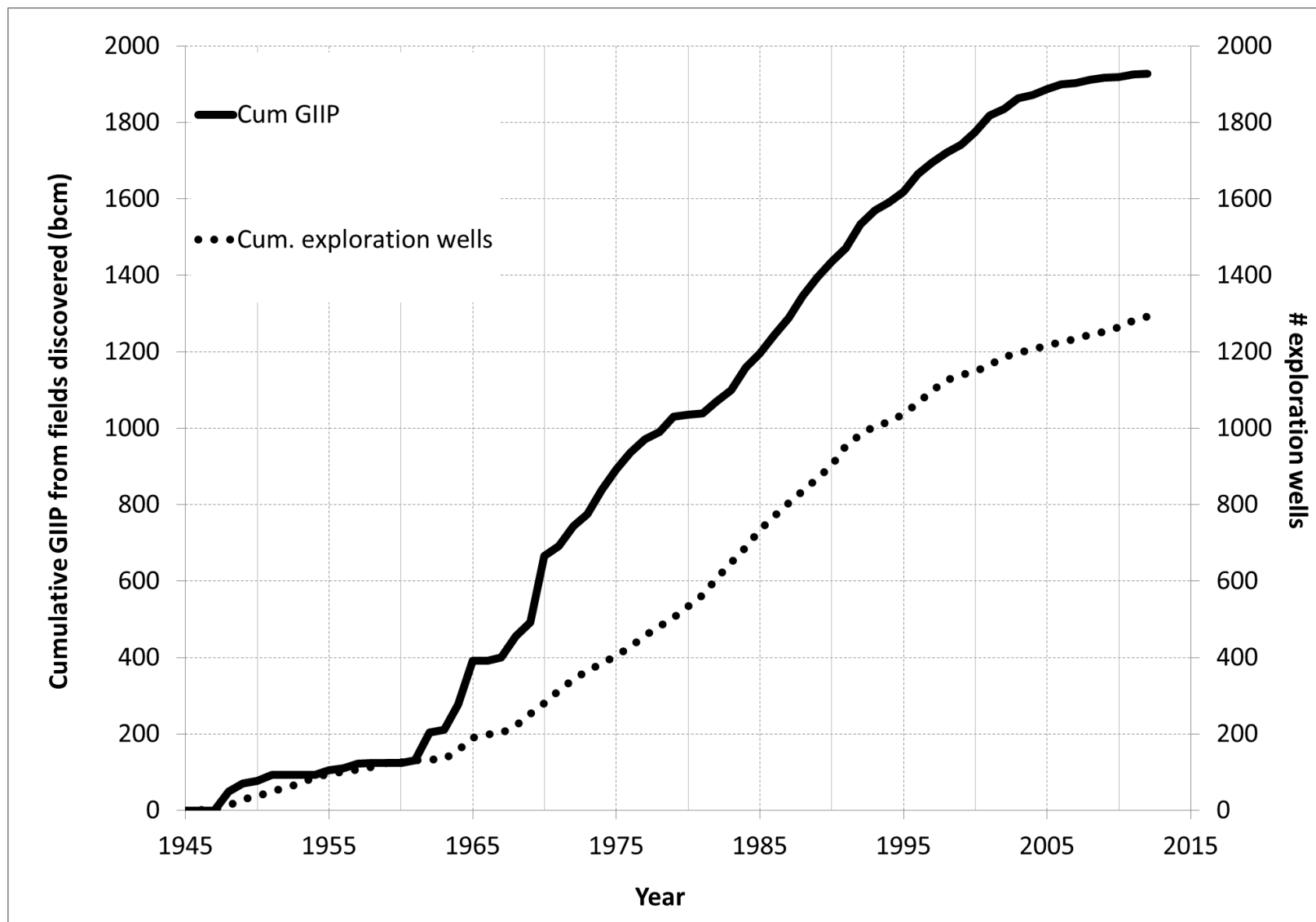
Documented Dutch resources

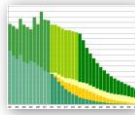


Supply	2013 – 2022	2013 – 2037
Small fields		
Reserves	144	166
Contingent resources (dev. pending)	60	120
Still to be discovered	40	125



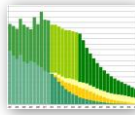
Creaming curves





How to postpone the decline and reverse the creaming

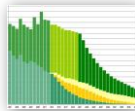
- › Tax incentives
- › Regulatory incentives
- › Gas in under-explored areas
- › Gas in new plays
- › Challenging reservoirs
 - › Tight reservoirs
 - › Shallow gas-reservoirs
- › Unconventional reservoirs
 - › Shale gas
 - › CBM
- › Tail end production
- › Synergy with Geothermal E&P



Reliable & Stable E&P investment framework

which constantly improves

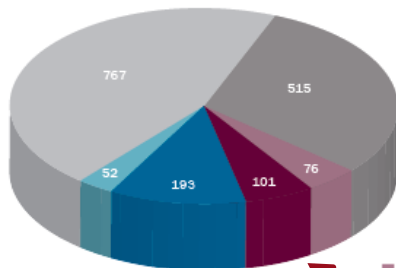
- › Small fields policy (long standing successful strategy)
 - › Guaranteed off-take (GasTerra)
 - › Guaranteed transport (Gas-Transport-Services)
- › State Participation through EBN in Production
- › Update of the mining act (2003)
- › 40% State Participation through EBN in Exploration (2010)
- › Marginal fields and prospects incentive (2011)
- › Fallow acreage incentive (2011)
- › Research & development incentive (2012)



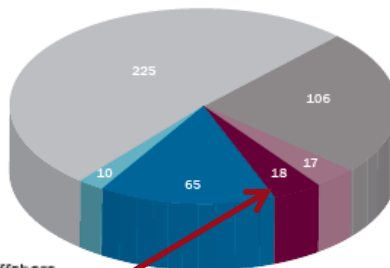
Fallow acreage incentive

- › 1 submission of a workplan by 3th party in 2013 Fallow licences
- › 2014 promotion activity foreseen
- › Factsheets on www.nlog.nl
- › Potential estimate

