



PL 834 - Licence status report

Summary

The PL834 license is located to the northwest of the Draugen field and northeast of the Hyme and Bauge fields and was previously a part of the former PL348 license. The Ginny prospect is the driving prospect within the license. The Ginny prospect is of upper Jurassic age, and a well would therefore be planned to test the upper Jurassic play in the Bremstein Fault Complex area. Upper Jurassic reservoir with hydrocarbons are proven in offset wells. These wells were drilled targeting lower and middle Jurassic prospects, and hence not in favourable locations for upper Jurassic sand deposition. The Ginny prospect is currently considered the best prospect to test the upper Jurassic play in this area. The prospect is most likely an oil prospect based on AVO analysis and similarities to seismic responses seen on the Draugen Field. The Ginny prospect is located directly up dip of a proven kitchen area, and Ginny sits in a likely migration route from the source kitchen area to the Hasselmus and Draugen gas and oil discoveries located up-flank to the Ginny prospect.

The Ginny prospect was put forward as basis for a drill decision within the PL834 license. The Operator did not get support from the partners, and according to the voting rules, the license had to be dropped. Moving forward, the Operator will consider re-applying the area around the Ginny prospect in APA 2019 with a firm well.

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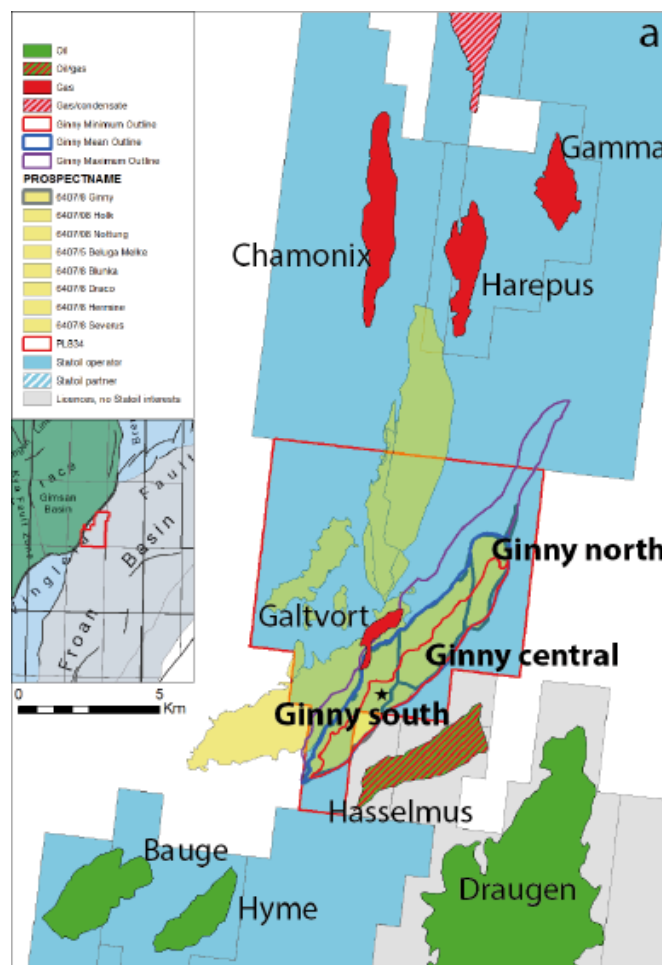


Figure 1: Area map with PL834 license outlined in red, Bauge, Hyme, Draugen fields, Ginny prospect and surrounding discoveries.

