Lower Carboniferous clastics

A virtually untested play

- The Lower Carboniferous clastics play is established in the SNS, with fields producing from Namurian reservoirs and the Breagh field development that will produce from Visean clastics
- From well reviews we conclude that the play is virtual ly untested in the Dutch northern offshore, see fig. 1.
- EBN's regional play fairway analysis indicates the presence of traps, source and reservoir rocks in large parts of the study area
- 20 structures have been defined on the Base Permian Unconformity (BPU) depth map. These are all 4-way or fault dip closures. Screening P50 GIIP's sum up to ~75 BCM (unrisked).

	Well	Charge	Reservoir	Seal	Trap	Conclusion
Namurian reservoir	A11-01	Weak gas shows	Present	Present	Absent	Invalid
	A14-01	Gas shows	Present	Doub@ul (Epen Fm)	Absent	Invalid
	A15-01	Gas in ZE 2) (1	Inconclusive	Lwr. Rotl. volc.	Present	NegaOve
	B17-04	Mature source in well	Tight but large depth (4600m)	Present	Absent	Invalid
	E06-01	No shows	17 m, l Yoredale	Present	Doub@ul (3D)	Invalid
	E09-01	Present (85% N	Inconclusive	Present	Inconclusive	Invalid
	E12-02	Gas shows	Probable	Present	Absent	Invalid
	E12-03	Present (33% N	Present	Present	Present	PosiOve
	E12-04	Present (65% N	Present	Present	Present	PosiOve
Visean reservoir	A14-01	Gas shows	Present	Doub@ul (Epen Fm)	Absent	Invalid
	A16-01	No shows	Present	Present,	Probable (2D)	NegaOve/ invalid
	B10-01	No shows	Present	Present	Absent	Invalid
	E02-01	Doub@ul shows	Present	Doub@ul (CK)	Absent	Invalid
	E02-02	No shows	Present	Present (thin)	Absent	Invalid
	E06-01	No shows	Present	Present	Doub@ul (3D)	Invalid

Fig 1. Well review results

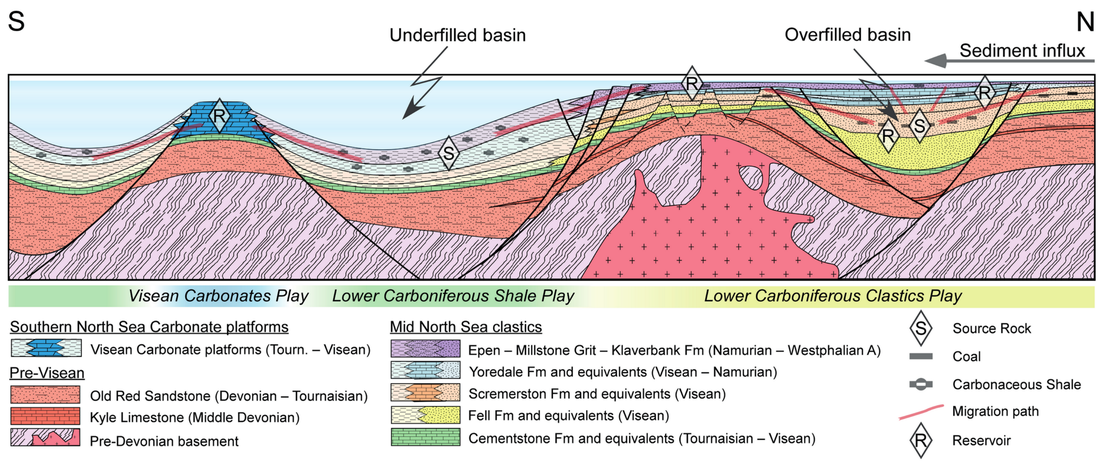


Fig. 2. Diagram illustrating concepts for the play elements of the Lower Carboniferous plays

Reservoir

- Visean and Namurian reservoir rocks are present throughout the study area
- Abundance and thickness of reservoir-quality sands increase from Breagh towards the northeast, see fig. 4, and favourable reservoir properties are not limited to a zone <200 m below the BPU

Seal

- Numerous 4-way closures at BPU level, below proven seals: Silverpit shales and Zechstein salt
- Fault dip closures are dependent on fault seal
- Presence of intra Lower Carboniferous seal(s) would provide large upside

Source & charge

- Lower Carboniferous Scremerston coals are the most promising source rocks in the northern part of the study area
- In the southern part charge may occur from Lower Carboniferous basinal shales and laterally from Upper Carboniferous Westphalian coals.
- See adjacent poster *Source rock potential*

