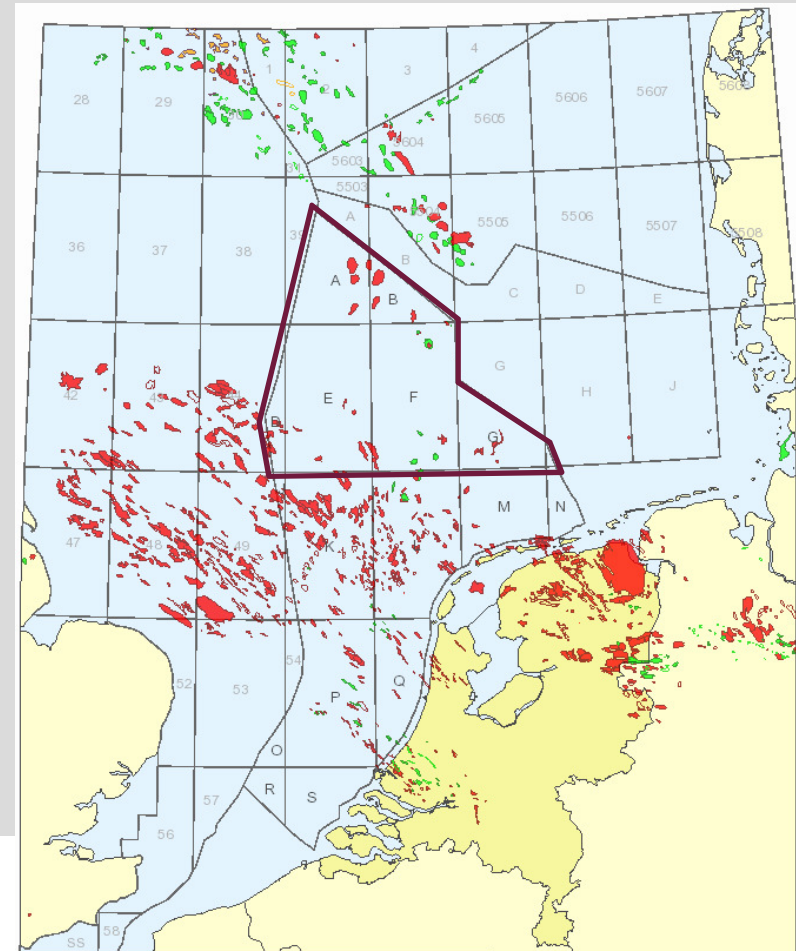


Shallow Gas Play in The Netherlands Takes Off



Mijke van den Boogaard & Guido Hoetz
Prospect 2012 London, 13 December 2012

1. EBN B.V.
2. Shallow Gas in the Dutch Offshore
 - Definition
 - Geological setting
3. Why Explore for Shallow Gas?
4. Shallow Gas Inventory EBN
5. Case Study (Open Acreage)
6. Summary

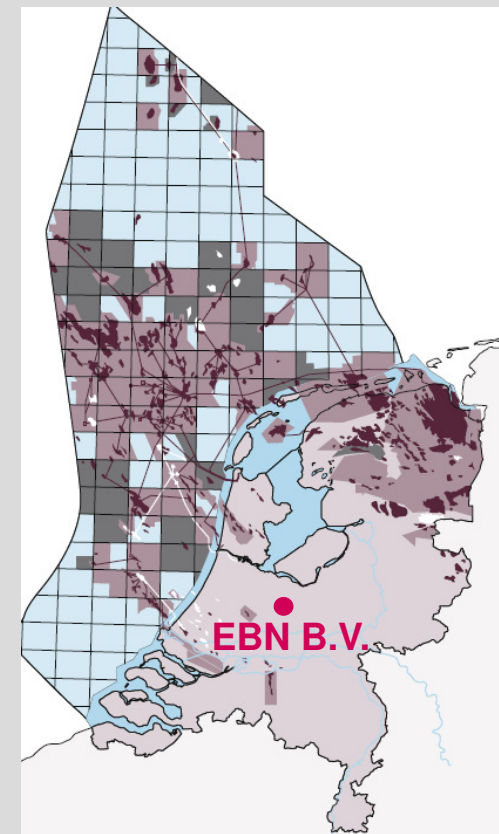




1. EBN B.V. (Booth 10)

State participant in exploration & production in The Netherlands

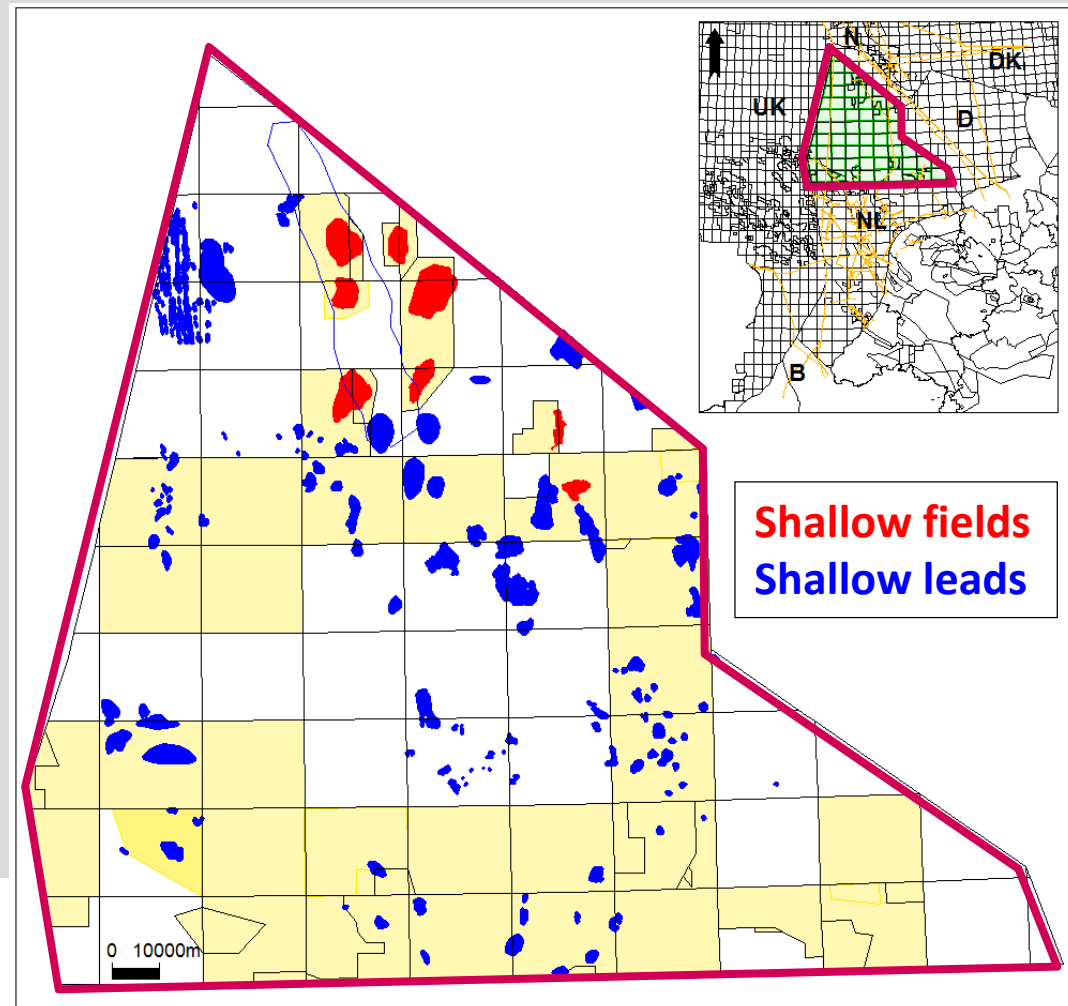
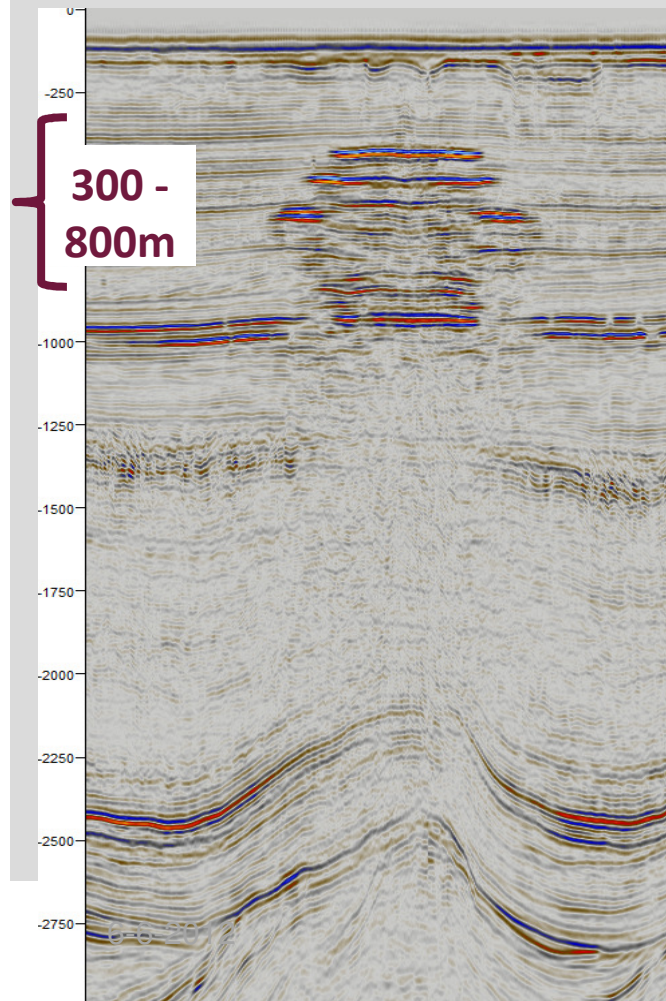
	2011
Productive fields (EBN participation)	258
Exploration participations	47
Production participation	125
Gas sales volume EBN share (bcm*)	30
Reserves EBN share (bcm)	431
Exploration wells drilled	19
Production wells drilled	38
New fields in development	12
Payments to state (billion €)	5.8



