

# Teknologidagen 2023

## Piloting Coiled Tubing Drilling at Ekofisk Field

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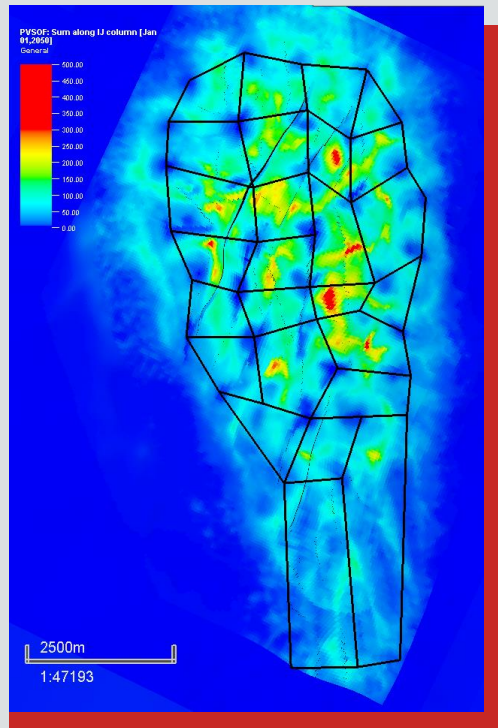
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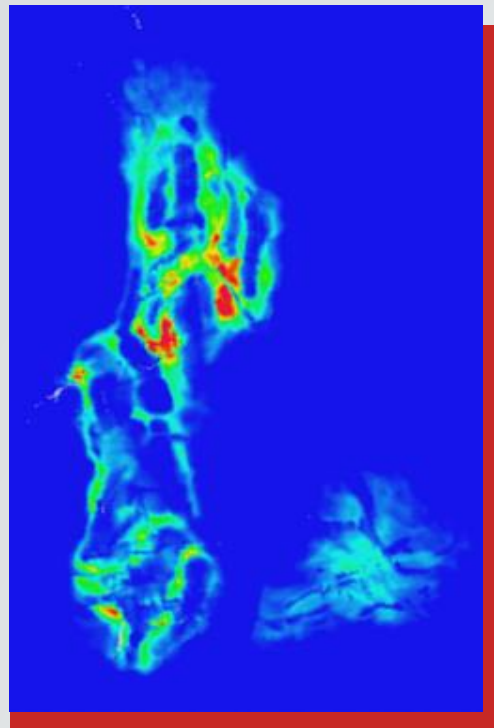
# Unlocking Value from Mature Assets: The Challenging North Sea Barrels

**Why:** Significant resource estimated to remain in mature assets

- ▶ Targets dispersed & decreasing in size
- ▶ Increasing uncertainty & poorer reservoir quality



