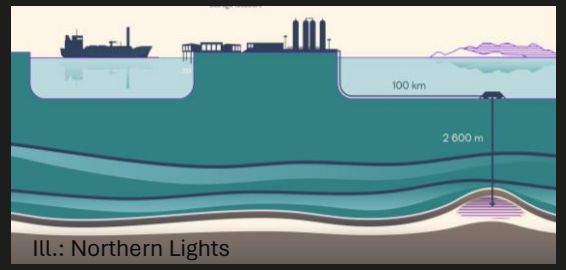
WELCOME

Norwegian Offshore Directorate – our goals


Photo: Vår Energi

Contribute to maximising **value to society** from the oil and gas industry on the NCS taking into account health, safety, environment and other users of the sea



Ill.: Northern Lights

Facilitate the development of CO_2 transport and storage on the NCS

Facilitate the development of seabed minerals on the NCS

High activity level on NCS

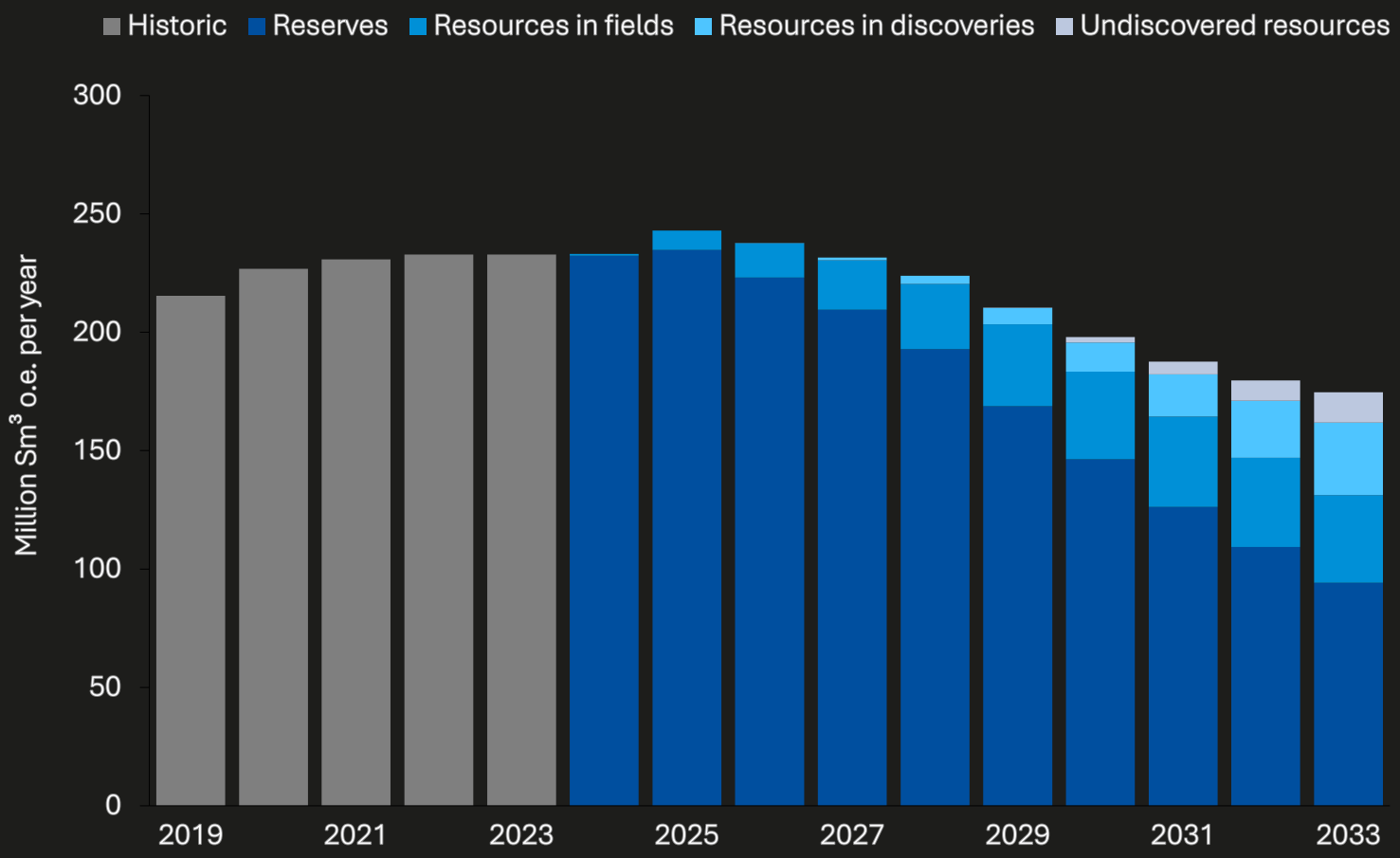
Foto: Gravås/Kleppa, Equinor

Foto: Eva Sleire, Equinor

Foto: Eva Gullerud, Aker Solutions

NCS production still on plateau

- New peak in 2025
- Beoynd 2025 new investments required
- Continued investments in exploration and development needed to arrest decline

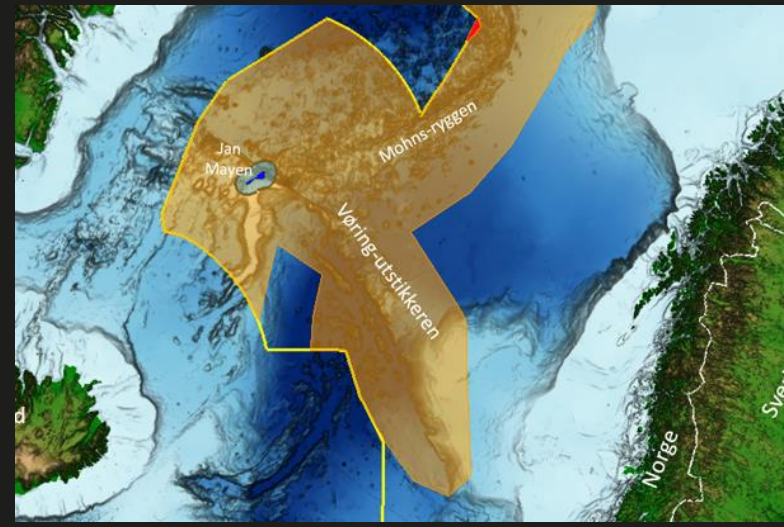


Growing interest to store CO_2 on the Norwegian Continental Shelf

Norwegian Shelf opened up for seabed mineral activities

Resource mapping

Resource assessment



Impact assessment

DECISIONS UNDER UNCERTAINTY

Making good decisions under subsurface uncertainty: How difficult can it be?

Biases

Improving predictions

Communicating uncertainty

Making decisions under uncertainty

What makes a good decision?

"A high quality (good) decision is based on a methodical analysis of the available information and on sound reasoning".

Good outcome ≠ good decision

To ascertain whether a decision is good or not, the focus should be on the **decision-making process**, not on outcomes.

Illustration: Harvard Business Review

FORCE – 30 years in 2025!

FORCE – 30 years in 2025!