***1 bcm (Nm) \approx 37.3 bcf**

2. Shallow Gas in the Dutch Offshore Definition

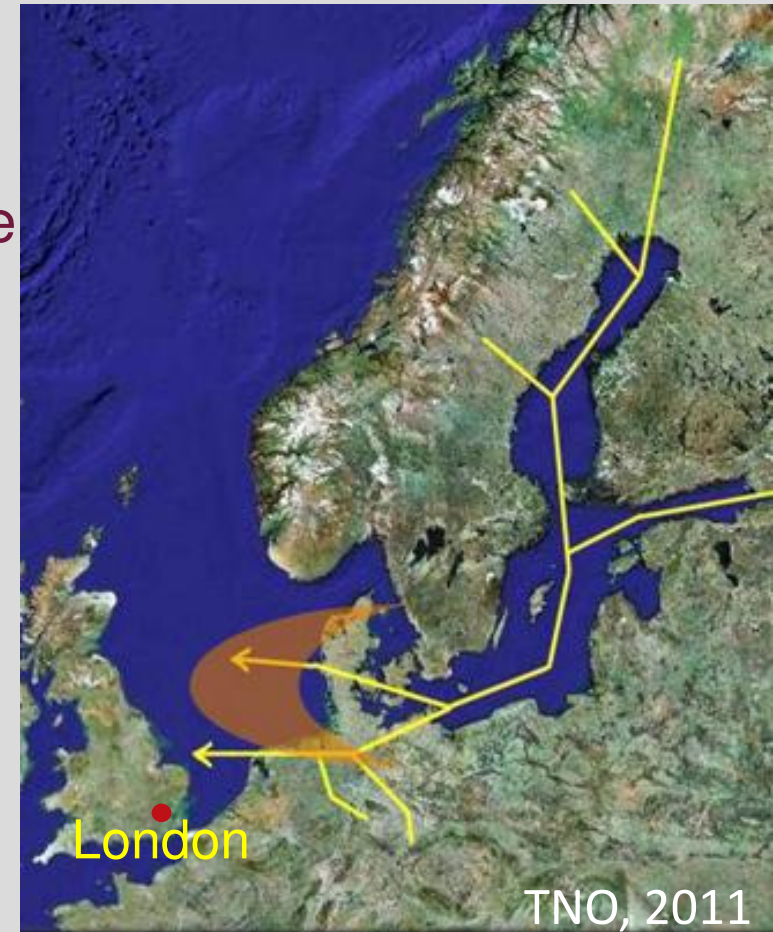
Shallow Gas (SG) = gas in unconsolidated sands, Miocene-Pleistocene



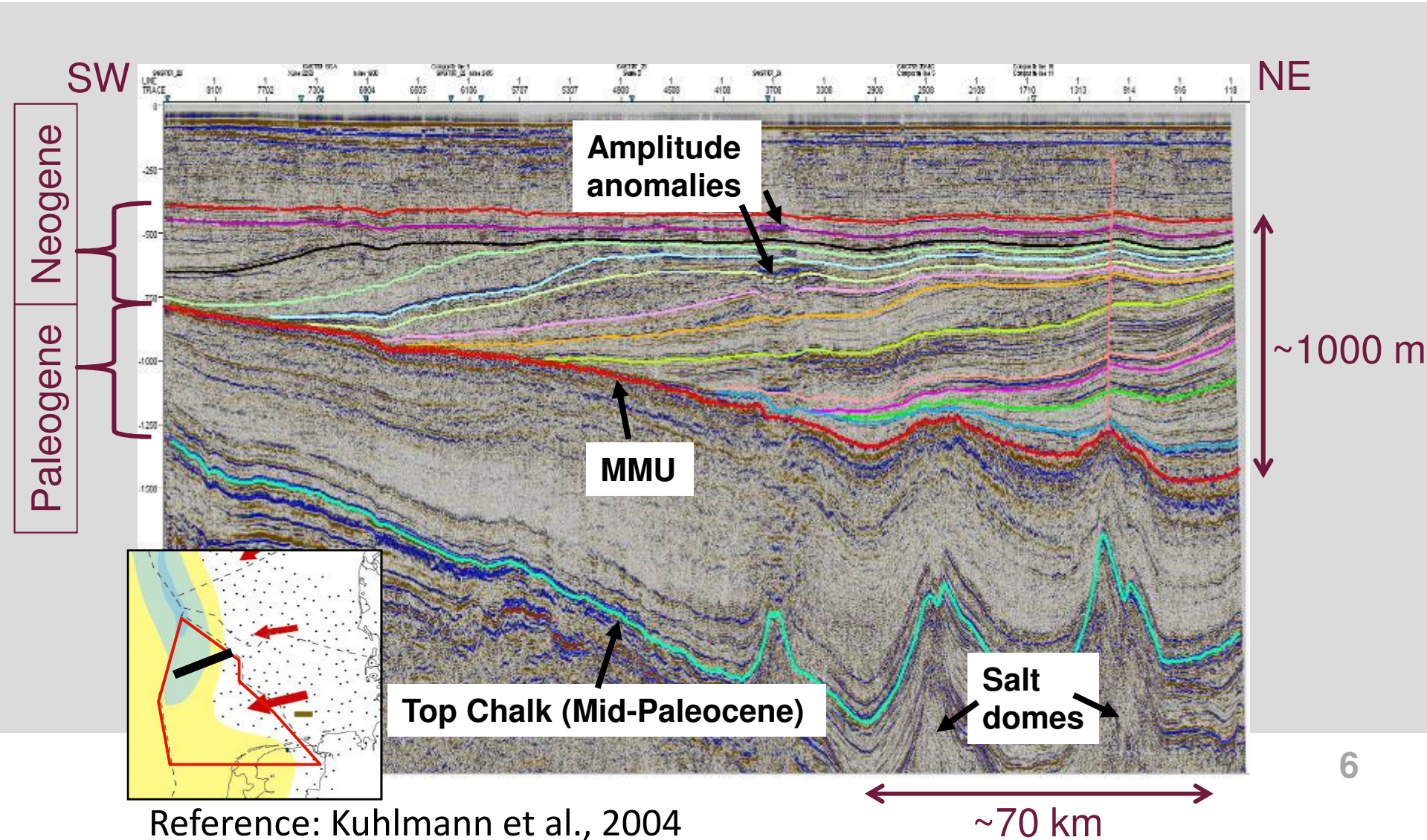
2. Shallow Gas in the Dutch Offshore Geological Setting