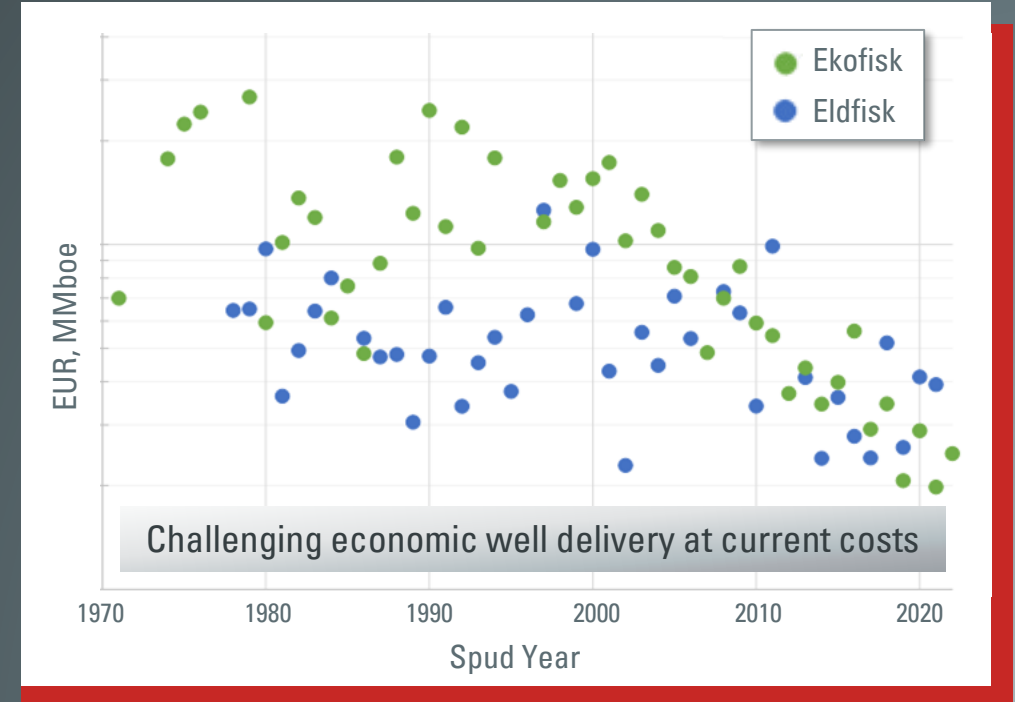
Ekofisk Estimated Remaining Mobile Resource, 2050



Eldfisk Estimated Remaining Mobile Resource, 2050

**What:** Preparing for the future by creating optionality

- ▶ 50 years of successful development with conventional drilling and completion approaches
- ▶ Alternative drilling methods estimated to offer potential to meet demands of maturing assets; estimated to unlock cost-effective access to remaining volumes

