

## **Overview of Petroleum Provinces in the Southern Permian Basin**

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The Southern Permian Basin is Europe's largest sedimentary basin. It is a typical intracontinental basin that evolved from latest Carboniferous to recent times and extends from eastern England to the Belarussian-Polish border and from Denmark to South Germany.

The Southern Permian Basin Atlas (SPBA) project is a joint project executed by Geological Surveys and is being supported by a wide range of E&P companies, government licensing authorities, universities and research institutes. The aim of the Atlas is to present an overview of the results of over 150 years of petroleum exploration and research in this basin area. As this gas and oil province continues to mature and with field sizes inevitably decreasing, more and more careful data integration and geoscientific effort is required to discover new reserves.

Six petroleum systems have been defined for the SPBA area, that are characterized by a unique source rock type and age. In addition, petroleum provinces have been delineated, that host one or more petroleum systems. By combining the source rock maps with tectonic elements and the presence of known oil or gas accumulations, a total of 12 petroleum provinces have been defined, related to Paleozoic and to Mesozoic source rocks. More than 1300 hydrocarbon fields have been discovered so far in the SPBA area and each field has been linked to one of these petroleum provinces.

The two major petroleum systems of the Southern Permian Basin are sourced by the gas-prone Westphalian (upper Carboniferous) coal measures and the oil-prone Posidonia Shale (lower Jurassic). They account for the bulk of the exploited petroleum. Other petroleum systems are less productive and restricted to a few play regions, but they still provide a significant economic benefit.

Their enormous thickness, wide distribution, and favourable burial history have made the Westphalian coal measures the principal source rocks of the SPBA area. Superposition of this huge hydrocarbon source by a variety of reservoir facies and top seals resulted in a great number of economically viable plays.

The Posidonia petroleum system is sourced from oil-prone marine shales deposited in a restricted marginal sea at high sea level. In the western SPBA area, the Posidonia has reached the oil/gas window and is an excellent source rock.

Besides the widely explored petroleum systems, there is an unfathomed potential from shallow gas, especially in the North Sea.