Eridanos delta:

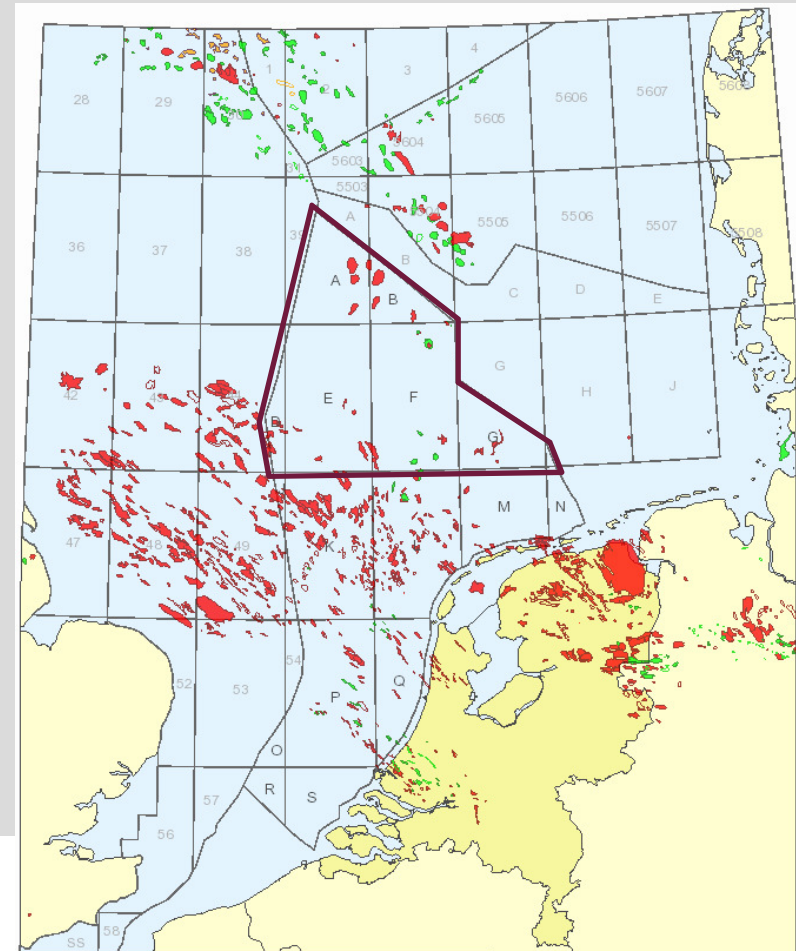
- Late-Cenozoic river delta system
- In NL: Late Miocene – Early Pleistocene



2. Shallow Gas in the Dutch Offshore Geological Setting



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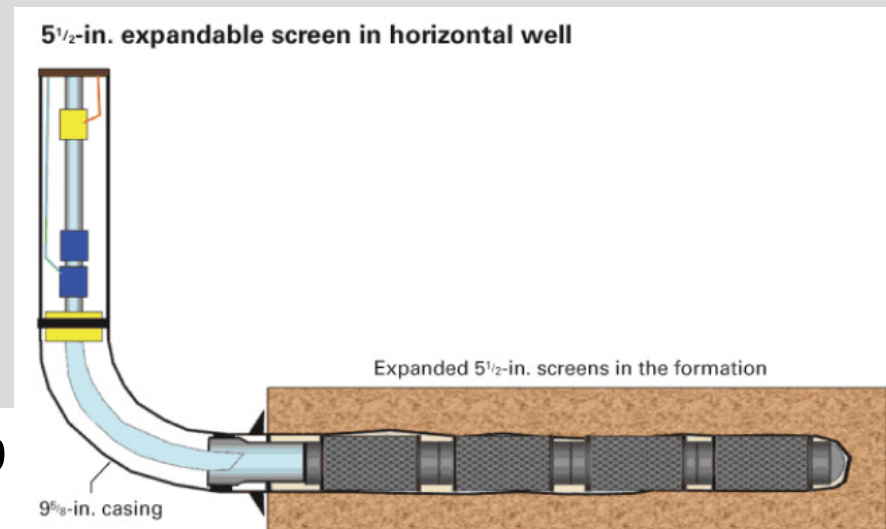
3. Why Explore for Shallow Gas? History

- Occurrence shallow leads known since early 70s
- Presence producible shallow gas proven by wells in 80s
- Early water breakthrough & sand production expected
→ fields not developed



