



# EXPLORATION



Danish Energy  
Agency

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## EXPLORATION

The Danish part of the North Sea must be considered a mature area. Nevertheless, there are still interesting new exploration prospects and existing exploration targets that remain to be intensively explored.

The award of 16 new licences in the 7th Licensing Round in 2016 means that extensive exploration activity can be expected in and around the Central Graben in the years to come. In 2016 the DEA received one application for an area in another part of Denmark, which signals that interest in exploration continues outside the traditional North Sea areas. The drilling of the first onshore exploration well for shale gas, Vendsyssel-1 in North Jutland in 2015, was another manifestation of this interest.

### 7TH LICENSING ROUND

Danish and international oil companies showed keen interest in applying for licences in the 7th Licensing Round, and when the time limit for submitting applications expired, the DEA had received 25 applications for new licences.

On 6 April 2016, after assessing the applications and holding discussions with the applicants, the Minister for Energy, Utilities and Climate awarded 16 new licences for oil and gas exploration and production. The 16 new licences cover areas totalling 4,064 km<sup>2</sup>, the equivalent of about one-fourth of the area offered for licensing (16,869 km<sup>2</sup>). The location of the licence areas is shown on maps at the back of the section.

Overall, the work programmes comprise two firm wells and up to 24 conditional wells, and also include obligations to conduct geophysical and geological surveys. Generally, the work programmes are more limited in scope than in previous licensing rounds, a trend also seen in several other North Sea countries. The DEA anticipates that exploration activities under the 16 new licences over the next six years will represent a total cost of about DKK 800 million.

In the 7th Licensing Round, licences were granted to several oil companies not previously holding licences in Denmark. At the same time, the companies DEA Deutsche Erdoel AG, Edison International S.P.A., Hansa Hydrocarbons and Ardent Oil were approved as operators for some of the new licences. These companies have not previously held operatorships in Denmark.

### SHALE GAS

In 2015 Total and Nordsøfonden drilled an exploration well to a depth of 3.6 km, Vendsyssel-1 at Dybvad in Vendsyssel. The exploration well target was shale gas. The well confirmed the presence of gas in the shale, but also demonstrated that the shale was not as thick as expected.

The companies chose to relinquish licence 1/10 in North Jutland on 5 June 2016, as – on the basis of subsequent well data analyses – they confirmed the shale play, but the productivity was too low to result in an economically viable project at present.

In 2012 a temporary halt was placed on issuing new onshore licences with shale gas as the exploration target. The suspension was introduced to investigate the possibilities of promoting safe and environmentally sound production of shale gas. Before new licences can be granted where the exploration target is shale gas, an evaluation must be performed amongst others on the basis of experience gained from the Vendsyssel-1 well in North Jutland.

In mid-2016 the Ministry of Energy, Utilities and Climate embarked on the first part of the evaluation of shale gas in Denmark, expected to be completed around the turn of the year 2016/17. It will subsequently be decided whether additional issues should be subject to a full evaluation. A time schedule for a potential full evaluation will be drawn up once the outcome of the initial part of the evaluation is available.

