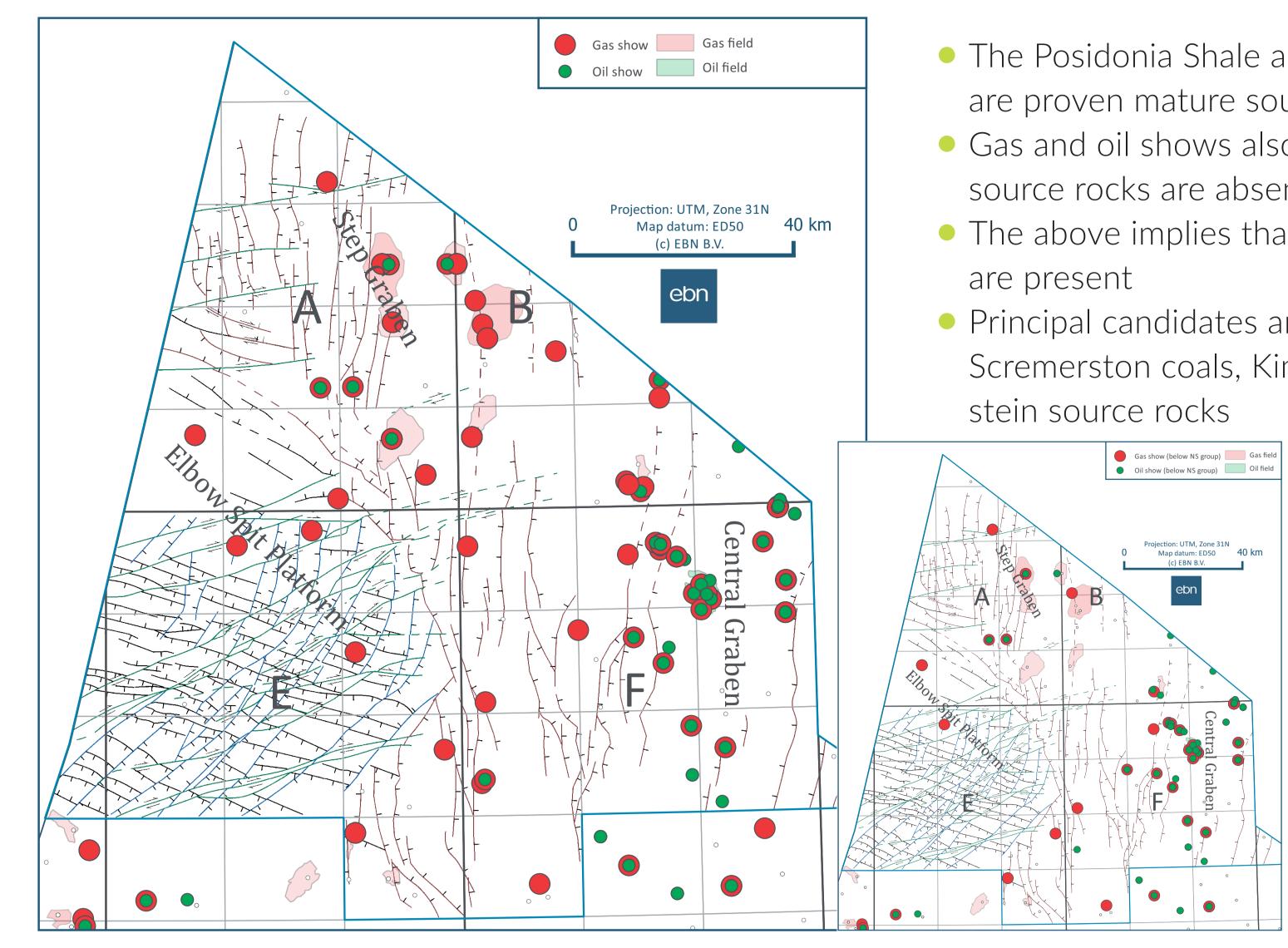
Source rock potential of the Dutch northern offshore



- The Posidonia Shale and Westphalian coal measures are proven mature source rocks
- Gas and oil shows also occur in areas where these source rocks are absent (fig. 1)
- The above implies that additional mature source rocks
- Principal candidates are Lower Carboniferous Scremerston coals, Kimmeridge Clay and intra-Zech-