Number of prospects per area



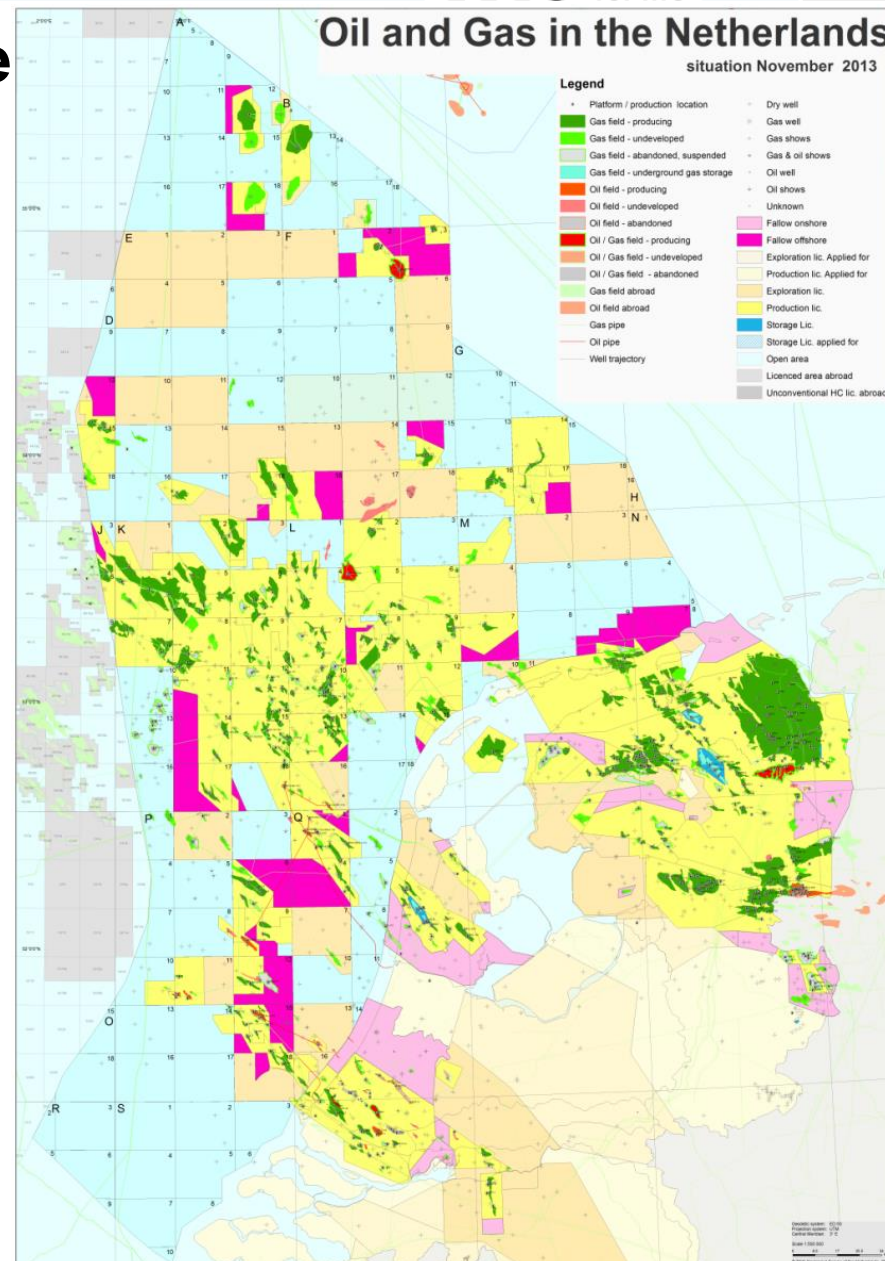
Prospect expectation volume (BCM) per area

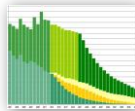


■ fellow offshore
 ■ fellow onshore
 ■ open offshore
 ■ open onshore
 ■ active offshore
 ■ active onshore

Oil and Gas in the Netherlands

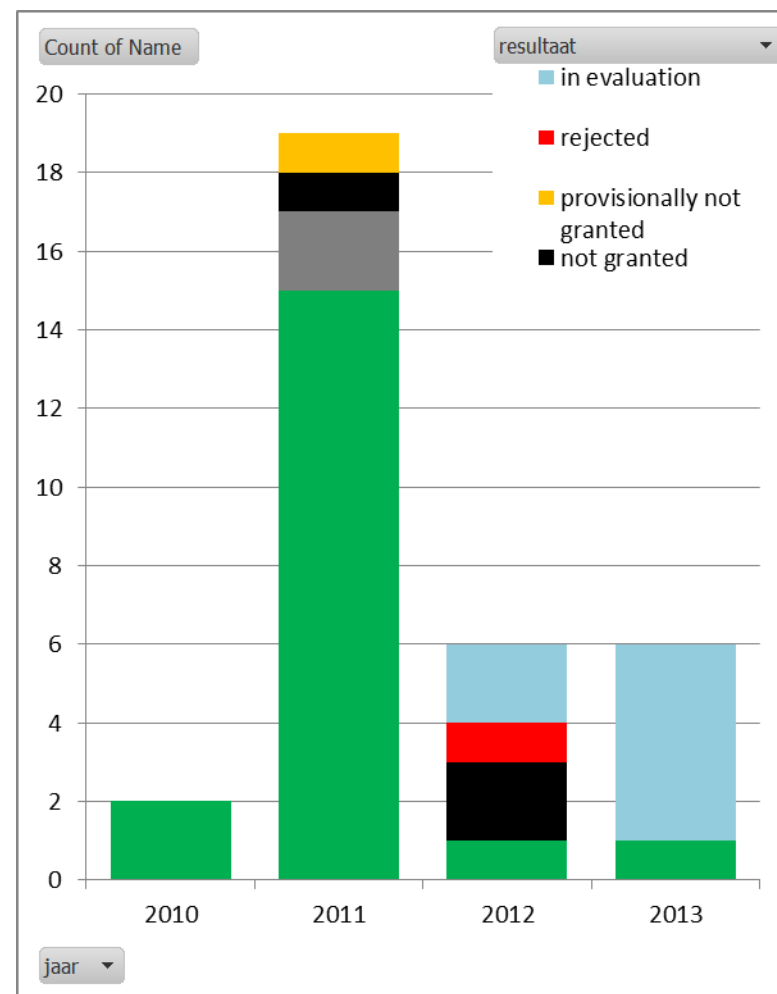
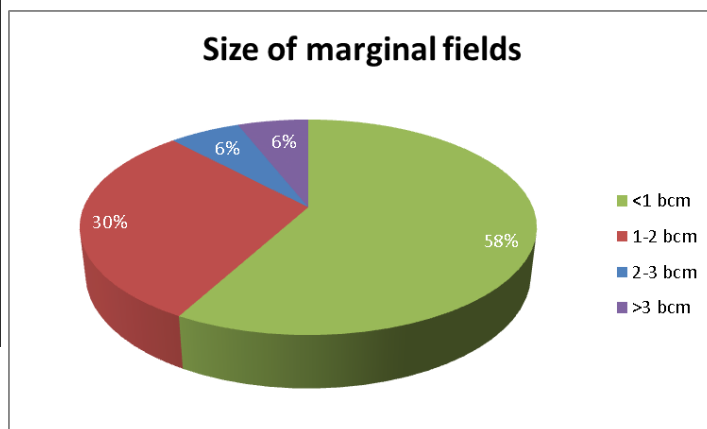
situation November 2013