1 Licence history

<u>Licence:</u>	PL834	
<u>Awarded:</u>	05.02.2016 (APA2015)	
<u>Licence period:</u>	Expires 05.02.2022 Initial period: 6 years	
<u>Licence group:</u>	Equinor Energy AS	40% (Operator)
	Vår Energi AS	30%
	Neptune Energy Norge AS	30%
<u>Licence area:</u>	87.954 km ²	
<u>Work programme:</u>	Technical G&G work	- Fulfilled
	Purchase 3D seismic	- Fulfilled
	Consider CSEM feasibility study and acquisition	- Fulfilled
	Initial Drill or Drop by 05.02.2017	- Applied for one year extension
	Extended Drill or Drop by 05.02.2018	- Applied for one year extension
	Extended Drill or Drop by 05.02.2019	- Decision made to drop the license
<u>Meetings held:</u>		
04.05.2016	EC/MC meeting #1	
13.06.2016	EC work meeting #1	
23.11.2016	EC/MC meeting #2	
09.05.2017	EC work meeting #2	
23.08.2017	EC work meeting #3	
14.09.2017	EC work meeting #4	
30.10.2017	EC work meeting #5	
22.11.2017	EC/MC meeting #3	
08.05.2018	EC work meeting #6	
20.09.2018	EC work meeting #7	
28.11.2018	EC/MC meeting #4	
<u>Work performed:</u>		
2016:	License start-up. The license purchased 295 km ² of the PGS14005 3D broadband seismic survey covering the PL834 license area. The Ginny prospect was interpreted on the new dataset. The Ginny prospect was also considered as a potential field test for the ongoing development of Deep Blue Source CSEM technology – a joint project between Statoil, Shell and EMGS. The CSEM survey was acquired in 2016.	
2017:	Decision made to apply for a one year extension of the Drill or Drop decision, mainly due to finish work on the CSEM dataset. Seismic gather conditioning of the PGS14005 dataset. AVO and attribute analysis on new dataset. Updated Ginny prospect evaluation, including technical economical evaluation. Site survey acquired at the Ginny prospect.	

- 2018: Decision made to apply for a one year extension of the Drill or Drop decision, mainly due to update CSEM modelled results and integrate this with the updated AVO work on conditioned dataset.
Evaluation of additional prospectivity within the license.
- 2019: Decision made to drop the license.

Reason for surrender:

The Ginny prospect has been evaluated on good quality seismic and CSEM data. Being within an un-proven economical part of the upper Jurassic play, the prospect has higher risk than the traditional middle Jurassic play in the area. As such, the discovery probability is lower.

After a thorough evaluation of the total prospectivity within the PL834 license, the Ginny prospect was put forward as basis for a drill decision. The Operator did not get support from the partners, and according to the voting rules, the license had to be dropped. Moving forward, the Operator will consider reapplying the area around the Ginny prospect in APA 2019 with a firm well.

2 Database overviews

The PL834 license common database was approved after ECMC meeting #1. In December 2016, the common database was updated to include the recently acquired Ginny CSEM 3D survey.

2.1 Seismic data

The seismic data that was utilized in the PL834 technical evaluations are shown in Table 1.

Table 1: Seismic and CSEM data included in the PL834 common database

Survey	NPDID	TYPE	Quality
PGS14005 (parts, 295 km2)	8054	3D	Good
EMGS ROANFT_SL02_CSEM	16252	3D	Good

2.2 Well data

The well database utilized in the PL834 technical evaluations area shown in Table 2. Wells 6407/8-4A & 6407/8-4S (Galtvort) are within the license and used for well ties and fluid substitution modelling. Wells 6407/9-9T2 (Hasselmus) and 6407/8-7 (Bister) were also used for well ties. Wells 6407/5-2S and 6407/6-7S were used for evaluation of upper Jurassic analogues.