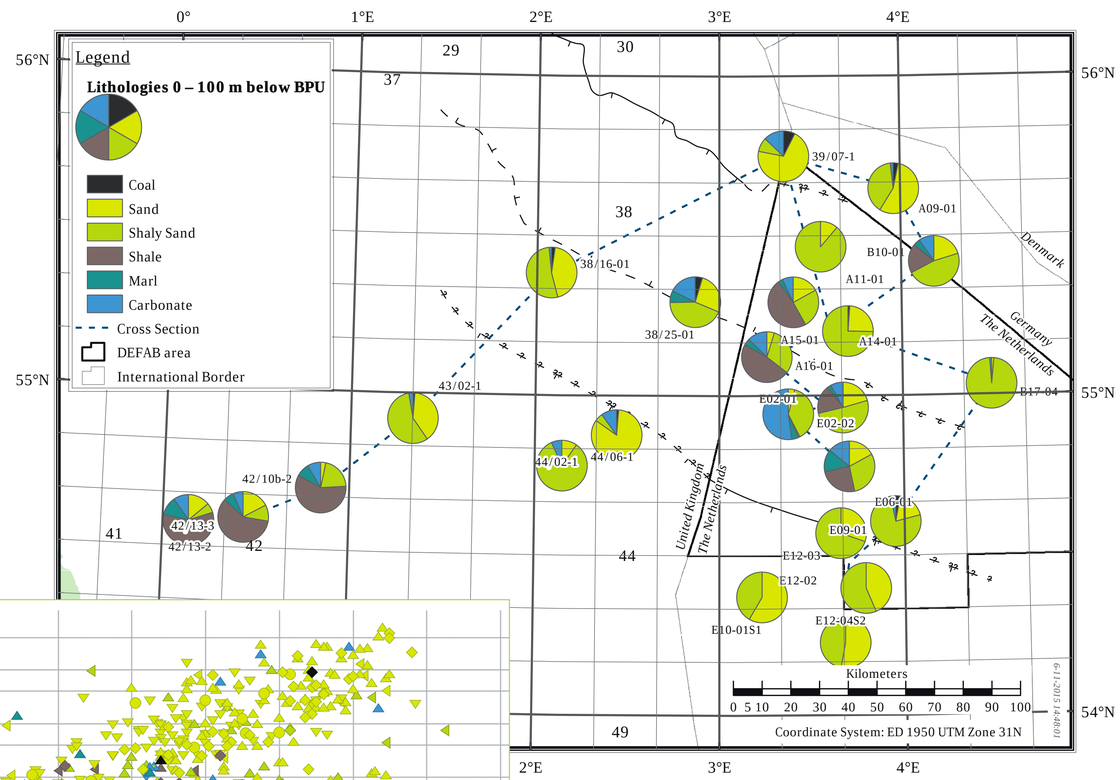


Fig. 3. Porosity and permeability measurements from core plugs for the Lower Carboniferous. Wells used: 42/13-2, 43/02-1 (UK), A14-01, A16-01, E02-01, E06-01, E12-02, E12-03, E12-04-S2 (NL), B10-01 (DE).

Fig. 4. Lithological characteristics of Lower Carboniferous below BPU

Structures and leads

- 20 structures have been identified with a total P50 GIIP of ~75 BCM (unrisked). A subset of these struc tures is indicated on the BPU depth map in fig. 6. One example of a lead is shown in fig. 7
- These structures will be evaluated in more detail, fi nal prospects could be part of multi-target exploration with prospects at various levels
- The presence of intra Lower Carboniferous seal(s) would provide large upside since many additional strqctural closures would become prospective, see op Yoredale map below and the adjacent poster *Structural framework*