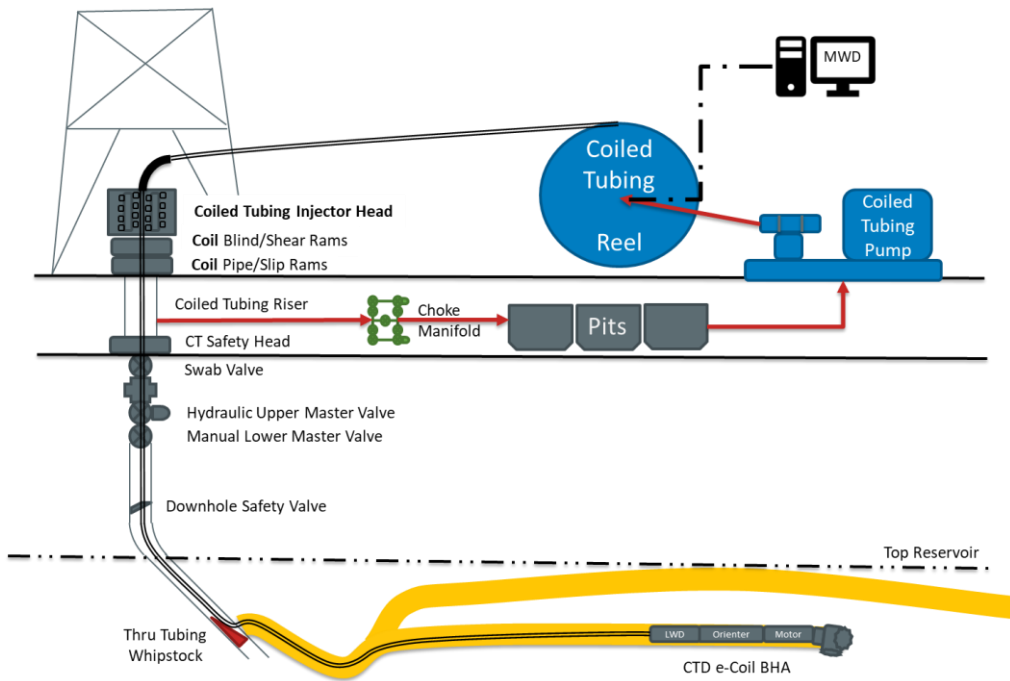


Average Well Estimated Ultimate Recovery (EUR) by Spud Year

# Innovation: Existing Technology in a New Application

## Coiled Tubing Drilling: What is it?

CTD combines coiled tubing and directional drilling



EkoK CTD Schematic

## Key Differences: Rotary Drilling vs. CTD

	Conventional Rotary Drilling	Coiled Tubing Drilling
Well Control	Mud Hydrostatic	CT Stripper and Choke
Hole Cleaning	Circulation and Rotation	Circulation and Wiper Trips
Steering	Rotary Steerable OR Slide/Rotate with Motor	Slide with Motor ONLY Electric Orienter for Toolface
Dog Legs	< 10 - 20 °/100 ft	< 45 - 50 °/100 ft
Hole Size	Many Options	Through Tubing
LWD	Many Options	Gamma Ray, Resistivity
MWD	Mud Pulse	Wireline Telemetry (e-Coil)
Spread Rate	\$\$	\$ (Typically, 1/2 - 2/3)

## CTD at Ekofisk:

- ▶ Systematic de-risking of key elements
- ▶ Verify Feasibility, Repeatability & Performance
- ▶ Leverage 20+ years' experience in Alaska

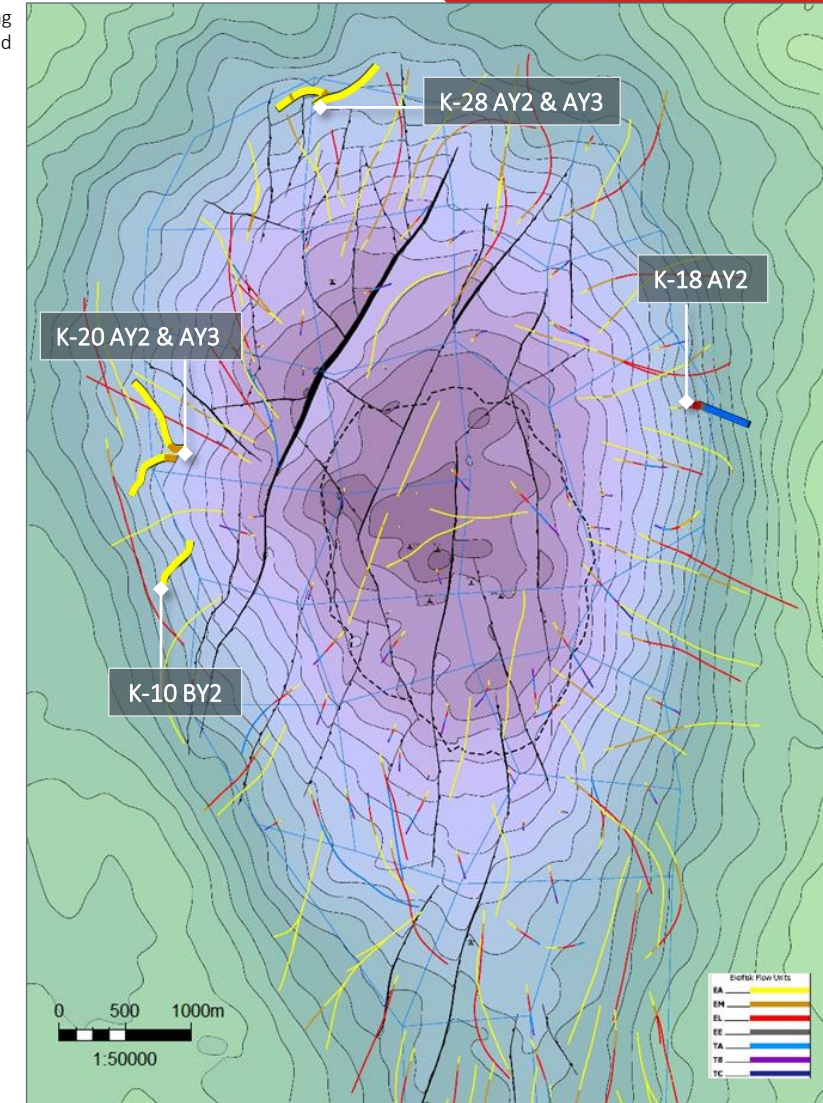
# Piloting Coiled Tubing Drilling at Ekofisk Field