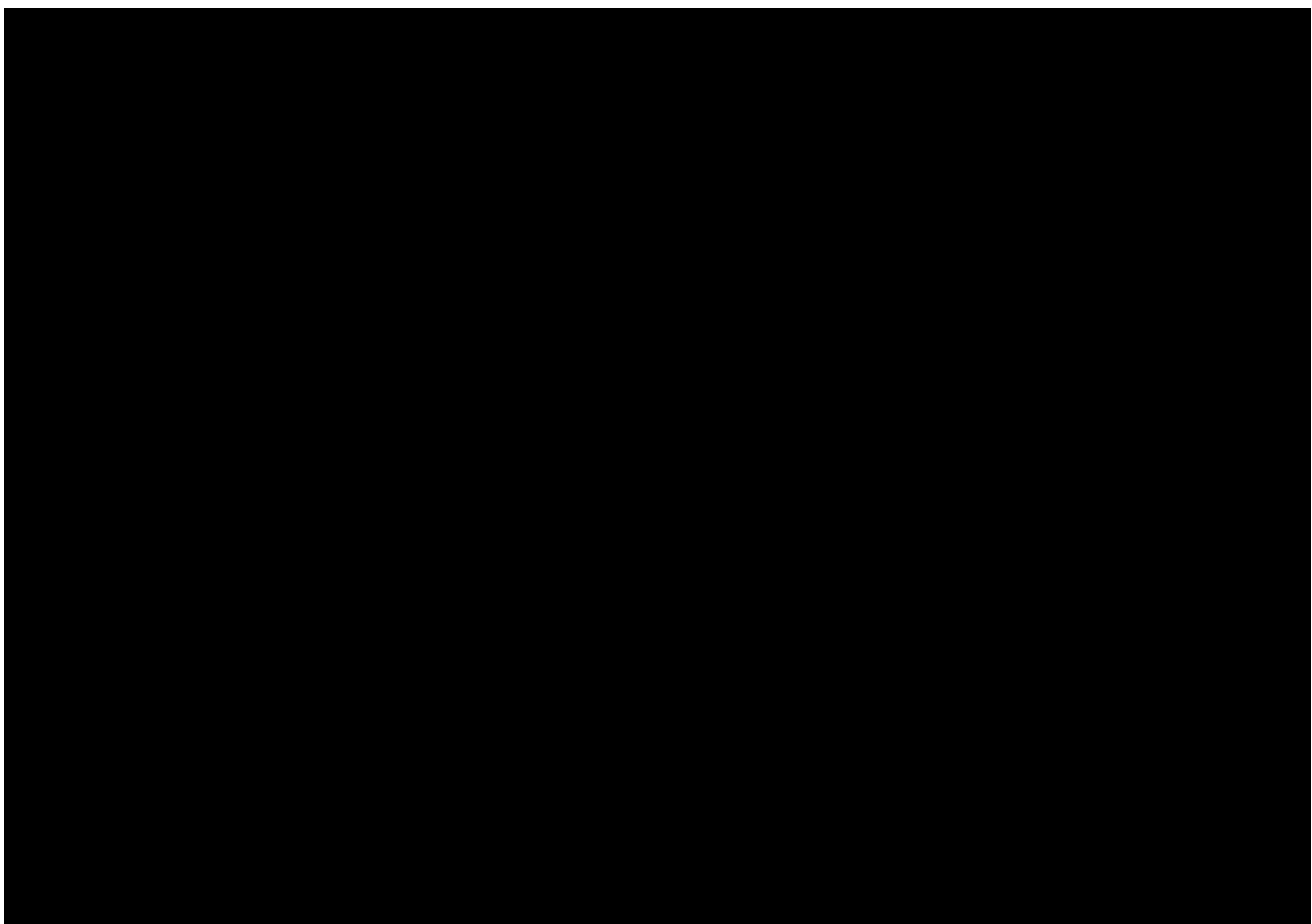
The well data that utilized in the PL834 technical evaluations are shown in Table 2.

Table 2: wells included in the PL834 common database

Well	NPDID	Well	NPDID
6407/5-2S	6648	6407/8-5S	6110
6407/6-6	5636	6407/8-6A	7266
6407/6-7S	5636	6407/8-6S	N/A

6407/8-1	1859	6407/8-7	7684
6407/8-4A	5814	6407/9-2	449
6407/8-4S	5813	6407/9-4	480
6407/8-5A	6153	6407/9-9T2	1990

3 Results of geological and geophysical studies



Seismic gather conditioning

The MC3D-PGS14005 seismic survey is to some degree contaminated by dipping and low frequent noise. In addition to that the gathers are not flat, which causes some problems in the AVO analysis. In order to provide a more appropriate data input to the AVO analysis gather conditioning were performed in the area around the main prospect in the PL834 license. The processing flow included linear and parabolic radon, RMO, additional gather flattening and bandwidth matching. The output data were used as input to the AVO analysis.