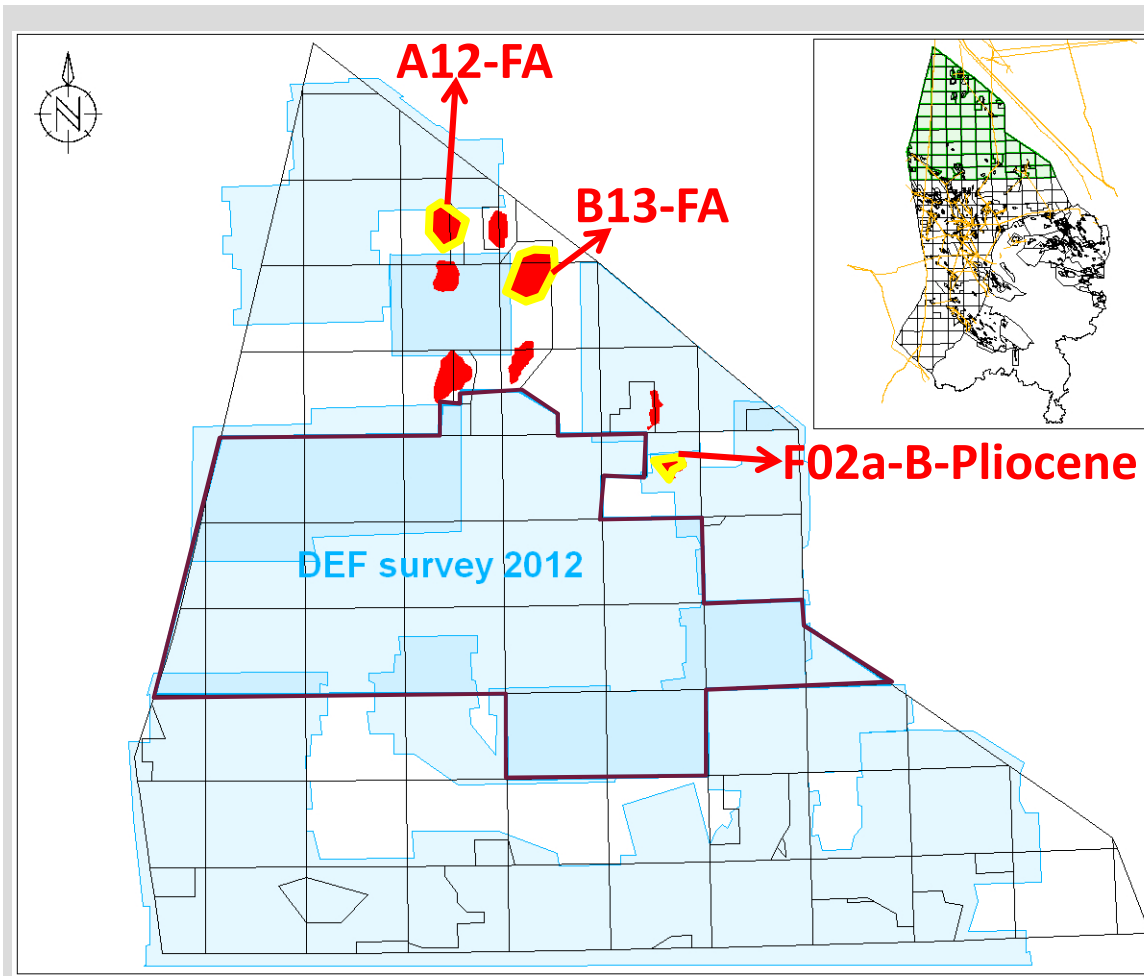
3. Why Explore for Shallow Gas? History

- Currently 3 successfully producing fields:
 - A12-FA (2007)
 - F02a-B-Pliocene (2009)
 - B13-FA (2011)
- Technical breakthrough (e.g. sand control in horizontal wells)



Reference: Chevron, Oil&Gas Journal, 2009

3. Why Explore for Shallow Gas?



Shallow Gas Offshore NL

Today:

3 fields producing

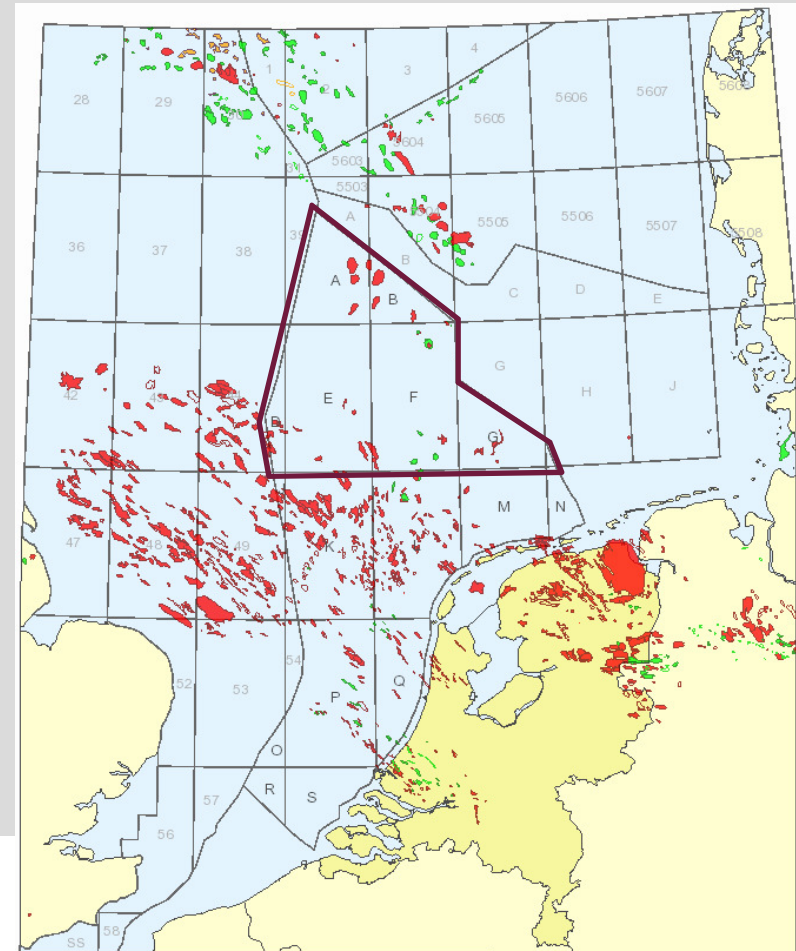
5 fields under development/
development pending

3. Why Explore for Shallow Gas?

1. New technology proven successful for SG developments
2. New 3D seismic points to more opportunities
3. Significant volumes identified:
36-118 bcm GIIP, 18-62 bcm UR
Relatively high POS
4. Marginal field tax incentive applicable (2010, www.nlog.nl)
& Guaranteed gas off take

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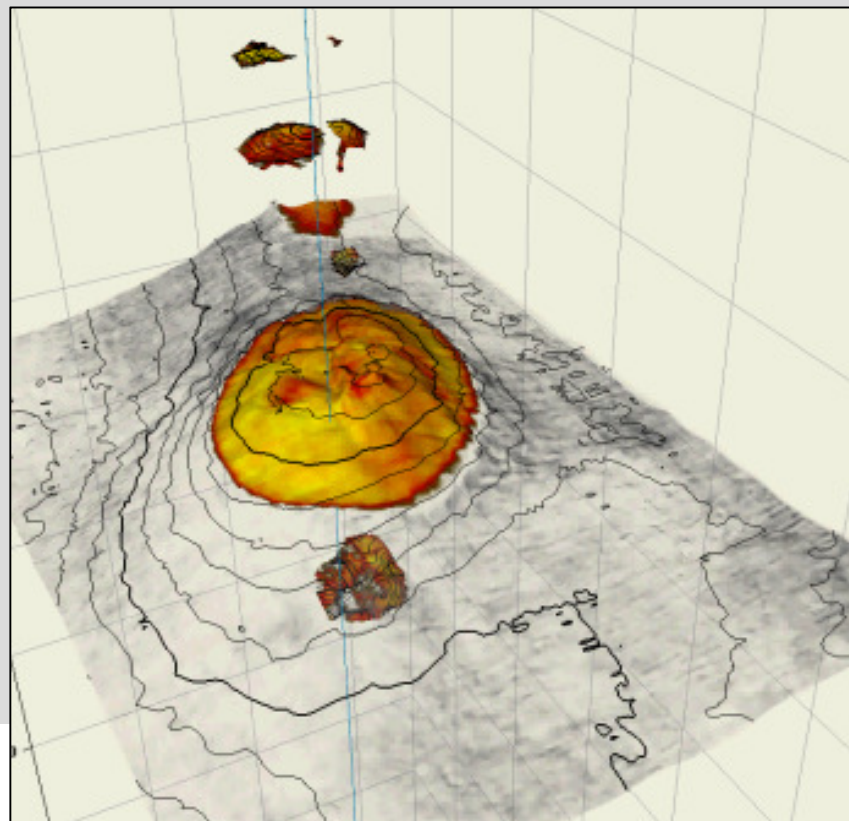
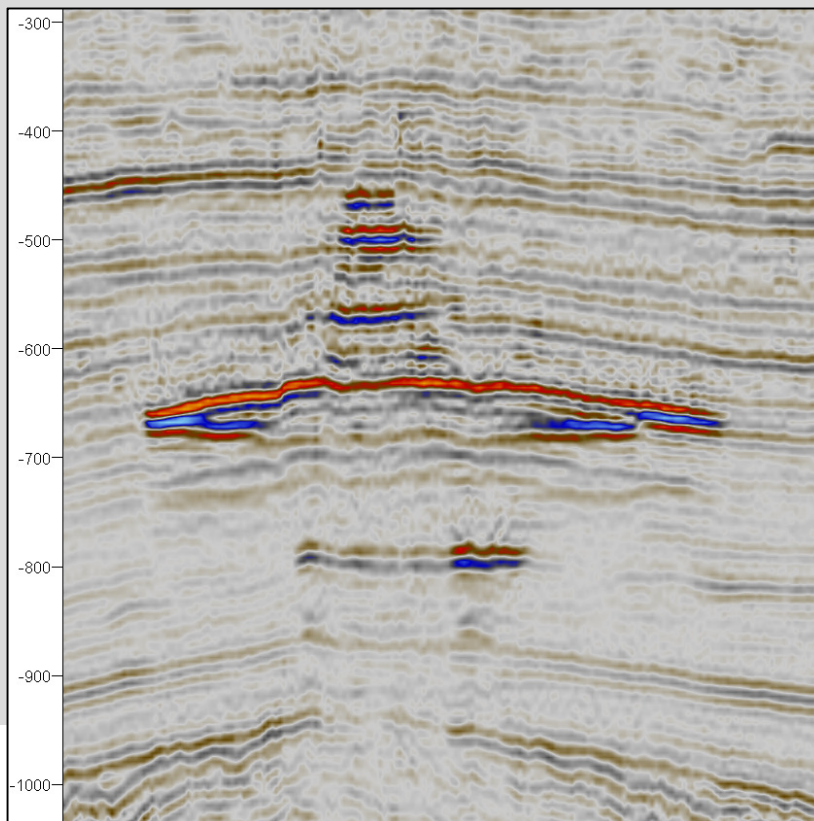
13/12/2012