**Objective:** Show technical & commercial viability of CTD at Ekofisk

- ▶ Premise: 5-well, 8-lateral campaign in injection wells
- ▶ Status: **Technical feasibility of CTD demonstrated**
- ▶ Key Deliverables: Drilled 6 laterals from 4 wells
  - Performed casing exit
  - Navigated reservoir
  - Managed high differential pressures

**Provided information to progress technology development to next phase**

Ekofisk Map showing CTD Laterals as drilled



**4** Casing exits delivered

**62** BHAs deployed

**10 860** (3 310 m) ft new pay drilled

**2 538** (773 m) ft longest lateral delivered

**180** degree turn achieved

**1** MILLION (300+ km) ft Coiled Tubing movement (down)

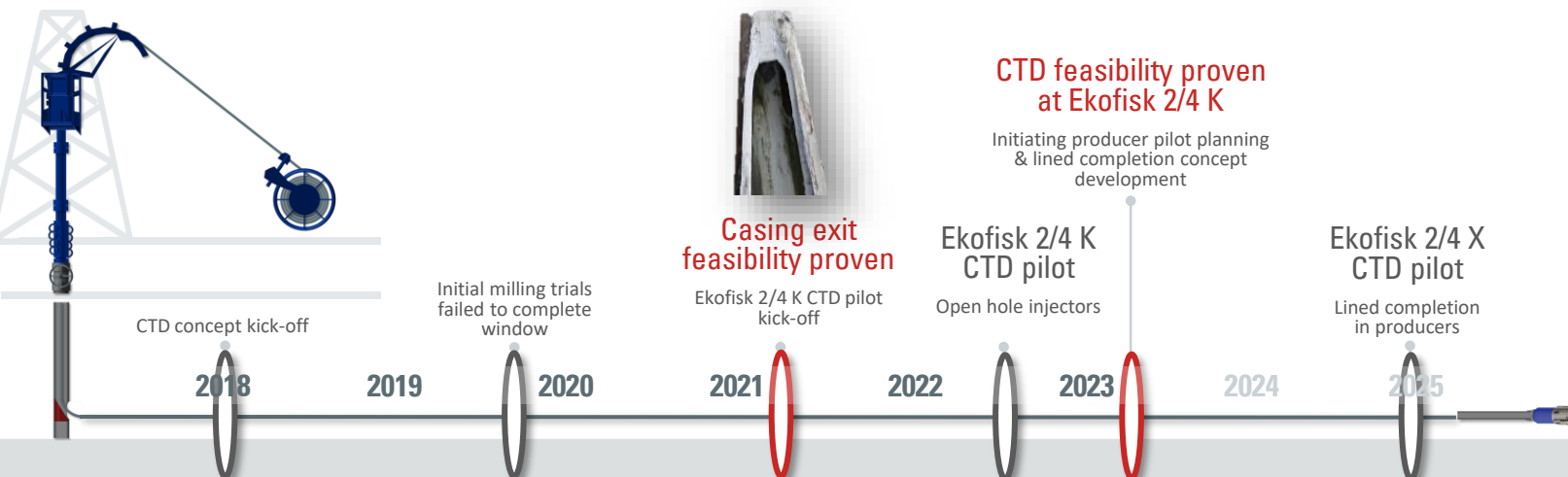
# Piloting Coiled Tubing Drilling at Ekofisk Field