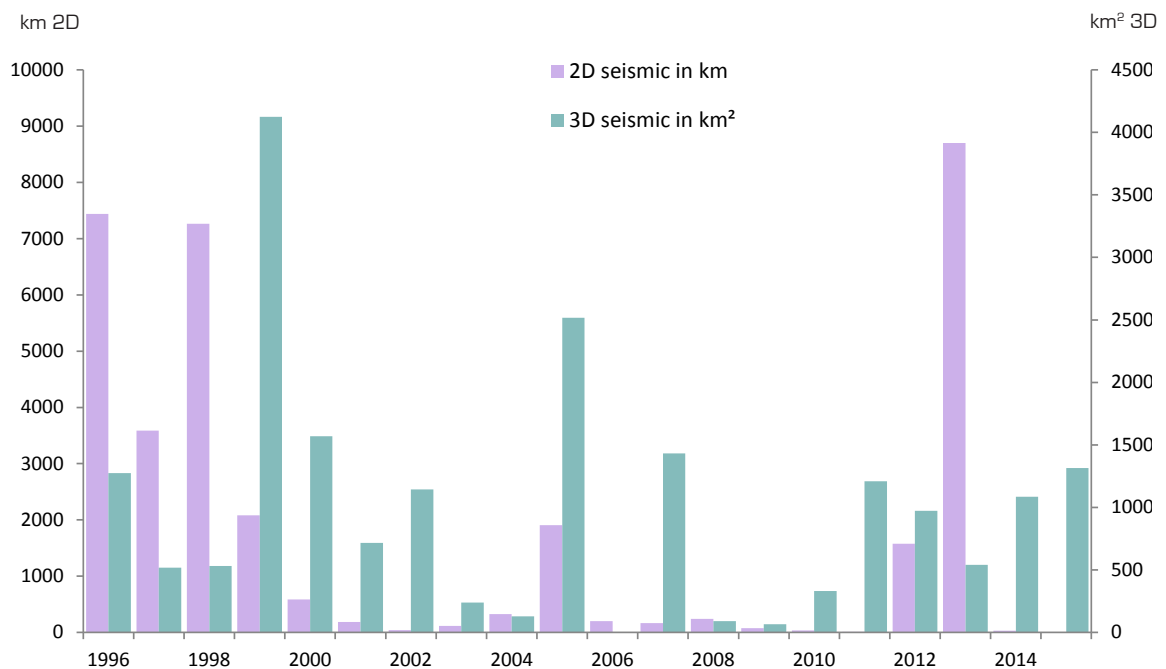


## EXPLORATORY SURVEYS

Oil companies depend on seismic data to identify the prospects of making new oil and gas discoveries. In 2015 four exploratory surveys were performed in the western part of the North Sea. The level of activity was somewhat lower than in 2013 and 2014, when more major 2D and 3D seismic surveys were carried out in the North Sea as part of the run-up to the 7th Licensing Round; see table 1 and figure 1.

**Table1.** Exploratory surveys in 2015

SURVEY LICENCE	OPERATOR CONTRACTOR	ON-/OFFSHORE TYPE	INITIATED COMPLETED	AREA	ACQUIRED
ORG SURVEY § 3	Ithaca Petroleum Norge AS and Concedo ASA ORG Geophysical	Offshore Electromagnetic survey	29-06-2015 31-06-2015	North Sea	35 km
DG 15001 § 3	DONG E&P NORGE A/S DCGG Services SA	Offshore 3D seismics	12-07-2015 08-08-2015	North Sea	73 km <sup>2</sup>
PGS15015 FASE 1 § 3	PGS Geophysical AS PGS Geophysical AS	Offshore 3D seismics	22-09-2015 30-10-2015	North Sea	1,241 km <sup>2</sup>
GEOCHEMICAL SURVEY 5/06 § 3	Wintershall Fugro Survey BV	Offshore Seabed samples, geochemical	27-09-2015 30-09-2015	North Sea	80 samples



**Figure 1.** Seismic data acquired 1996 - 2015

## EXPLORATION AND APPRAISAL WELLS

Four exploration and appraisal wells were drilled in 2015 – three in the western part of the North Sea and one onshore in North Jutland. Two of the exploration wells resulted in two new discoveries, and two appraisal wells confirmed previous discoveries; see table 2 and figure 2.