4. Shallow Gas Inventory EBN Identify Leads

Identify Shallow Gas (SG) leads:

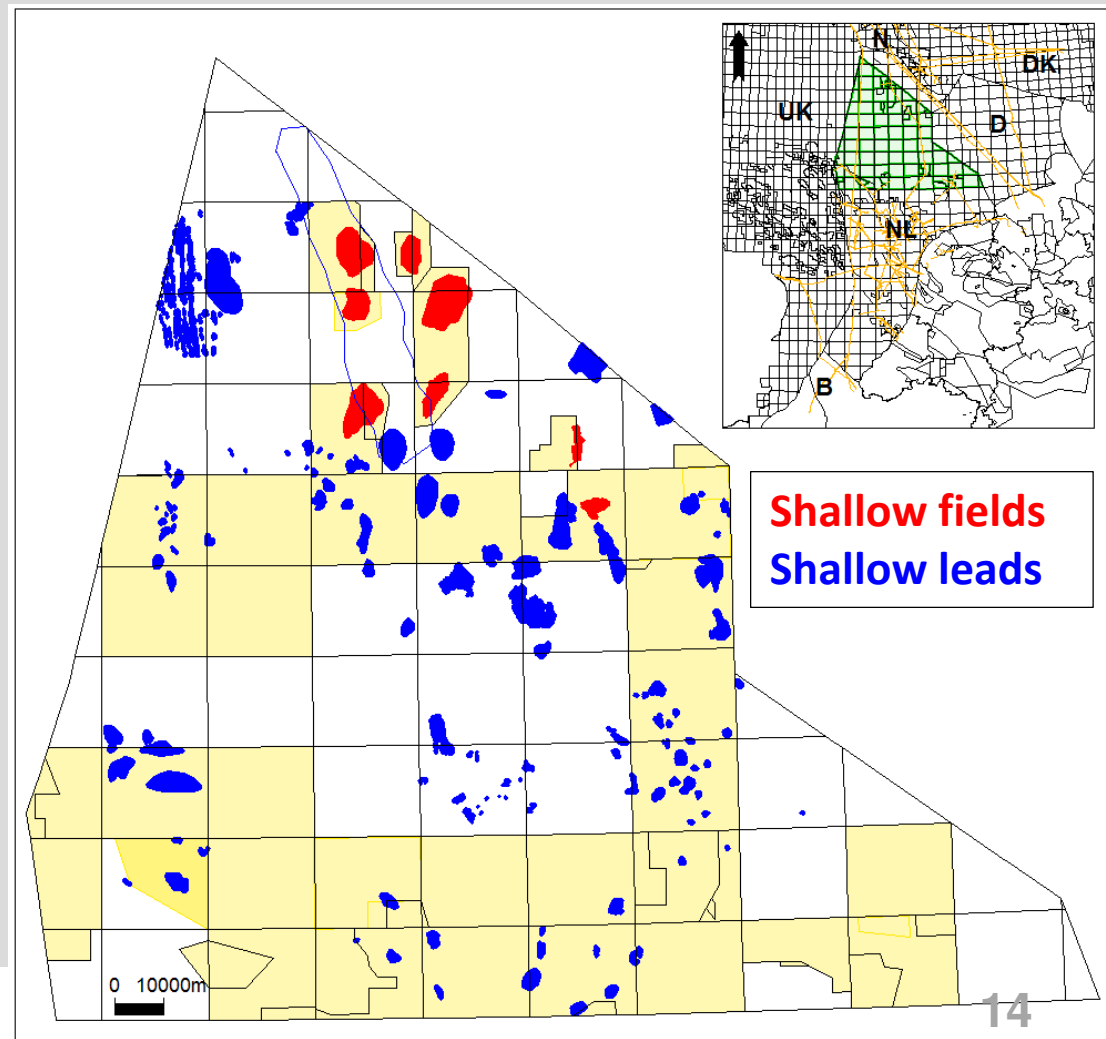
- High amplitude seismic reflection indicative for gas
- Mapping of *bright spots* (BS) defines SG leads



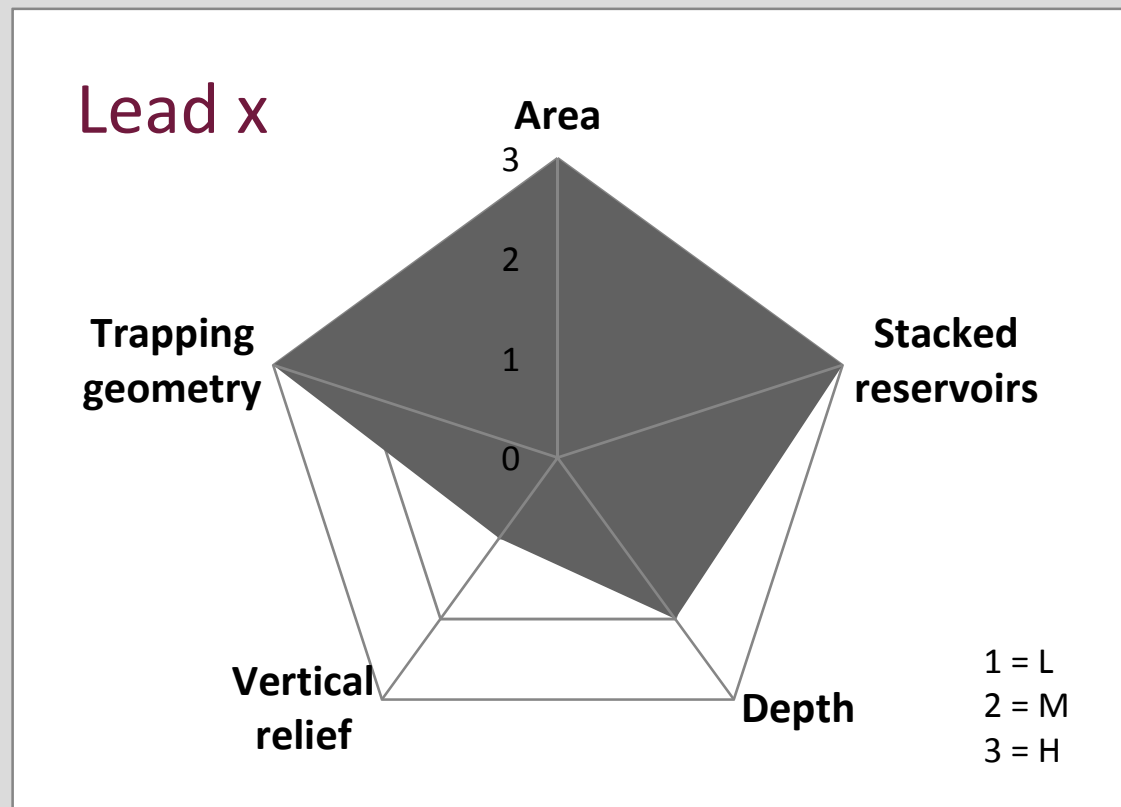
4. Shallow Gas Inventory EBN Identify Leads

Select most attractive leads based on:

1. Well data:
gas shows, log data
2. *Bright spot*
classification



4. Shallow Gas Inventory EBN Bright Spot Classification



4. Shallow Gas Inventory EBN Bright Spot Classification

BS type:

Prospectivity?