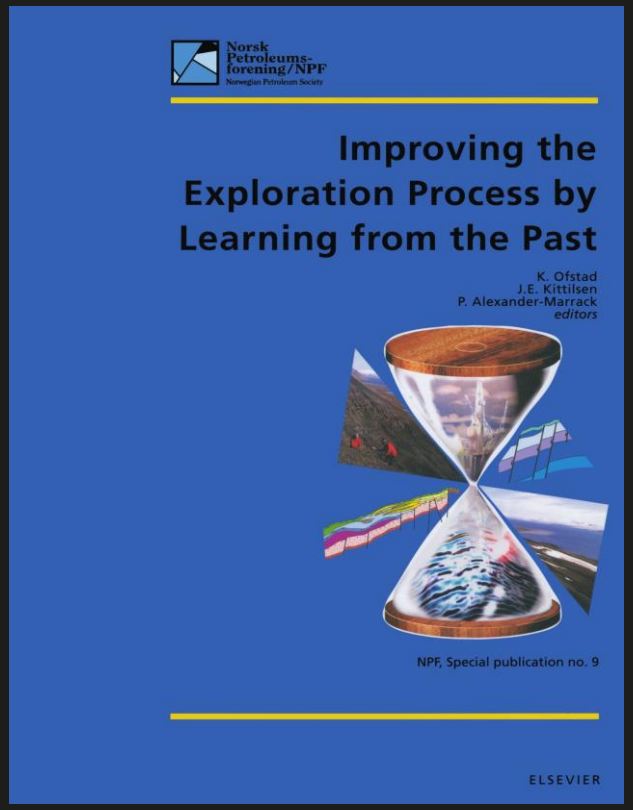
- FORCE - FOrum for Reservoir Characterization and reservoir Engineering, 1995

- FIND - forum for exploration technology co-operation, 1996
- FUN - forum for Forecasting and UNcertainty analysis, 1997

Today:

FORCE is a cooperating forum for Sustainable Recovery , Improved exploration (IE) and Energy efficiency and environment conducted by oil and gas companies and authorities in Norway.

FIND and FUN



Best Practices and Methods in Hydrocarbon Resource Estimation, Production and Emissions Forecasting, Uncertainty Evaluation and Decision Making

20 years on - are we learning?

Production Forecasting: Optimistic and Overconfident—Over and Over Again

Reidar B. Bratvold and **Erlend Mohus,** University of Stavanger,
and **David Petutschnig** and **Eric Bickel,** University of Texas at Austin

Improving predictions

Summary

The oil and gas industry uses production forecasts to make decisions, which can be as mundane as whether to change the choke setting on a well, or as significant as whether to develop a field. These forecasts yield cash flow predictions and value-and-decision metrics such as net present value and internal rate of return.

In this paper, probabilistic production forecasts made at the time of the development final investment decisions (FIDs) are compared with actual production after FIDs, to assess whether the forecasts are optimistic, overconfident, neither, or both.

Although biases in time-and-cost estimates in the exploration and production (E&P) industry are well documented, probabilistic production forecasts have yet to be the focus of a comprehensive, public study. The main obstacle is that production forecasts for E&P development projects are not publicly available, even though they have long been collected by the Norwegian Petroleum Directorate (NPD), a Norwegian government agency. The NPD's guidelines specify that at the time of FID, the operators should report the forecasted annual mean and P10/90 percentiles for the projected life of the field.

We arranged to access the NPD database in order to statistically compare annual production forecasts given at the time of FID for 56 fields in the 1995 to 2017 period, with actual annual production from the same fields. This work constitutes the first public study of the quality of probabilistic production forecasts. The main conclusions are that production forecasts that are being used at the FID for E&P development projects are both optimistic and overconfident, leading to poor decisions.[1]

The human factor

Volumes are overestimated

Uncertainty ranges are too small

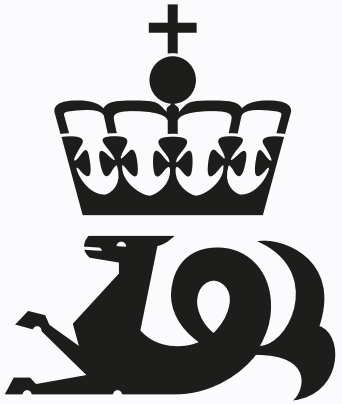
Probabililty of Success is often underestimated

We do not seem to learn…

We must apply learnings as we move into an era of smaller prospects and discoveries!

Biases

Additional data reduce uncertainty



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