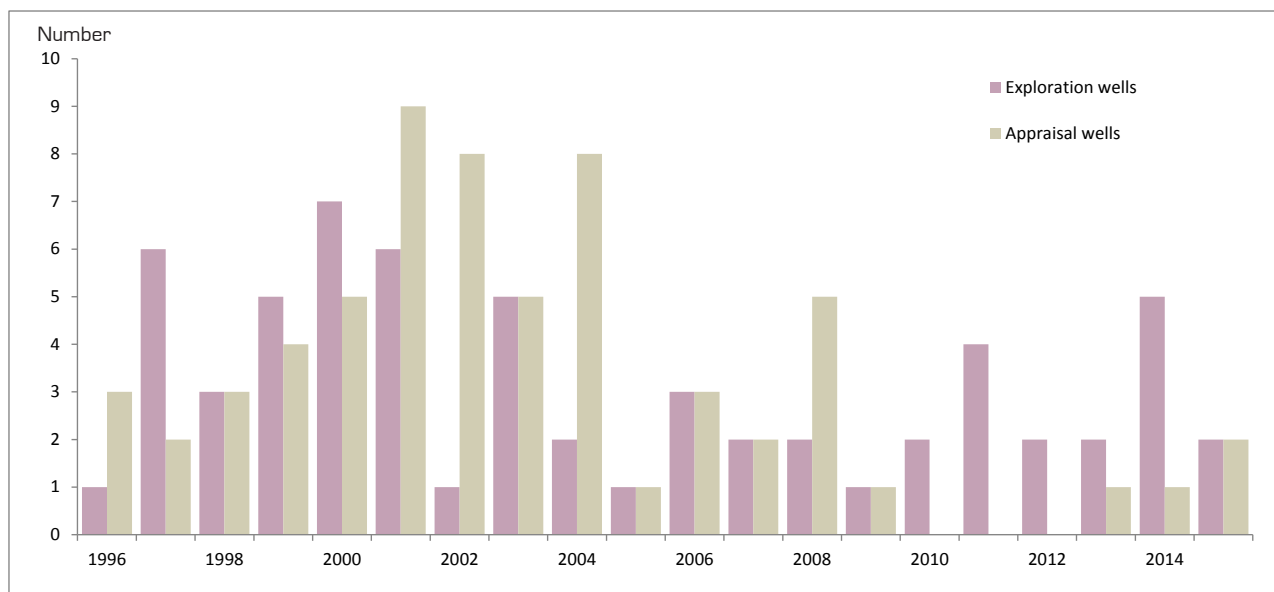
The Vendsyssel-1 exploration well encountered gas in alum shale in North Jutland.

The Xana-1 exploration well demonstrated the presence of hydrocarbons in Upper Jurassic sandstone under licence 9/95 and is now being evaluated. The two appraisal wells in the North Sea, Lille John-2 and Jude-1, confirmed the presence of hydrocarbons in the Lille John accumulation and Bo South, respectively.

The results from the Jude-1 well is now being closely evaluated, while the Lille John accumulation has been declared commercial.