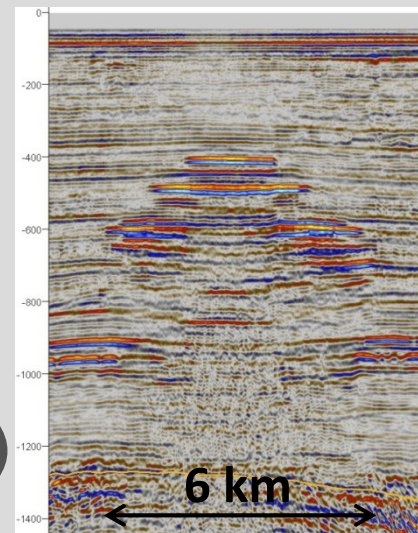
4WDC (e.g. A12-FA)

FDC (e.g. F02a-B-Pliocene)

Strat. trap

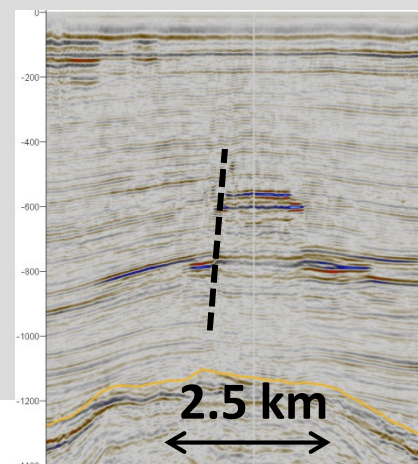
Very shallow

Small size



4WDC type

- Area: M/H
- Depth: M/H
- Vertical relief: L/M
- Number of Stacked Reservoirs: L/M/H
- 4WDC

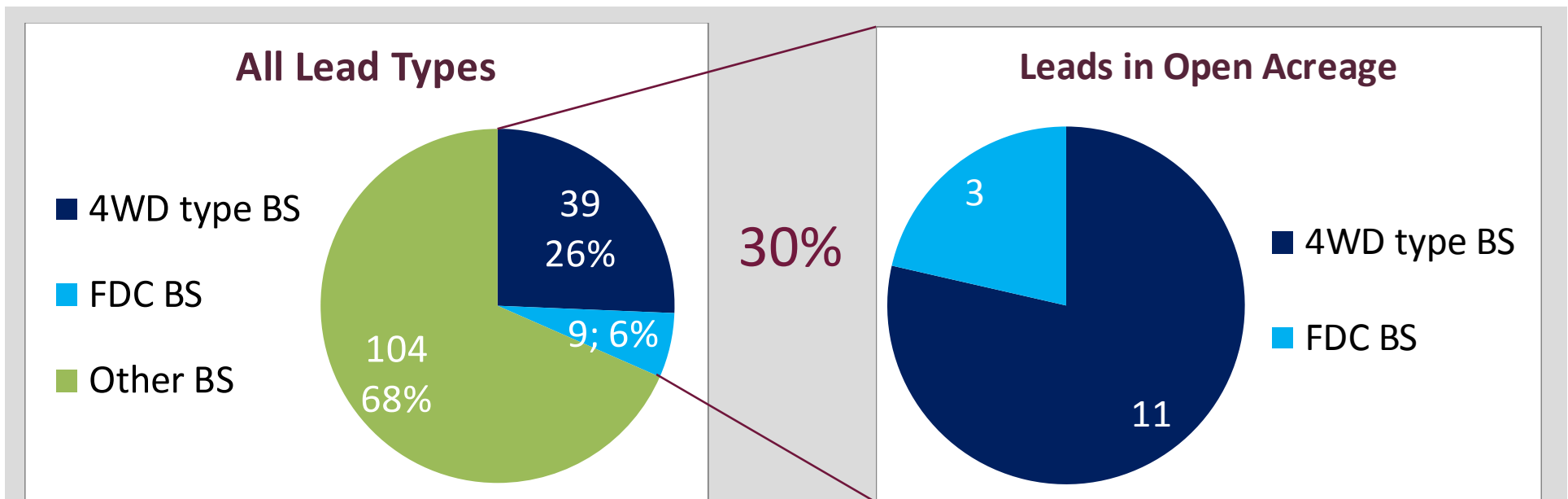


FDC type

- Area: M/H
- Depth: M/H
- Vertical relief: M/H
- Number of Stacked Reservoirs: L/M/H
- FDC



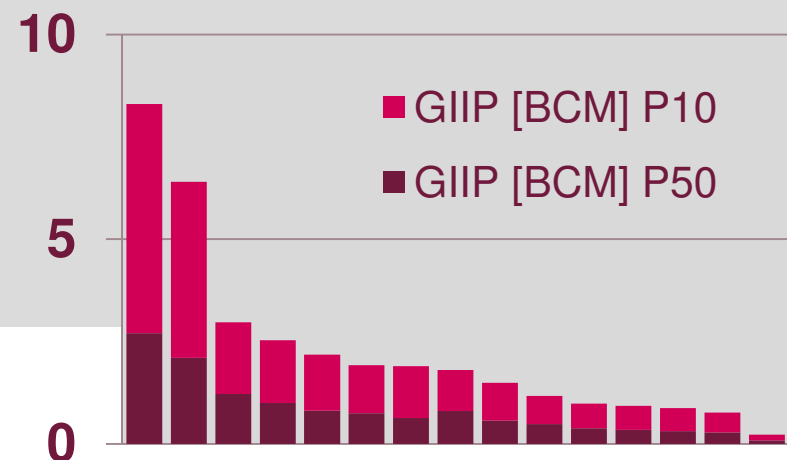
4. Shallow Gas Inventory EBN Size of the Prize