Shallow gas can be sourced from biogenic and thermogenic sources. Shallow amplitude anomalies occur throughout the Step Graben and Central Graben (fig. 2)

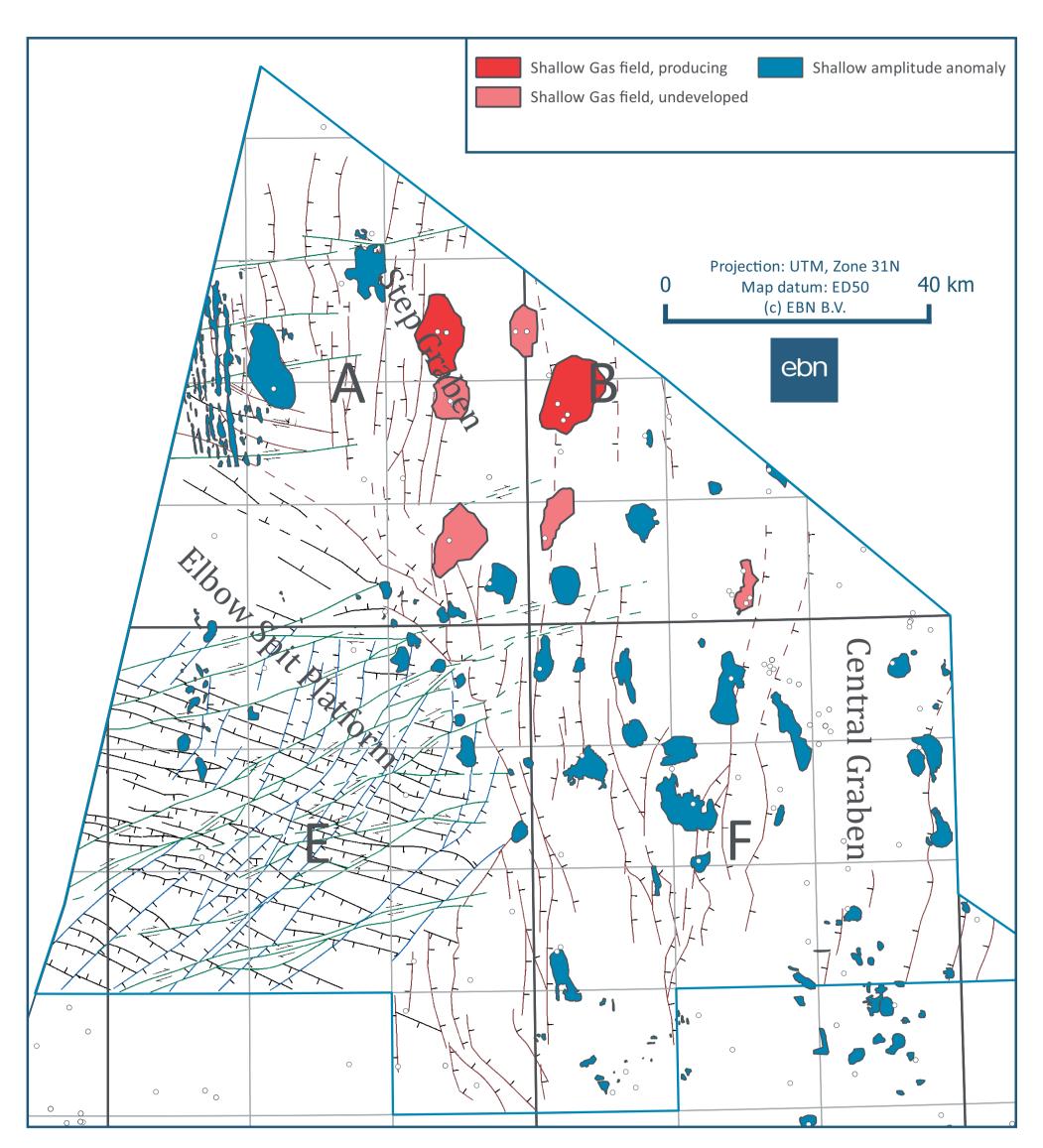


Fig. 2 Shallow gas fields and shallow seismic anomalies.

Presence of source rock bearing units

Fig. 1 Gas and oil shows. Inset: shows in the pre-Tertiary.