The main uplift of the process was seen on the near offset data, which were cleaned up quite well. De-noise in general improved the stability of the AVO attributes, however the low frequent noise seen as spikes in the low end of the spectrum were harder to attack and are probably remnant noise boosted by pre-migration processes. The conclusion from the conditioning work was that the PGS14005 data have limitations with

respect to the amplitude responses. A strong HC AVO effect i.e. gas in good reservoir conditions will likely be observable and identified, less strong AVO effects i.e. oil vs. Brine response will be less likely to be identified.

AVO and attribute analysis

A substantial work program was conducted with respect to AVO and attribute analysis. Gather conditioning were applied to the input data in order to make some use of the near angle information in PGS14005 and gather flattening in order to stabilize the Intercept/ Gradient attributes. Attributes generated in the AVO work included, bandwidth matched angle volumes, relative impedance cubes, trace integrated and colored inversion volumes, intercept & gradient, AVO volume, Shear impedance volume, various Chi/ EEI rotated volumes.

The conclusions of the AVO work conducted was that the main driving prospect Ginny have a good probability of upper Jurassic reservoir presence. This is analogue to the Draugen response, however it is likely that the Ginny upper Jurassic sands are of Melke age, similar to Harepus and Chamonix. The reservoir model is based on a heterogeneous upper Jurassic package where interbedded sand and shales are expected. It is also expected to have lateral variations of the N/G controlled by the subsidence and distance from the source. This will impact the expected HC response and given the observations in Ginny and Galtvort the conclusion is that a gas fill is less likely than an oil filled prospect. AVO fluid cube Indicate fluid fill in the Ginny prospect, however it is not confined consistently to a depth contour. This impacts the DFI of the prospect, although observations that are comparable to the Draugen field are seen.

Site survey

The Ginny prospect was included in a Statoil Site Survey campaign in the area acquired during 2017. ST17331 was focused to cover three potential different well locations for the Ginny prospect, Figure 2. The well locations reflect the Ginny segments, South, Central and North. In total, 454 line km of integrated data were acquired and 18 km of analogue data only. The locations evaluated were Ginny south, Ginny central and Ginny north.

Summary of the well locations:

- The Ginny south location has no apparent pock marks at the well location. The well location is within a seabed depression that has inprint of scour marks. Glacially derived scour marks in the seabed may hold shallow gas. There are no apparent reef build-ups. No seismic bright spots are observed in the overburden along the well path.
- The Ginny central location is within scour marks and has apparent pock marks just to the north of the well location. The well location is positioned borderline to a ridge in the seabed that shows inprints of scour marks. No apparent reef build-ups. No seismic bright spots are observed in the overburden along the well path.
- The Ginny north location does not show any apparent pock marks or scour marks at the well location. No apparent reef build-ups is observed either. No seismic bright spots are observed in the overburden along the well path.