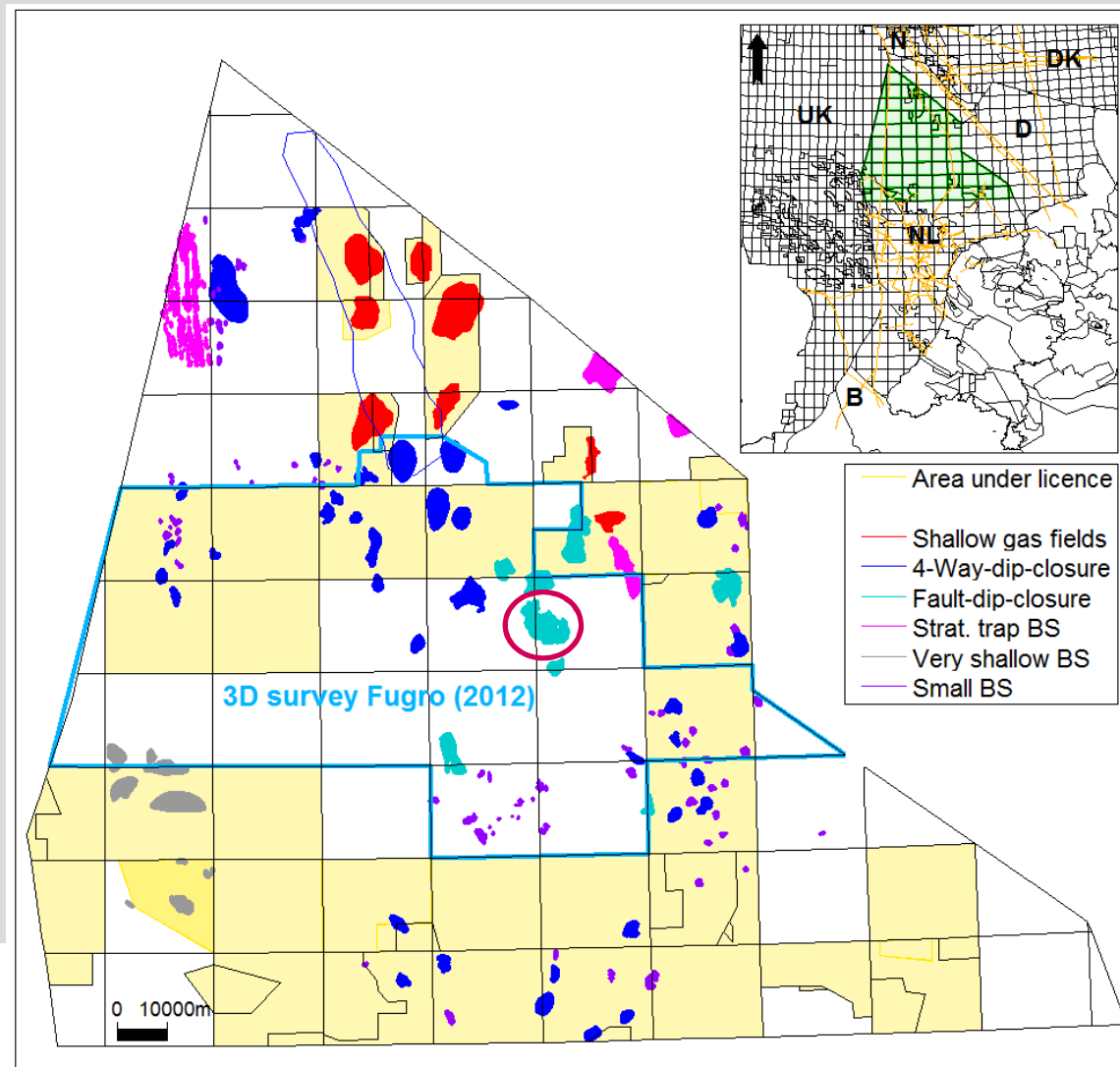
15 leads analysed in detail:

- Total GIIP P50-P10: 12 – 22 bcm*
- Several large leads to be analysed

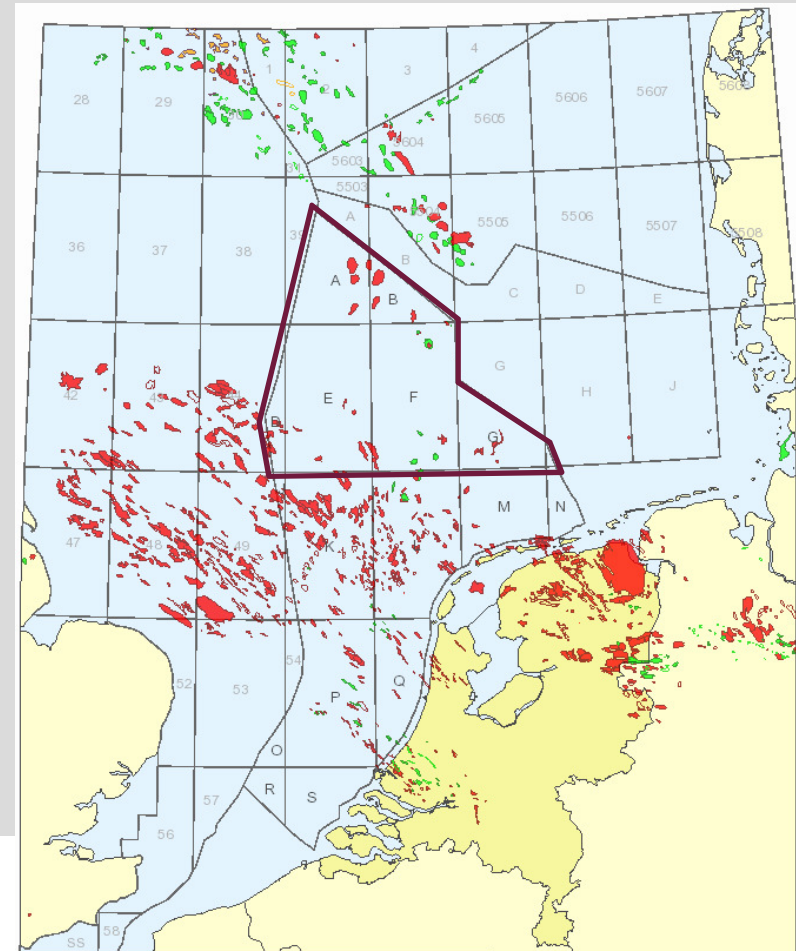
*1 bcm (Nm) \approx 37.3 bcf



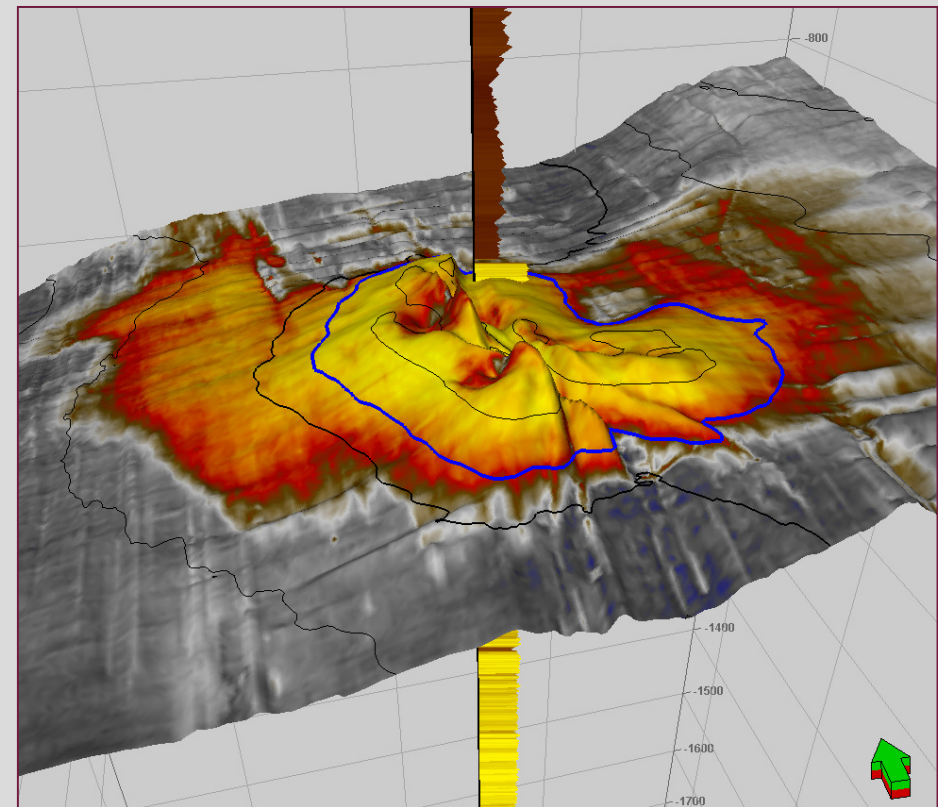
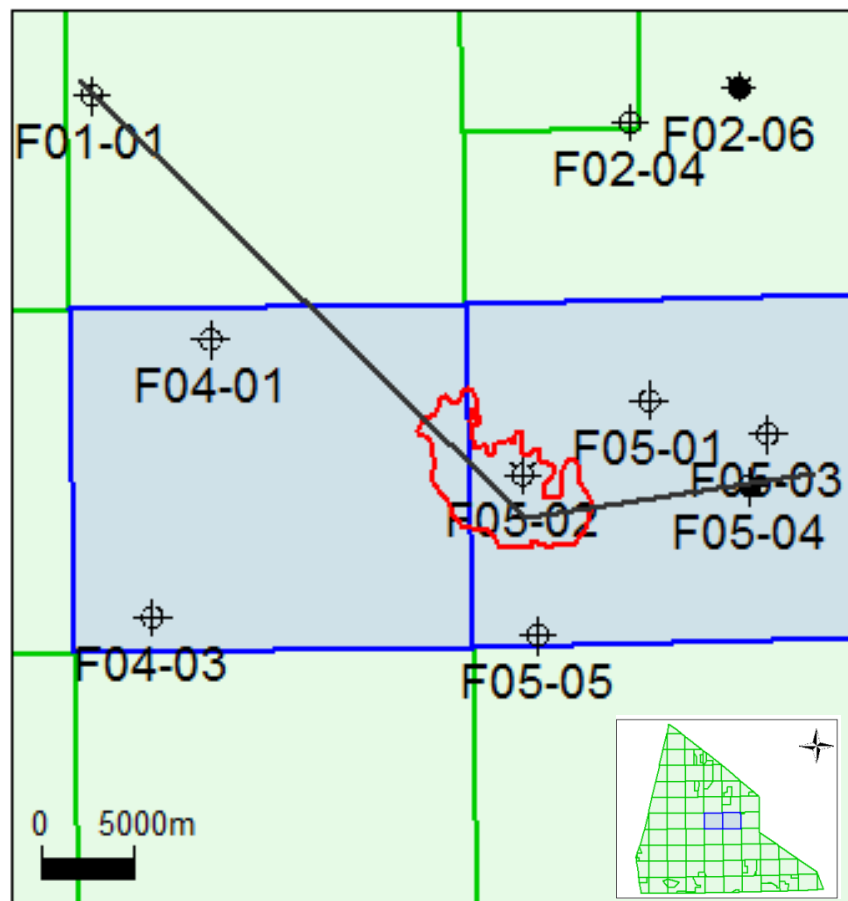
4. Shallow Gas Inventory EBN Bright Spot Classification