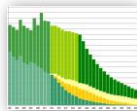




Marginal fields/prospect incentive

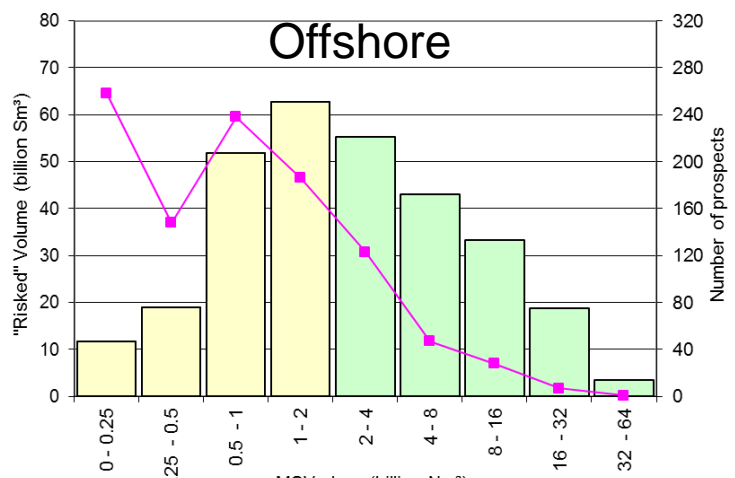
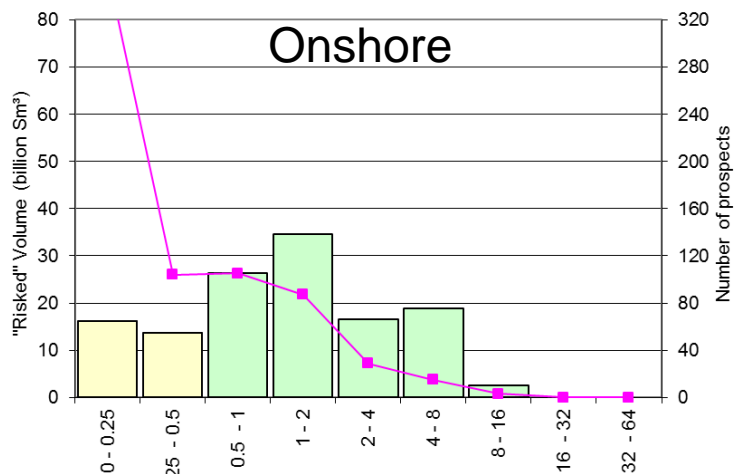
- › A gas field or prospect is marginal when:
 - › *Volume,*
 - › *Productivity and*
 - › *Distance to infra structure*
- › are below a threshold ➡ Then project screens for **25%** uplift.





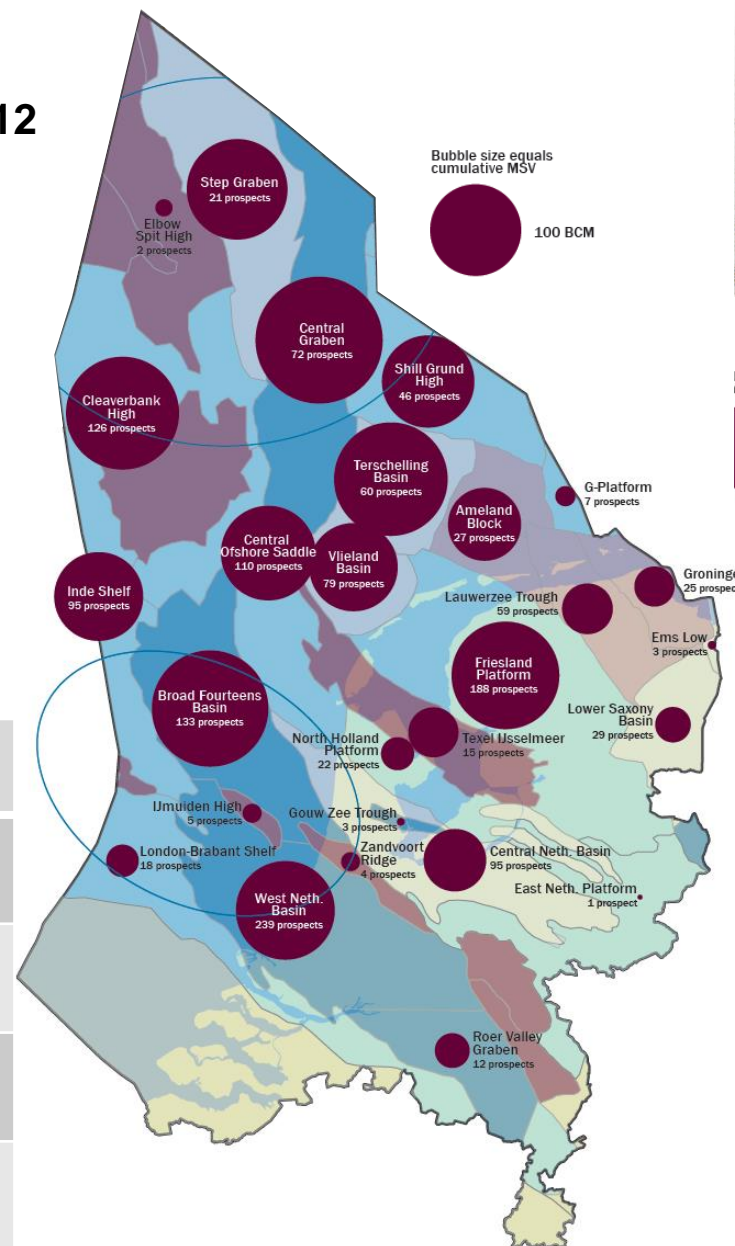
Prospectivity review

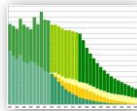
Exploration potential MEA annual review 2012



█ Exploration Potential after MSV cut-off of 2bcm
█ less than 2bcm
— Number of prospects Continental Shelf