ST17331 Ginny

<ul style="list-style-type: none"> • 442 km + 23 CPTs • Acquisition time: 06.08.17 – 20.08.17 <ul style="list-style-type: none"> - Operational Seismic 117:52 (35.2%) - Operation Geotechnical 28:02 (8.4%) - Standby (WOW) 133:21 (39.9%) - Transit 44:41 (13.4%) - Non-invoicable time 10:32 (3.1%) • No HSE to report, Estimated 5213 Synergi Hours. 								
<ul style="list-style-type: none"> • Acquisition Cost: <table border="0"> <tr> <td>Vessel Contractor</td> <td>GBP 360 069,30 (Estimated)</td> </tr> <tr> <td>FLO Services</td> <td>NOK 94 000 (Estimated)</td> </tr> <tr> <td>On-Board QC</td> <td>GBP 13 000 (Estimated)</td> </tr> <tr> <td>Reporting</td> <td>GBP 58 000 (Estimated)</td> </tr> </table> 	Vessel Contractor	GBP 360 069,30 (Estimated)	FLO Services	NOK 94 000 (Estimated)	On-Board QC	GBP 13 000 (Estimated)	Reporting	GBP 58 000 (Estimated)
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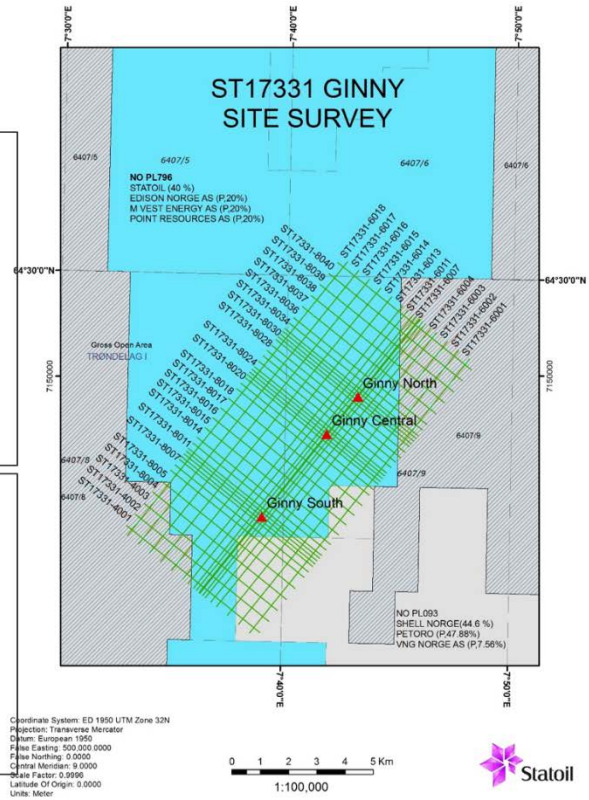


Figure 2: ST17331 Site Survey focused on three potential well locations. One well location identified for each of the three Ginny segments (South, Central, North).

4 Prospect update report

Ginny Prospect

The Ginny prospect is located in PL834, northwest of the Draugen field, northeast of the Hyme and Bauge fields and between the Galtvort and Hasselmus discoveries (Figure 1a). Ginny is currently evaluated as a most likely oil prospect based on AVO analysis and similarities to seismic responses seen on the Draugen Field. The Ginny prospect is located directly up dip of a proven kitchen area, and Ginny sits in a likely migration route from the source kitchen to the Hasselmus and Draugen gas and oil discoveries located upflank to the Ginny prospect. Ginny is a downfaulted combined structural-stratigraphic trap with reservoir in the Rogn Formation (Upper Jurassic). Water depth is 270m and reservoir burial depth is 2000m. The prospect consists of three laterally combined segments: (i) Ginny South, (ii) Ginny Central and (iii) Ginny North, Figure 3. The top seal consists of the Spekk Fm. (Upper Jurassic) and/or Cretaceous shales above the Base Cretaceous unconformity (BCU). The base seal consists of mudstones from the Spekk and/or Melke fms. (Upper Jurassic). The trap concept includes fault membrane seal against Lower and Middle Jurassic strata in the Hasselmus horst to the east and/or a stratigraphic pinch-out at the apex of Ginny Central. The main risk for the prospect is trap seal. The two faults that split the prospect into three segments seem to tip out before merging with the Galtvort fault (eastern boundary). Alternatively, these faults could extend further below seismic resolution. This fault architecture is the basis for the assumption that if a hydrocarbon column is filled to a depth below c.2050mTVD, all three segments will be communicating and sharing a common HCHW. The minimum volume (P100) in Ginny Central is based on a 125m HC column. The column has no significant steps in its distribution but tapers off exponentially toward increasing depths. A Ginny prospect map and volumetric spread are shown in Figure 4.