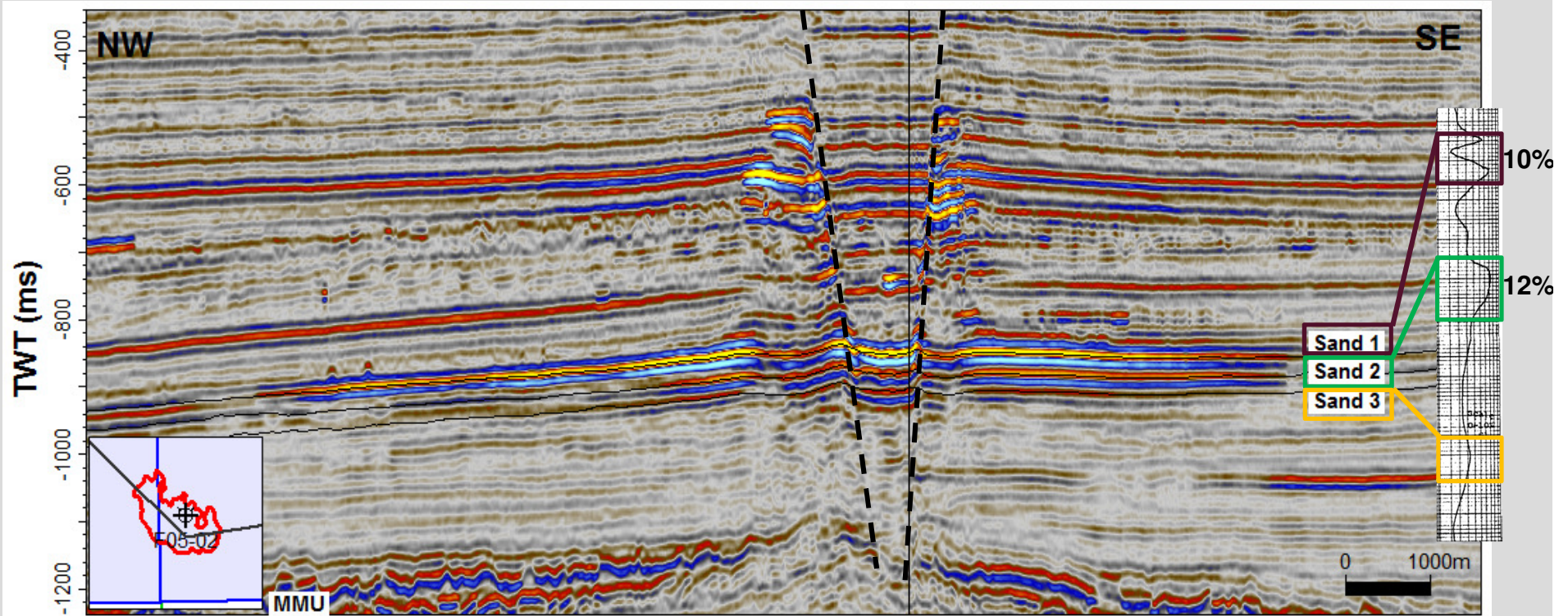
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5. Case Study 1: F04/F05-P1 (Open Acreage)



5. Case Study 1: F04/F05-P1 (Open Acreage)

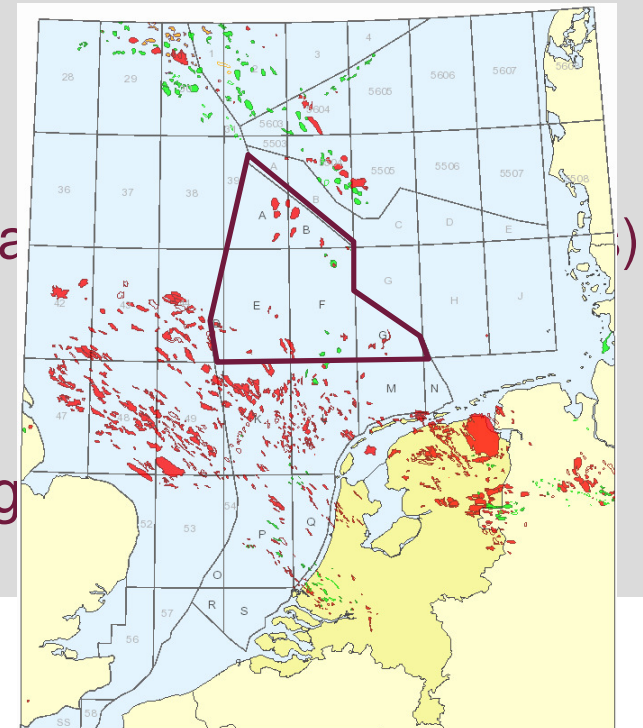


Zone	GIIP (BCM)		
	P90	P50	P10
Sand 1	0.4	1.0	2.0
Sand 2	0.4	0.8	1.6
Sand 3	0.4	0.9	2.0
Total	1.2	2.7	5.6

1 bcm (Nm) \approx 37.3 bcf

Shallow Gas Play in The Netherlands Takes Off

- Northern offshore NL: SG in Cenozoic unconsolidated sediments (Eridanos Delta)
- Extensive occurrences of SG known from seismic & wells
- Why explore for SG now?
 1. 3 Successfully producing fields (sand me...
 2. Area largely covered by 3D seismic
 3. Significant shallow gas potential (18 – 62 ...)
 4. Marginal field tax incentive applicable & g...





6. Summary (2/2)

Shallow Gas Play in The Netherlands Takes Off

Shallow Gas Inventory EBN

- Bright Spot Classification
- 152 leads in northern offshore NL
- 48 attractive leads (14 open acreage)

Case study (open acreage)

- F04/F05-P1: 2.7 – 5.6 bcm GIIP (P50-P10)
-
- Remaining challenge: find cost efficient solutions due to
 - Relatively small leads
 - Distance to infrastructure



Acknowledgements

- TNO, Chevron, Dana, ONE, Total
- EBN B.V., in particular:
 - Berend Scheffers
 - Eveline Rosendaal

See you in booth 10!