A review of exploration activity and results 2015-2017 on the NCS

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Exploration activity follows the oil price

*) Oil price with one year lag
Drilling activity the last 3 years

**Exploration wells by type**

<table>
<thead>
<tr>
<th>Year</th>
<th>Wildcat</th>
<th>Appraisal</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>39</td>
<td>18</td>
</tr>
<tr>
<td>2016</td>
<td>29</td>
<td>8</td>
</tr>
<tr>
<td>2017</td>
<td>23</td>
<td>11</td>
</tr>
</tbody>
</table>

**Exploration wells by area**

<table>
<thead>
<tr>
<th>Year</th>
<th>North Sea</th>
<th>Norwegian Sea</th>
<th>Barents Sea</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>35</td>
<td>6</td>
<td>17</td>
</tr>
<tr>
<td>2016</td>
<td>30</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2017</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>
From wells to Discoveries – what did we find?

Wilcat wells by area

Discoveries by area
From wells to Volumes – what did we find?

Wilcat wells by area

- 2015: 16 North Sea, 2 Norwegian Sea, 2 Barents Sea
- 2016: 23 North Sea, 3 Norwegian Sea, 3 Barents Sea
- 2017: 12 North Sea, 4 Norwegian Sea, 7 Barents Sea

Discovered volume by area

- 2015: 0 North Sea, 10 Norwegian Sea, 1 Barents Sea
- 2016: 49 North Sea, 15 Norwegian Sea, 1 Barents Sea
- 2017: 33 North Sea, 6 Norwegian Sea, 3 Barents Sea
From wells to targets – what did we drill?

Wilcat wells by area

2015: North Sea 21, Norwegian Sea 16, Barents Sea 2
2016: North Sea 23, Norwegian Sea 3, Barents Sea 3
2017: North Sea 12, Norwegian Sea 4, Barents Sea 7

Chance of Success vs. Unrisked Recoverable volume (mill Sm3 o.e.)

- North Sea
- Norwegian Sea
- Barents Sea
For wildcat wells, the Norwegian Petroleum Directorate must receive both the prognosis and result on a separate form in digital format as an appendix to the final report. In the event of a discovery, the discovery evaluation report must also be submitted.

Regulations relating to resource management in the petroleum activities Section 30 Final reporting of geotechnical and reservoir well data
Reasons for dry targets in selected NPD plays in the North Sea
Reported drilling targets 2015-2017 – Pre drill

- Skogul
- Utgard
- Knarr
- Balder

Chance of Success vs. Unrisked Recoverable Volume (mill Sm3 o.e.)

- North Sea
- Norwegian Sea
- Barents Sea

EV = 1
EV = 10
Example fields
Discovery rates – prognosis vs result

Expected vs actual success rate (technical)

- North Sea
- Norwegian Sea
- Barents Sea
- NCS

- Expected
- Actual
Very consistent – and very optimistic
We have seen it before

8th through 14th licensing round

16th through 22nd round and APA2003-2011
Why are the volume prognoses so poor?

• Methodology?
  • The way we do post mortem analysis?
  • Current prospect evaluation methodology and tools?
  • The way we use our tools?
  • Too complex or too simple models?

• Different biases?
  • Are explorers optimistic by nature?
  • Are we just fulfilling management expectations?
  • Company internal competition?
Some shortcomings with the current dataset

• How is success defined, in relation to the CoS? (above a minimum value or that the well will be classified as a discovery)
  • No data on the minimum value of the volume estimate
• Is the CoS adjusted according to well placement, i.e. is there a chance that the well misses an actual accumulation?
• No data on possible DHI adjustment of the CoS
Definition of success vs volume prognosis

Is this a success?
Prospect 36/7 C3-E (Norsk Hydro, 2002)

On the basis of the currently available data, about 2 m of net pay are interpreted in the interval 2530 - 2545 m RKB (Rodby-Agat formations). The analysis also indicates hydrocarbons in the interval 2555 - 2570 m RKB and if real are likely to be residual hydrocarbons. Currently it is not clear in which phase (gas or oil) these hydrocarbons are present.
Do we need a FIND2 on the NCS?

**Evaluation of Well Results**

**FIND:**
- Forum for Exp
- 21 oil compar

**Evaluation of V**
- One of four pr
- 20 oil compar

**Background for the Project**

Prognosis vs. results:

The industry in general:
- overestimate resources
- underestimate the probability of discovery

No apparent improvement with time
The NPD proposes to form a forum to share learnings across the industry. This could be organized under the FORCE umbrella.

Topics that could be covered could be (but not limited to):

- Prospect volumetrics and risking
- Performance tracking and post well analysis
- Case studies – lessons learned
- Peer review processes
Questions?