- Oil shows in the A quadrant may be linked to early mature Upper Jurassic 'hot shale', similar to Jurassic source rocks in the Danish and German offshore
- Gas and oil shows indicate that intra-Zechstein source rocks are present and mature in the Step Graben
- Namurian shales may provide additional charge in the southern E and F blocks
- Westphalian coal measures provide gas to Rotliegend and Carboniferous reservoirs

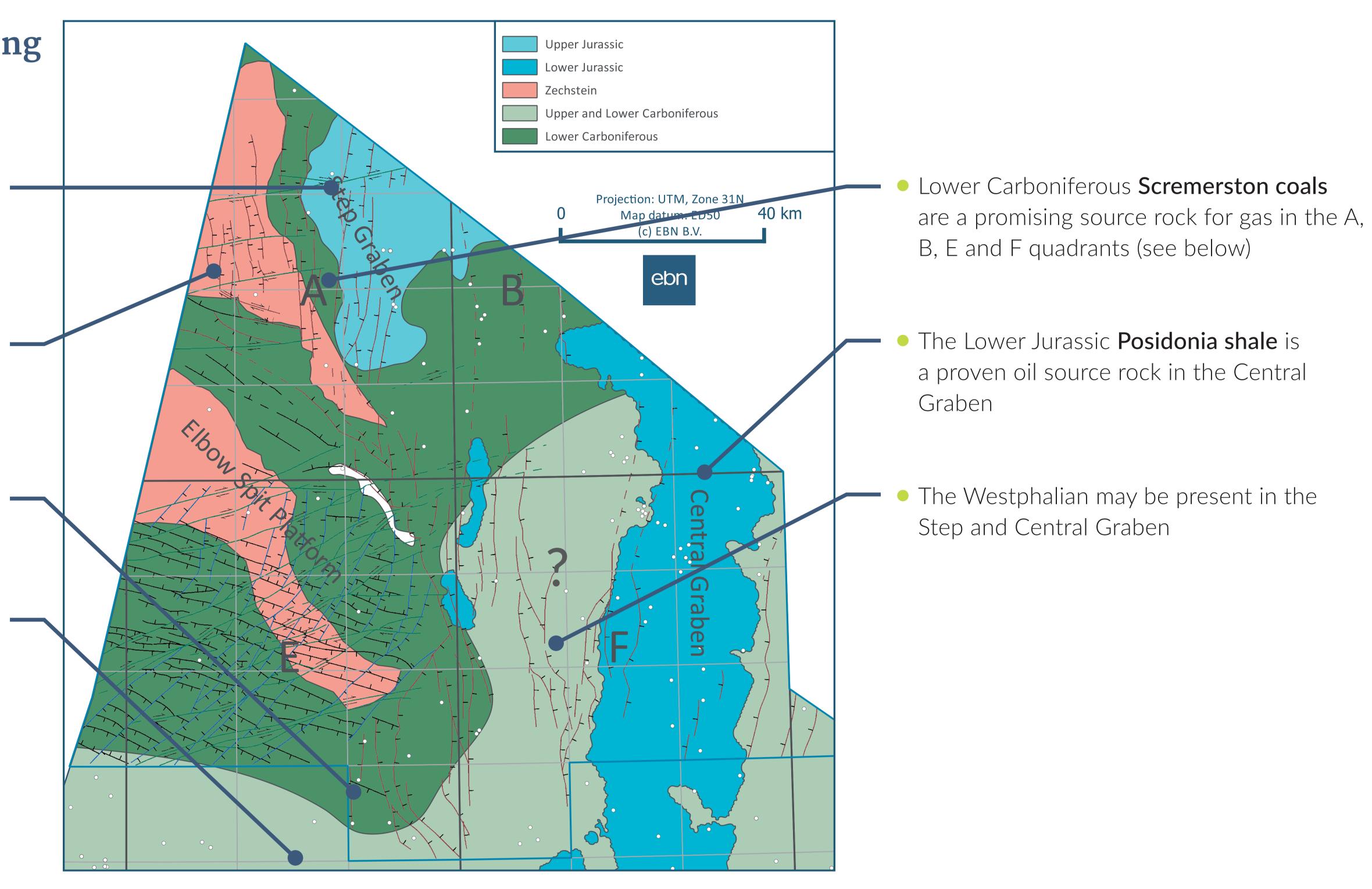


Fig. 3 Units with source rock potential. Where formations overlap only the shallowest formation is shown.