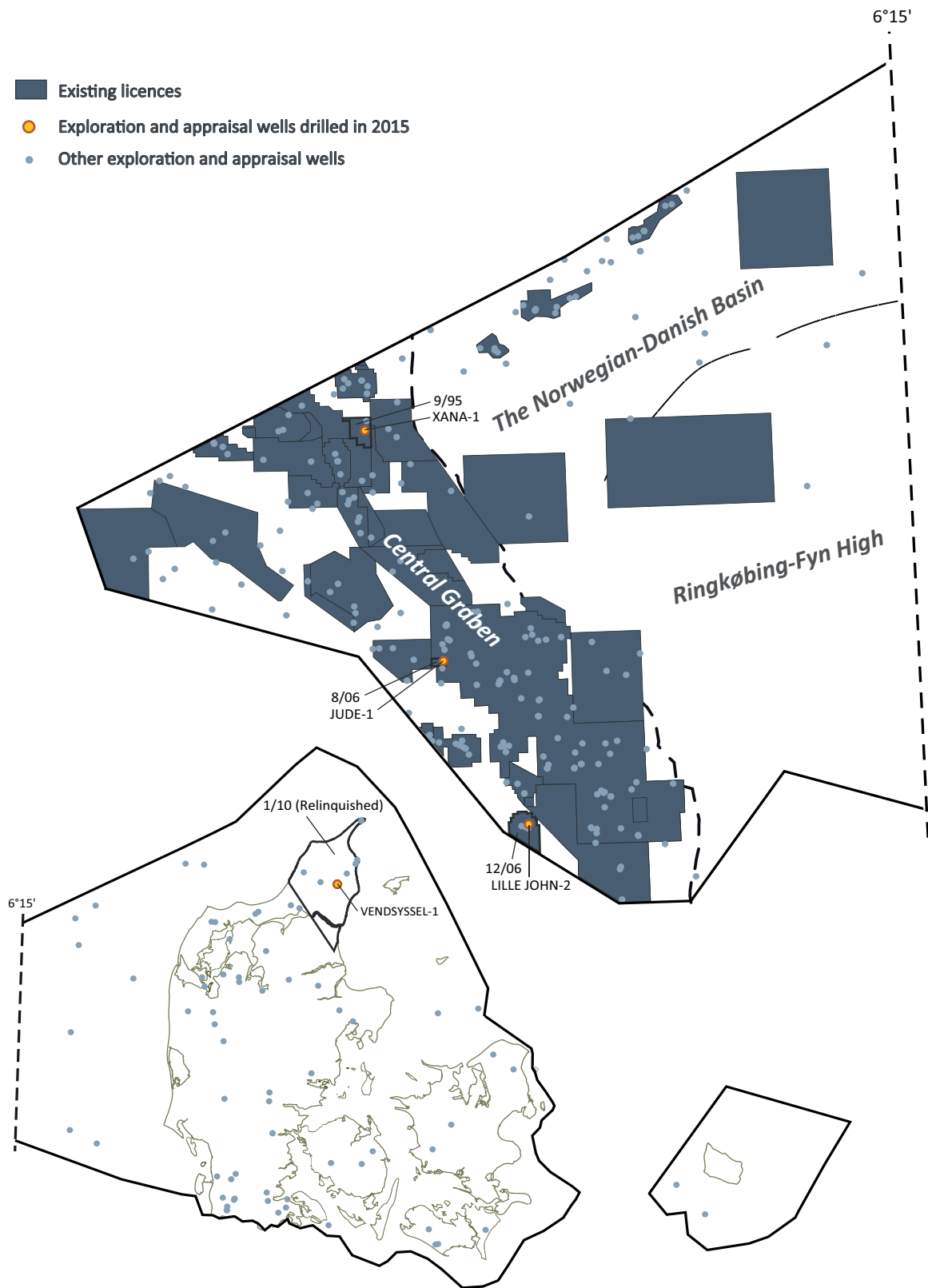
**Table 2.** Exploration and appraisal wells in 2015

WELL NUMBER	PURPOSE	LICENCE	OPERATOR	INITIATED COMPLETED	ON-/OFFSHORE AREA	DRILLING RESULT
Xana-1X 5604/26-07	Exploration	9/95	Mærsk Olie og Gas A/S	08-12-2014 25-05-2015	Offshore The Central Graben	Hydrocarbons in Upper Jurassic sandstone
Lille John-2 5504/20-06	Appraisal	12/06	Dana Petroleum B.V.	13-12-2014 13-02-2015	Offshore The Central Graben	Oil in Miocene sandstone
Vendsyssel-1 5710/22-02	Exploration	1/10	TOTAL E&P Denmark B.V.	04-05-2015 02-09-2015	Onshore North Jutland	Gas in Alum shale
Jude-1 5504/07-18	Appraisal	8/06 area B	Mærsk Olie og Gas A/S	02-06-2015 21-08-2015	Offshore The Central Graben	Oil in Lower Cretaceous



**Figure 2.** Exploration and appraisal wells drilled from 1992 - 2014

Figure 3. Exploration and appraisal wells i 2015.





# EXPLORATION WELLS AND DISCOVERIES - OPEN DOOR AREA