	EXP (bcm)
Onshore @ zero cutoff	129
Offshore @ zero cut-off	299
Onshore @ EMV>0 cut-off	120
Offshore @ EMV>0 cut-off	119





Prospectivity review: under-explored area



Studied, Proven & in development

(Under) explored

Under explored

Under explored to relatively
mature

Under explored

Under explored

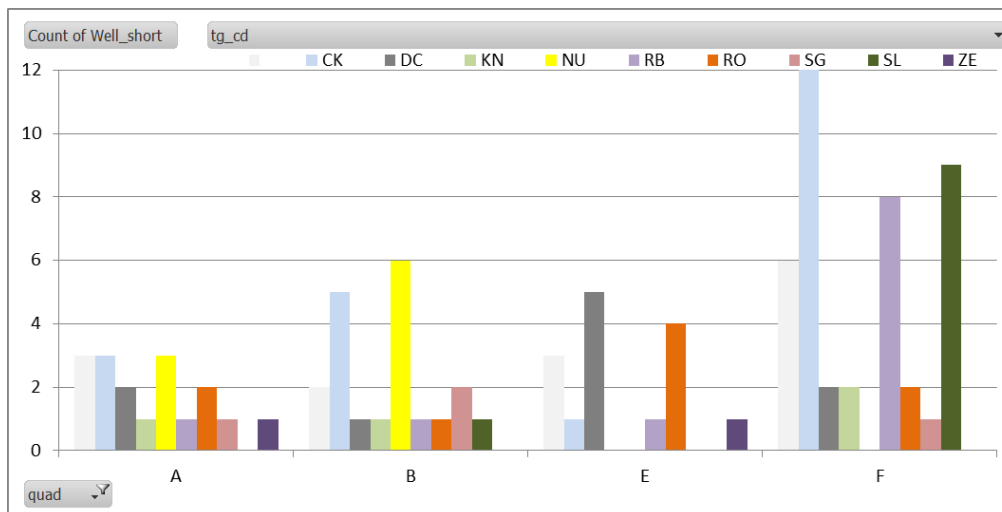
relatively mature

Under explored

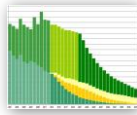
Study focus on
pre-Zechstein

Era	Period	Epoch
Cenozoic	Quaternary	Neogene
	Tertiary	Paleogene
Mesozoic	Cretaceous	Late
		Early
	Jurassic	Late
		Middle
		Early
	Triassic	Late
		Middle
		Early
	Permian	Late
		Middle
		Early
Paleozoic	Carboniferous	Stephanian
		Westphalian
		Namurian
	Dinantian	

From: Geology of the Netherlands 2007, Wong et al.

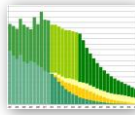


Under-
explored
area



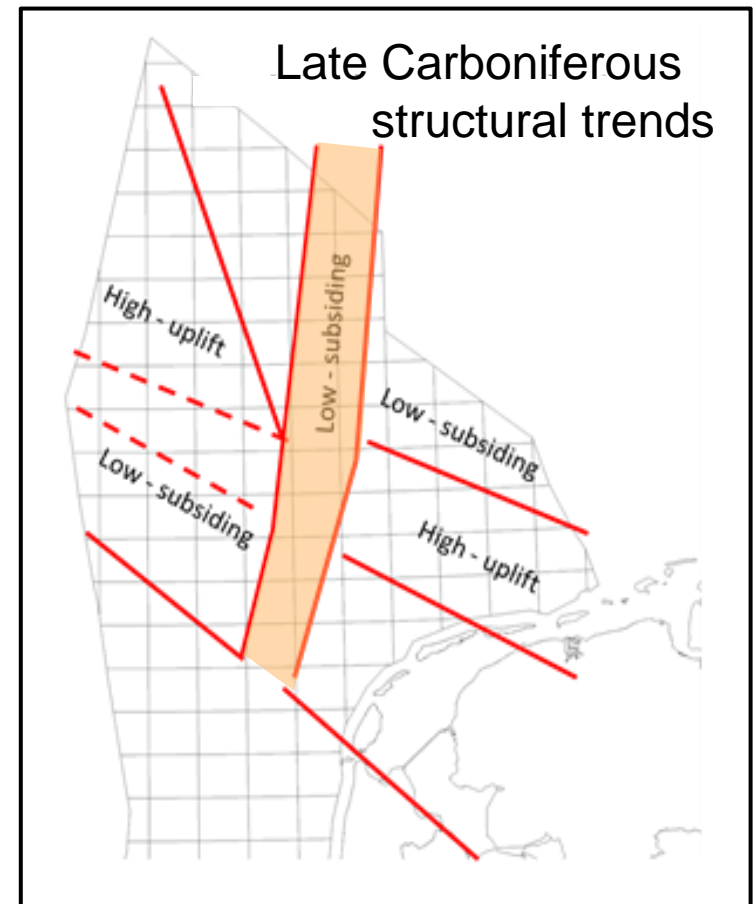
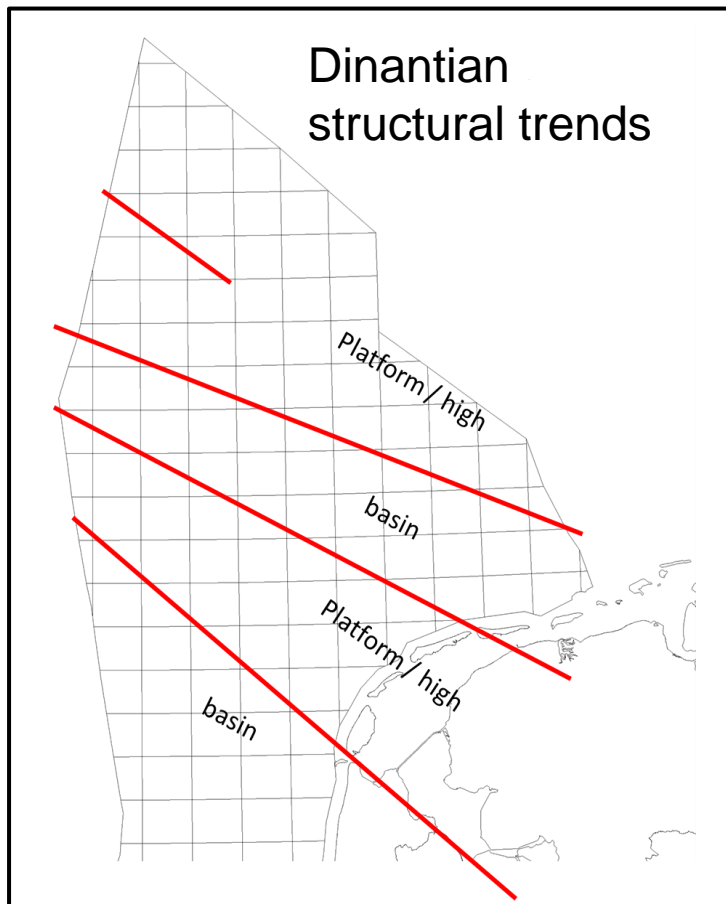
The map illustrates the Lower Slochteren interval, a complex geological area. Key features include:

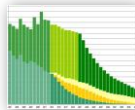
- Regional Sedimentary domains:**
 - Aeolian:** Yellow areas, primarily in the central and eastern parts.
 - Fluvial:** Blue areas, often associated with fans and channels.
 - Sandflat:** Green areas, scattered throughout the central and western regions.
 - Playa (Saline Mudflat):** Pink areas, located in the northern and eastern parts.
- Faults and Structural Features:**
 - Douling Fault Zone:** A major fault running north-south on the left side.
 - CSH Drainage Divide:** A dashed line running north-south in the center.
 - Hantum Fault Zone:** A fault running east-west in the upper right.
 - Roosdorp Fault Zone:** A fault running north-south on the far right.
 - Texel-Jessimer High:** A high area in the lower right.
 - Inde High:** A high area in the center.
- Depositional Features:**
 - Fluvial Fans:** Multiple fans radiating from various points, particularly in the western and eastern parts.
 - Lee-Side Dune Field:** A field of dunes in the center.
 - Thin Aeolian Sands:** Areas of thin aeolian sands in the center.
 - Windward Side:** The eastern side of the central features.
 - Leeward Side:** The western side of the central features.
 - Wind direction:** Indicated by an arrow pointing towards the east.
 - Isolated Dunes or Thin Sands:** Small, isolated features scattered throughout.
 - Local Basin:** A basin in the lower left.
 - Groningen gasfield:** Located on the far right edge.
- Other Labels:**
 - UK / NL:** Boundary between the United Kingdom and the Netherlands.
 - Salt Pan:** A large pink area in the upper right.
 - Aluvia Fan:** A fan in the lower right.
 - Windward Side:** Labeled near the center.
 - Leeward Side:** Labeled near the center.
 - Wind direction:** Indicated by an arrow pointing towards the east.
- Legend:**
 - Regional Sedimentary domains:** Aeolian, Fluvial, Sandflat, Playa (Saline Mudflat).
 - Legend:**
 - Highs (shallow deposition):** Circle with a dot.
 - Local Basin:** Circle with a cross.
 - Isolated Dunes or Thin Sands:** Crescent shape.
 - Abrupt Thickness Change (probably fault control):** Thick black line.
- Scale:** 0 to 40 km.



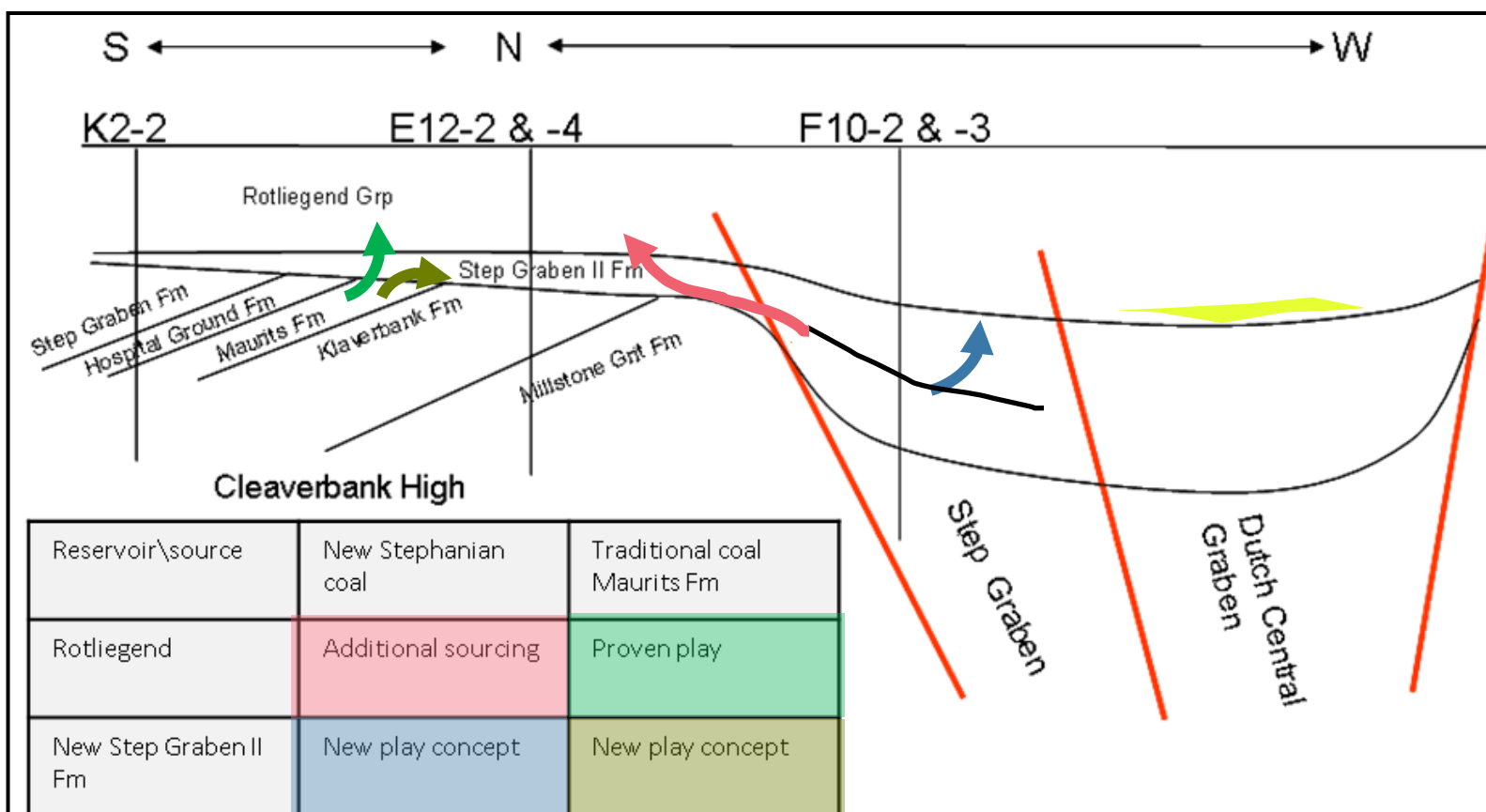
Under-explored area:

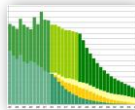
Structural and sedimentological development of the Dutch Central & Step Graben



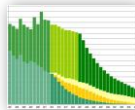


Source and reservoir





Chemostratigraphical correlation; report CC950



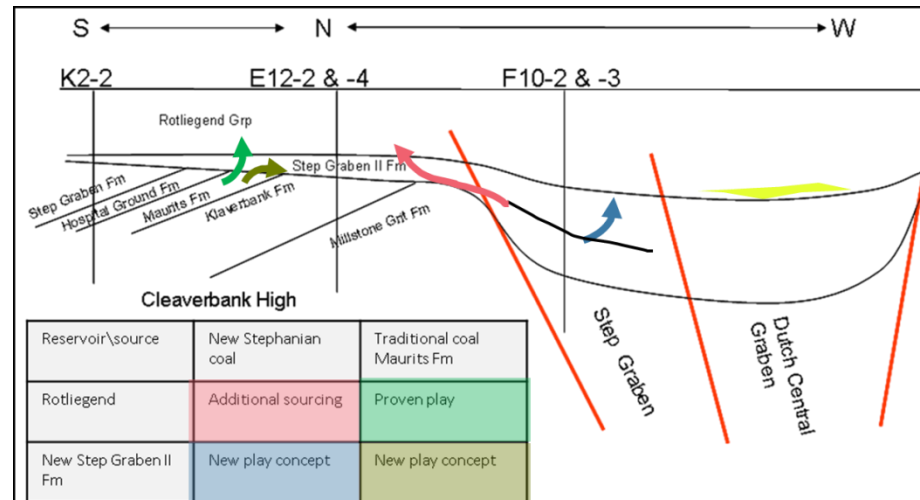
Prospex, 12-12-2013
E&P opportunities & activities in the
Netherlands, Harmen Mijlief