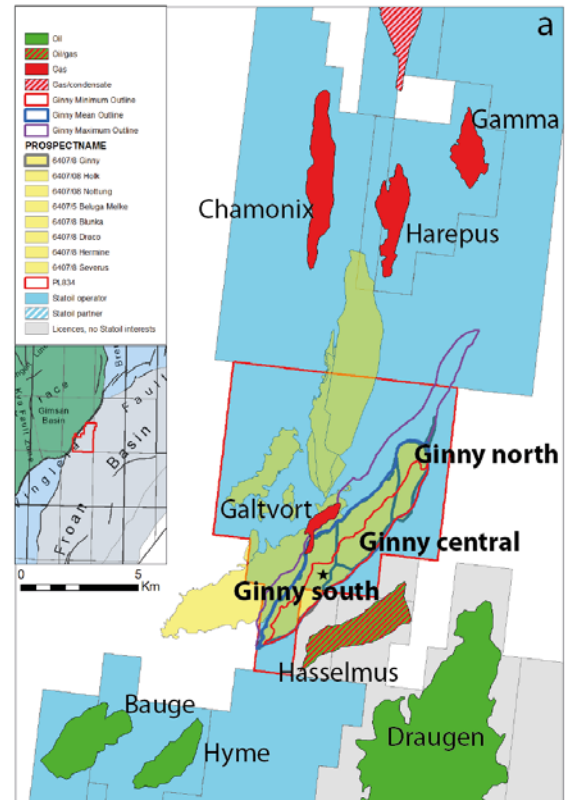


Figure 3: PL834 Ginny prospect segments

The two faults that split the prospect into three segments seem to tip out before merging with the Galtvort fault (eastern boundary). Alternatively, these faults could extend further below seismic resolution. This fault architecture is the basis for the assumption that if a hydrocarbon column is filled to a depth below c.2050mTVD, all three segments will be communicating and sharing a common HCHW. The minimum volume (P100) in Ginny Central is based on a 125m HC column. The column has no significant steps in its distribution but tapers off exponentially toward increasing depths. A Ginny prospect map and volumetric spread are shown in Figure 4.

The N/G distribution for the prospect is adjusted such that, with an increasing column height, the N/G decreases as the sandstones with the Rogn Fm. thin westwards across the Galtvort horst. The sandstones from the Rogn Fm. found in the 6407/8-4 A well (Galtvort) proved gas. Hence, the a-priori phase probability for Ginny is gas (0.6) and oil (0.4). According to re-conditioned AVO data from PGS14005, no DFI support is found for a gas phase. A DFI support is found for an oil case in Ginny Central and North, but not in Ginny South. Thus, DFI-modified phase risks for Ginny Central are oil (0.14) and gas (0.069), and Ginny Central is regarded primarily as an oil prospect. Both oil and gas scenarios have been technical-economically assessed.

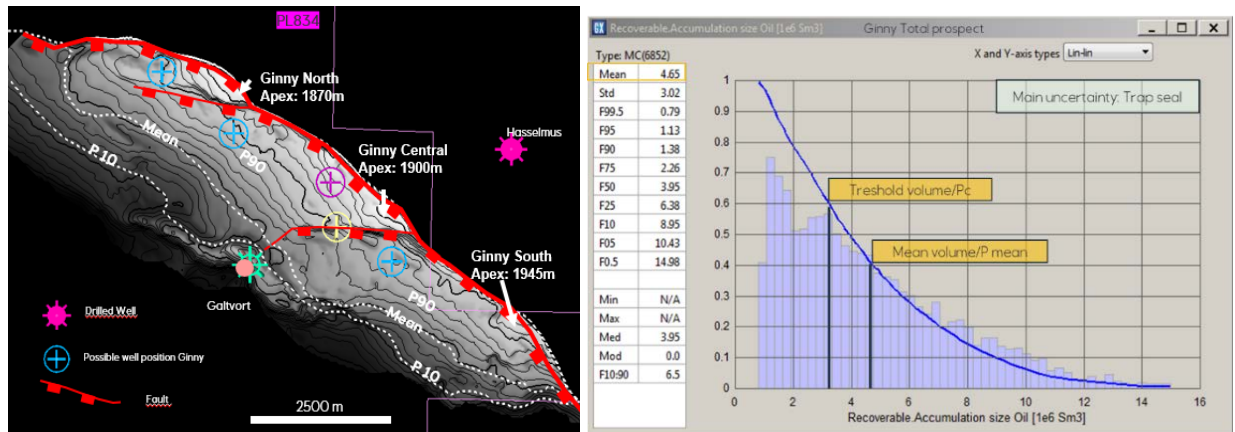


Figure 4: Prospect map to the left. Recoverable resources main HC phase for the business case (all segments) to the right.