Scremerston coals: a 'new' source rock in the Dutch northern offshore

- Wells show increase in coal content in Scremerston Fm towards the N (fig. 4)
- 23 m coal in 39/07-1, 30 m in A09-01
- DEFAB area 42/10b-2 (339 m)
- Coals coincide with high contrast seismic facies in well 39/07-1
- High contrast seismic facies also present in A
- Fig. 4 Lithologies in the Lower Asbian (rough-
- Fig. 5 High contrast seismic -3.0 facies in the Elbow Fm. (partial equivalent of the Scremerston Fm.). The projected position of well A09-01 (30 m coal) is shown. Public seismic

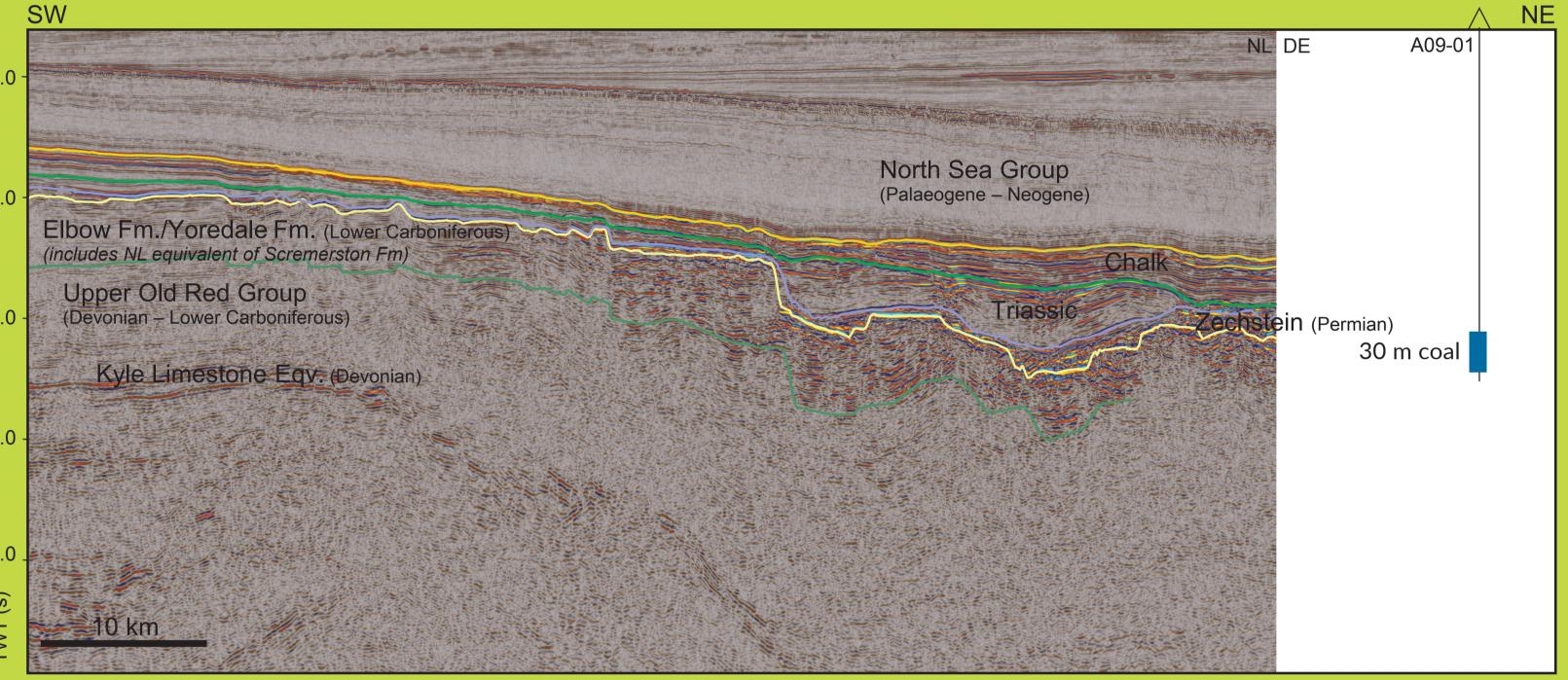
line NSR32294, available

through http://www.nlog.nl/.

ly equivalent with the

Scremerston Formation)

- quadrant (fig. 5)
- Yoredale Fm and Klaverbank Fm (Lower Carboniferous) also contain coal: up to 7.5 m encountered in wells



For questions contact exploration@ebn.nl