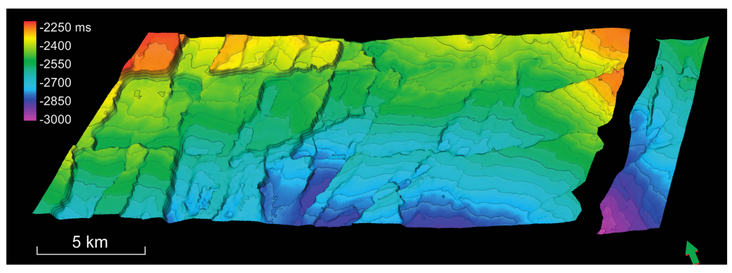
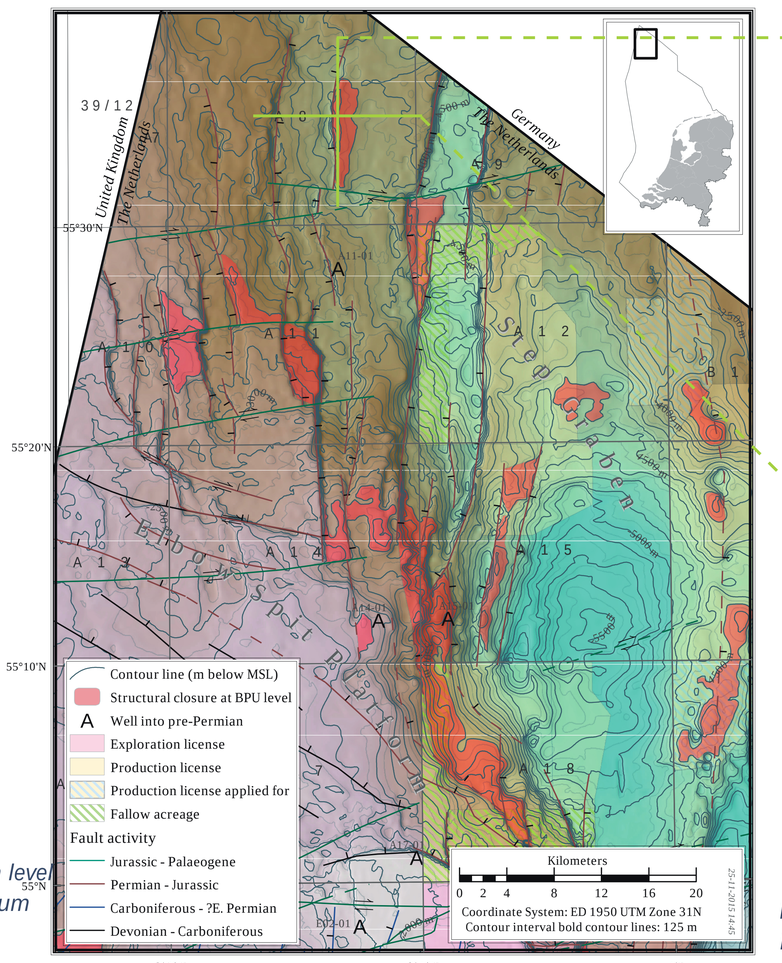


Fig. 5. Top Yoredale TWT map (ms) – illustrating structures at Yoredale Fm level in the E-blocks. Mapping on 3D DEF survey - seismic data courtesy Spectrum ASA.



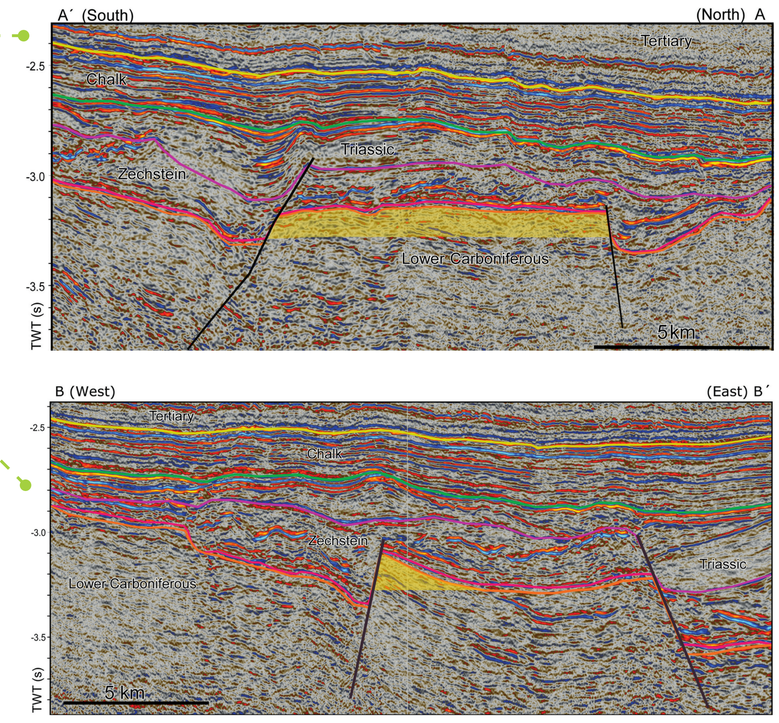


Fig. 7. N-S (above) and W-E (below) seismic sections through lead Kiliman jaro (public 3D seismic data)

Fig. 6. BPU depth map with closures indicated

Lead	*Kilimanjaro*
Reservoir	*Namurian & Visean clastics*
Seal	*Silverpit shales & Zechstein salt*
Source	*Scremerston coals*

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