TNO innovation
for life

Appendix B1: Stratigraphic Group boundaries

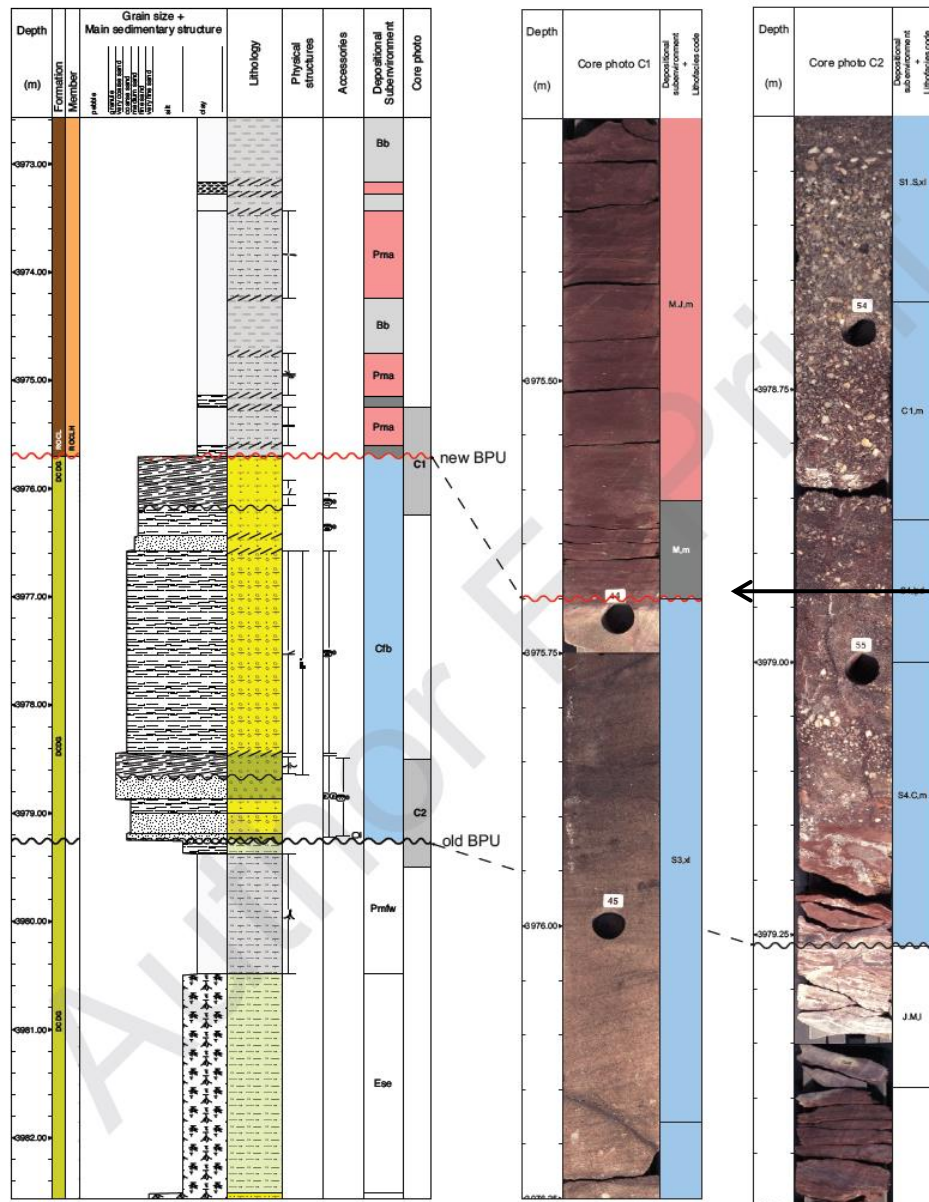
Well K02-02

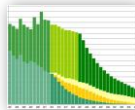
K2-2



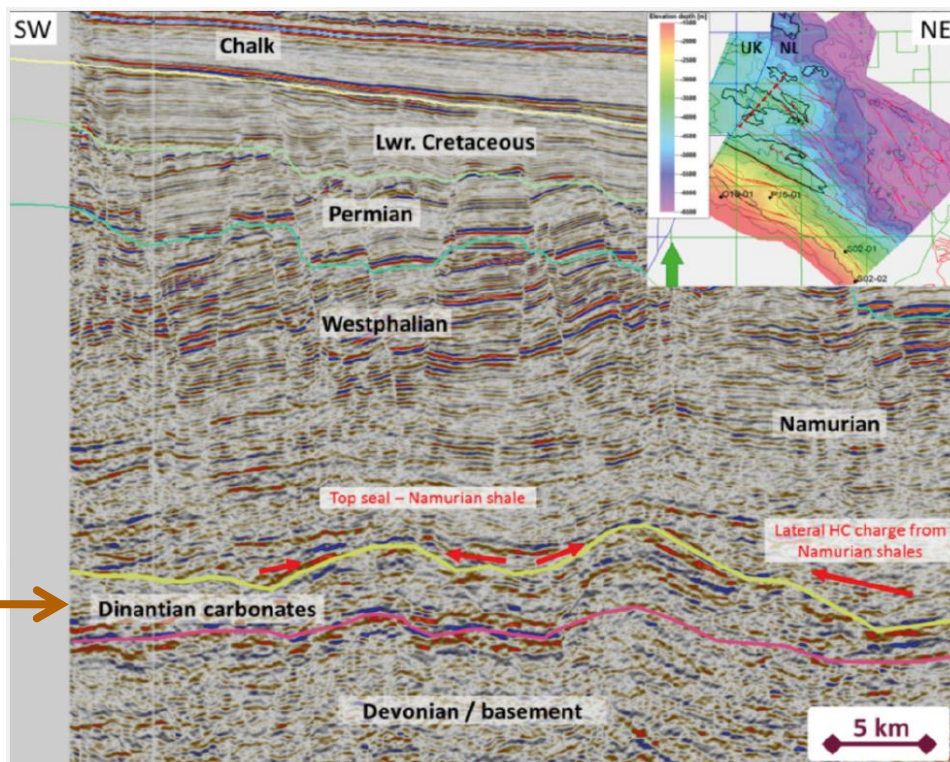
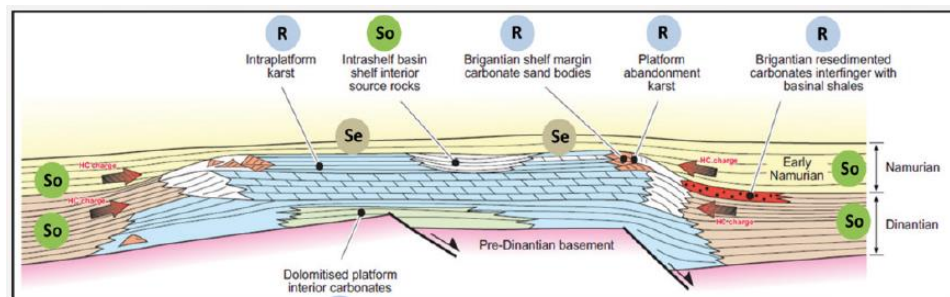
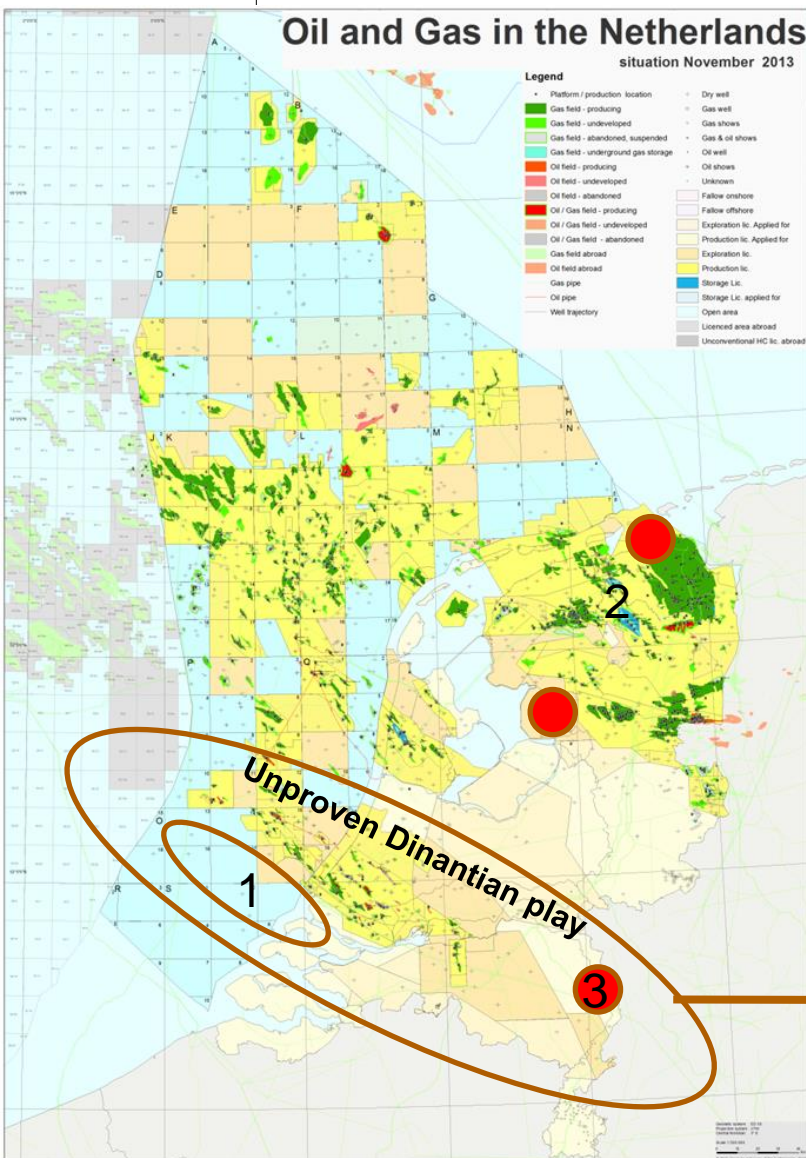
Sandstone clasts

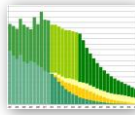
Mature soil





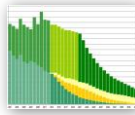
Prospectivity review: Yet unproven Play





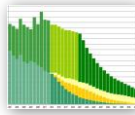
Research and Development projects

- › 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



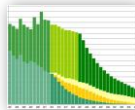
Geothermal Energy in a proven oil & gas province

- › 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.