Additional prospectivity

The Ginny Prospect overlies several lower and middle Jurassic leads, and are located adjacent to several other prospect in the area. In addition, the Galtvort discovery is located along the western flank of the Ginny prospect. PL834 prospects and leads are summarised in Figure 45, Table 3 and Table 54.

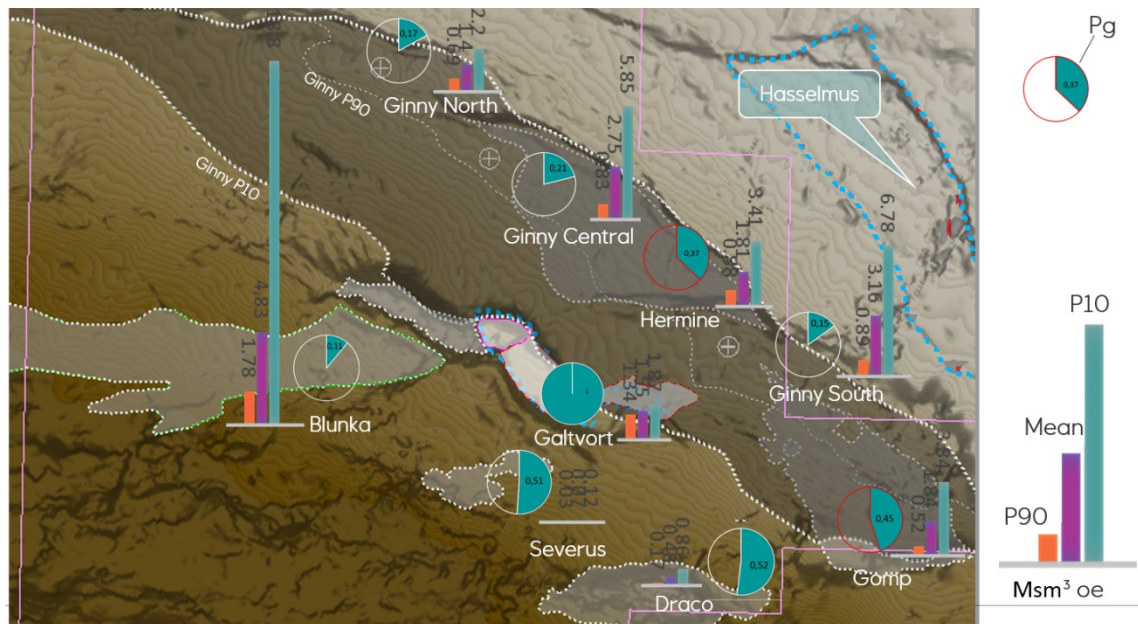


Figure 5: Licence overview map of PL834. The Ginny Central and Ginny south segments overlie the lower and middle Jurassic Gomp lead and Hermine prospect. The Grandpa and Grandma leads are also overlain by the Ginny prospect. These leads are of Callovian age and may link up the Galtvort discovery with the Ginny prospect.

Table 3: PL834 prospects and discoveries. Volume in MSm³oe.

