The Wisting Field in the Barents Sea
- Maturing from discovery to field development
- Conceptual and area related challenges

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Stavanger, 21 March 2018
The OMV Group

- **Upstream:**
  - Four core regions: CEE, Russia, MEA and North Sea
  - Production: 343 kboe/d
  - Proven reserves: 1.03 bn boe (1P)
  - E&P activities in 15 countries

- **Group total:**
  - 22,000 employees
  - 3 refineries
  - 3,800 filling stations
  - Supplies 200 million people with energy
**OMV in Norway**

- Established in Norway in 2006.
- Office in Stavanger from 2007
- 105 permanent employees incl. expats
- Daily net production 2016: Approx. 70,000 boe.
- Producing asset: Gullfaks, Gudrun and Edvard Grieg.
- Aasta Hansteen production start-up 2018.
- Operator of the Wisting discovery in the Barents Sea.
- Participate in 31 licenses and operator of 5.
Wisting – our main focus
**Wisting: A Big Discovery**

- Ultra-shallow reservoir with low temperature and pressure - heavily compartmentalized

- 6 wells
  - Discovery well (Central I)
  - Horizontal well (Central II)
  - Data well/Xlot (Central III)

- Recoverable Volumes
  - Estimated 200 – 500 mnboe

- More data to improve understanding

- (CSEM & P-Cable)
Resource Estimates

STOIIOP Historical Increase

<table>
<thead>
<tr>
<th>Discoveries</th>
<th>CE</th>
<th>CE Hanssen</th>
<th>CE Hanssen CSEM (CW+CS)</th>
<th>CE Hanssen CW CS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>392</td>
<td>502</td>
<td>816</td>
<td>1084</td>
</tr>
</tbody>
</table>

Year:
- 2014
- 2015
- 2016
- 2017
Wisting: Field Concept Studies

- **Conditions:**
  - far from shore
  - no infrastructure
  - metocean and Ice
  - shallow Reservoir LT/LP

- **Design criteria:**
  - subsea manifolds with tie-back
  - horizontal wells
  - water injection
  - floater with storage capacity
Project Schedule

Wisting Project Schedule

Identify

- Appraisal program
- Update subsurface models
- Integrated floater study
- Screening studies

Assess

- Concept study

Select

Define

- Feed
- PDO

Execute

- DG0 (BOK)
- DG1 (BOV)
- DG2 (BOG)
- DG3
- DG4

Operate

- 2015
- 2016
- 2017
- 2018
- 2019
- 2020

OMV (Norge) AS, Arctic Safety Summit - Stavanger 21 March 2018
Location Related Challenges

- High Stakeholder Focus on Barents Sea operations
- Polar lows hard to predict, low temperatures possible
- 24/7 Darkness during Wintertime
- Logistics
- Duration for MedEvac
- Rescue from sea in case of evacuation or helicopter crash
When the going gets tough – World Records happen!
Horizontal Well Concept and Achievements

- First subsea **ultra** shallow reservoir extended reach well
- First subsea horizontal **appraisal** well in Barents Sea
- High build-rate enabled successful horizontal trajectory in the 12 ¼ section
- Efficient horizontal drilling in a shallow reservoir
- Managed to drill through several faults despite extensive losses
- Well design changes implemented successfully based on information from offset wells, data gathering and modelling
Facilities Concepts

- Floating structure
  - 400m water depth

- Produced gas is re-injected or used as fuel gas
  - Low GOR 30-50 (export unlikely, need gas for turbines or power from shore)

- Pressure boosting pumps located sub-sea
  - Low pressure reservoir – 70barg

- Oil export via tanker offloading
  - Currently no oil pipeline infrastructure

- All produced water re-injected
  - Barents sea requirement
Some HSSE-related points to consider in evaluations have been:

- Offloading
- Ice resistance
- Helicopter regularity
- Emissions and energy consumption
- Winterisation
- Layout
- Safety by distance
- Material handling
- Evacuation
BaSEC - A joint approach to safe operations in the North
PSA Projects – Most of them directly relevant to Wisting

<table>
<thead>
<tr>
<th>Activity</th>
<th>Relevant</th>
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<tbody>
<tr>
<td>Simultaneous operations, undertaking activities in the High North</td>
<td>Yes</td>
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<tr>
<td>Alternative personnel transport and evacuation solutions in the High North</td>
<td>Yes</td>
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<tr>
<td>Winterisation of facilities</td>
<td>Yes</td>
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<tr>
<td>Suitable drilling facilities in the High North</td>
<td>Yes</td>
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<tr>
<td>Challenges linked to ice and snow in the High North</td>
<td>Yes</td>
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<tr>
<td>Human performance when working in the High North</td>
<td>Yes</td>
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<tr>
<td>Structural safety in the High North</td>
<td>Yes</td>
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<tr>
<td>Drilling in karstified formations</td>
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<td>Directional drilling in the High North</td>
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<td>Enclosed modules, design and explosion pressure</td>
<td>Yes</td>
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<td>Effect of cold on the working environment in the High North</td>
<td>Yes</td>
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<tr>
<td>Risk of acute spills in the High North</td>
<td>Yes</td>
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<tr>
<td>Winterisation</td>
<td>Yes</td>
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<tr>
<td>Operational challenges for process facilities and extinguishing systems in severe cold</td>
<td>Yes</td>
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