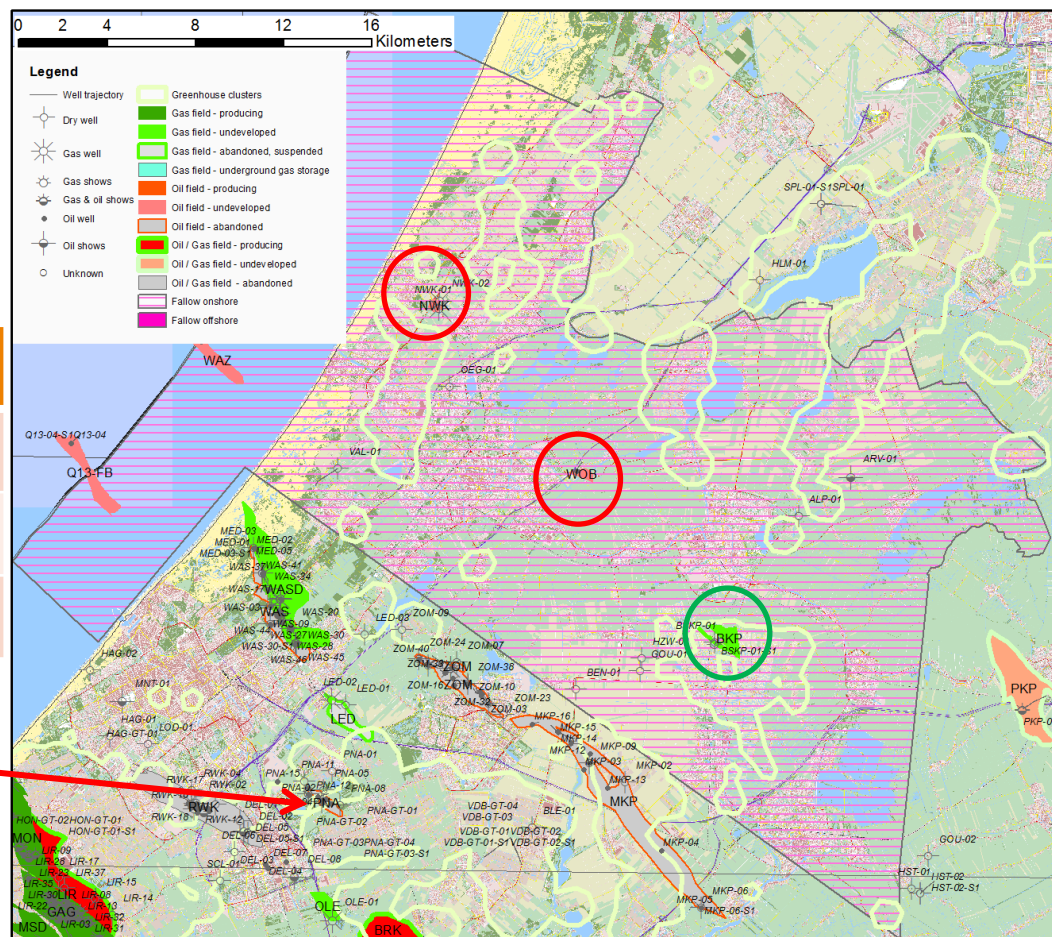
Prospex, 12-12-2013
E&P opportunities & activities in the
Netherlands, Harmen Mijlief

TNO innovation
for life

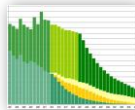
Fallow acreage ⇔ synergy with Geothermal

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

Name HC-field	type	remarks
Nieuwerkerk	Oil minor gas	Marine Lower Cretaceous Oil STOIP < 1mln m3, Tight Bunter GIIP < 0.2 bcm
Woubrugge	Oil	Terrestrial Upper Jurassic Schieland Oil STOIP < 1mln m3
Boskoop	Gas minor oil	Tight Triassic reservoir, low saturation, GIIP < 0.2 bcm



Co-produced Oil in Geothermal Doublet



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

TNO innovation
for life

Subsurface Data and other E&P information

Welcome to the NL Oil and Gas Portal

www.nlog.nl/en/home/NLOGPortal.html

- Boreholes**
- Seismic surveys**
- Oil & gas fields**
- Production**
- Infrastructure**
- Licences**
- Oil and gas**
- Geothermal Energy**
- Salt production**
- Underground gas storage**
- Geological storage of CO₂**
- Seismicity and subsidence**
- Legislation**
- Administrative procedures**
- E&P: Results and statistics**
- Papers and presentations**
- Geological mapping & data sets**
- Subsurface Spatial planning**
- Home**
- Links**
- Disclaimer**
- Contacts**
- Mail**
- (In het Nederlands)**

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.

It aims to help users access information furnished by the Dutch government in an easy, comprehensible way.

This site was produced at the request of the Dutch Minister of Economic Affairs and is managed by TNO, Geological Survey of the Netherlands.

Dutch Oil & Gas Portal: www.nlog.nl

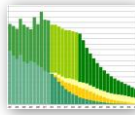
- Well data >6000 wells**
- Seismic data, 2D and 3D**
- Field data (e.g. production data)**
- Licence information**
- Legislation & administrative procedures**
- Maps and digital datasets**
- Bibliography Dutch Subsurface, papers and presentations**
- Other subsurface use (e.g. geothermal)**

Recent changes

We keep this site continually up-to-date. Click [here](#) for an overview of recent changes.

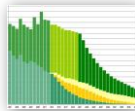
News

- 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 Energiemarkt, Postbus 20401, 2500 EK DEN HAAG
- 11-10-2013 | [Ontwerpbesluit zoutwinning Havenmond](#), available for inspection from 11 October 2013 to 21 November 2013.
- 01-08-2013 | Digital files of the Geological Map of the sub-regions [Elbow Spit High](#), [Step Graben and Dutch Central Graben \(NCP2C\)](#) en [Winterton High](#), [Winterton Platform](#) and [Zeeland Platform \(NCP2G\)](#). 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 and -2G](#)
- 16-07-2013 | [Natural resources and geothermal energy in the Netherlands - annual review 2012](#)
- 01-07-2013 | [Activity plan received for the fallow part of the production licence F03b](#)
- 25-03-2013 | [Approval of the amended production plan Anjum](#)
- 13-03-2013 | Release of data from 2003 annual reports (art 113 Mining Decree): ['Release annual report 2003 art 113'](#) and ['Structural maps'](#) (available as per March 15th, 2013).
- 21-02-2013 | Third opening of [Garantieregeling / Regeling SEI risico's voor Geothermal Energy](#) published in the [Staatscourant](#). For more information (in Dutch) go to page [Aardwarmte](#) and [bleetcat](#)
- 14-02-2013 | Information on induced earthquakes in: [Groningen gas field](#) 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

Visit us in booth 70

or

in our digital booth @
www.nlog.nl