Prospect/Discovery	Year of evaluation	PG	MEAN	P90	P10	Phase	Stratigraphy
Galtvort	2018	1	<u>1.55</u>	1.34	1.87	Gas	Garn & Melke Fm.
Ginny Central	2017 (QC & APX)	0.21	<u>2.75</u>	0.83	5.85	Gas & Oil	Rogn (or Melke) Fm.
Ginny North	2018 (QC)	0.17	<u>1.4</u>	0.69	2.2	Gas & Oil	Rogn (or Melke) Fm.
Ginny South	2019 (QC)	0.15	<u>3.16</u>	0.89	6.78	Gas & Oil	Rogn (or Melke) Fm.
Hermine Aggregated	2013	0.37	<u>1.81</u>	0.88	3.41	Gas	Garn, Ile, Tofte And Tilje Fm.
Gomp Aggregated	2013	0.45	<u>1.84</u>	0.52	3.84	Gas	Garn, Ile, Tofte And Tilje Fm.
Blunka Aggregated	2013	0.11	<u>4.83</u>	1.78	18.8	Gas	Ile and Tilje Fm.
Draco	2013	0.52	<u>0.48</u>	0.17	0.86	Gas	Åre Fm.
Severus	2013	0.51	<u>0.07</u>	0.03	0.12	Gas	Ile Fm.
Beluga Melke	2016	0.14	<u>1.1</u>	0.18	2.47	Gas	Melke Fm
Beluga Rogn	2016	0.041	<u>1.28</u>	0.242	3.05	Gas	Rogn Fm

In addition, Ginny Central and Ginny south overlies the newly identified Grandpa and Grandma leads respectively. These are Melke Sandstone leads of Callovian age. The Licence also includes some deeper prospects of Triassic (Nottung), Permian (Kjerald) and Basement (Holk) but these have not been evaluated recent years.

5 Technical evaluation

The technical-economical valuation for the Ginny prospect has been performed on oil and gas cases. Both scenarios are tied-back to the Njord Platform (30km south of Ginny). In addition, a gas case tied back to Mikkel Sør (12km north-east of Ginny) has also been evaluated. The field development solution for the oil cases consists of single slot satellites with one horizontal oil producer with gas lift in each segment and one water injector in each segment. The oil cases are tied back to the Njord Platform through the existing Hyme subsea infrastructure. The distance from Ginny to the Hyme subsea infrastructure is c.11km. The field development solution for the gas cases consists of single slot satellites with one vertical gas producer in each segment tied back to the Njord Platform. The Mikkel Sør case has been performed as a sensitivity.

Economic analysis is based on: (i) EPA Q3 2017, (ii) Early Phase processing tariffs, (iii) including deferral, (iv) PL834 with Statoil equity share 40%. Key valuation metrics and sensitivities are shown in Figure 6 and Figure 7.

Table 4: Key numbers from the technical economical evaluation for the Ginny prospect

Prospect	Volume (Mean mill. boe)	Pg	Threshold volume rec. (mill. boe)	Pc	Expected value (mUSD)	Expected B/E (USD/bbl)	Expected IRR	B/E@DG3 (USD/bbl)
Ginny	31	21%	13	17.6	9	44	11%	33

Table 5: Ginny prospect drainage strategy

Drainage strategy	Recovery factor* (%) or EUR/well** (%) P90 - mean - P10	Producing analogue	Issues controlling drainage
Oil cases: 1 horizontal producer with gas lift and 1 vertical water injector in each segment. Gas cases: 1 vertical gas producer in each segment.	Oil: 37% - 45% - 53% Gas: 62% - 65% - 68%	Oil: Hyme, Bauge, Draugen Gas: Galtvort	Heterogeneities in the reservoir. No holdback production assumed due to capacity in pipelines and gas handling.

6 Conclusion

The lower, middle and upper Jurassic has been the main plays for consideration in the PL834 license. The upper Jurassic Ginny prospect was put forward as the main driving prospect within the license. A thorough evaluation of this prospect has been carried out, including acquiring modern 3D broadband seismic data, conditioning of the seismic dataset, AVO and attribute analysis on new data and acquiring new CSEM data. Integration of all this data brings the Ginny prospect forwards as an interesting opportunity that can test the upper Jurassic play in the eastern parts of the Halten Terrace, within the Bremstein Fault Complex. The Ginny prospect was however seen as a to high risk opportunity to bring forward as a drill candidate by the PL834 license partners. According to the voting rules in the license, the PL834 must be dropped.