## Technology Qualification: Approach with 2 pilot campaigns

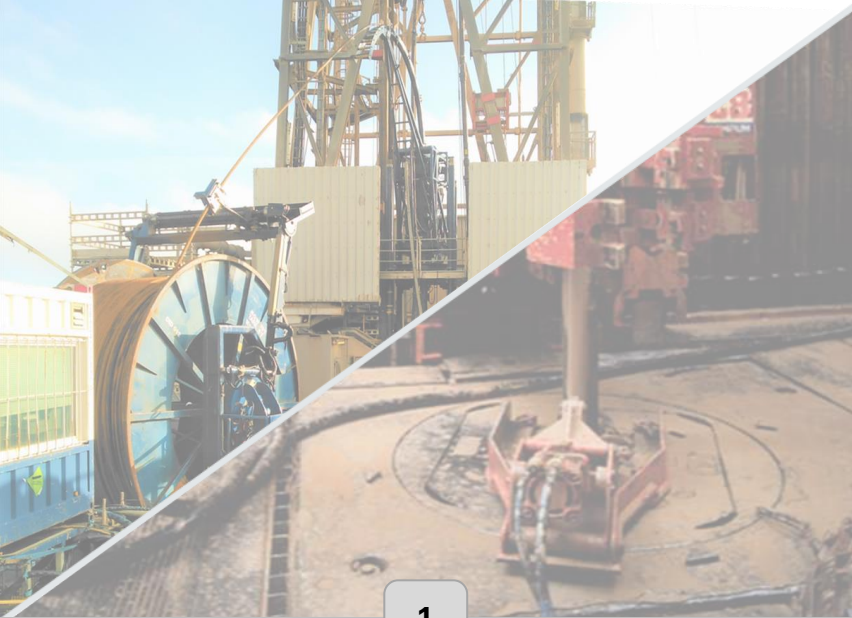
- ▶ **Ekofisk 2/4 K CTD Pilot (2022/23):** Demonstrated technical feasibility & de-risked key elements
  - Injection wells, open hole completion (no liner)
  - Objectives: Casing exit, reservoir drilling, stimulation through CT
- ▶ **Ekofisk X-Ray CTD Pilot (2024/25):** Application to producers with fit-for-purpose completion
  - Production wells, lined & open hole completions
  - Objectives: Lower completion installation, selective/open hole stimulation efficiency

## Future Plans: Continue increasing complexity & integrate into development planning

- Phased campaigns aligned with rotary drilling activities



# Coiled Tubing Drilling: A Game-Changer for North Sea Oil Extraction?



1

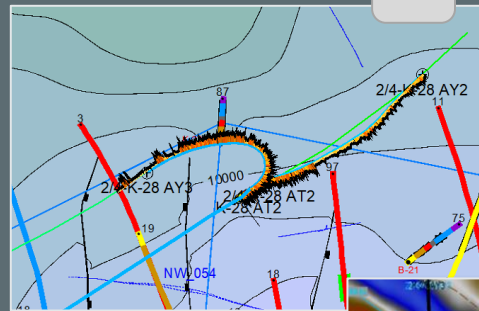
## Cost Effective

- ▶ Less equipment than traditional drilling methods
- ▶ Leverages existing infrastructure to add new pay
- ▶ Option to retain the original wellbore
- ▶ Accessing the reservoir directly avoids costly slot recovery & re-drilling risk

## Increased Agility

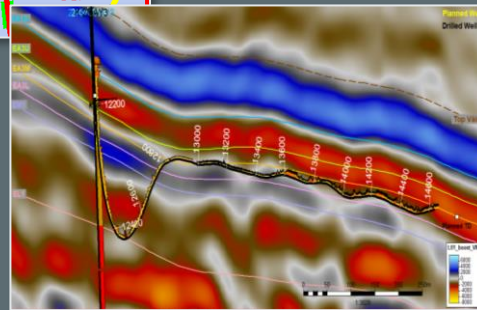
- ▶ A CTD BHA is used to drill to a well plan with high degree of accuracy
- ▶ The flexibility of coiled tubing allows for more geometrically complex well paths
- ▶ High build rates and large turns can be estimated to be achieved to access targets and optimize well placement

2



High dog-leg severity achieved in K-20 to land lateral in target formation

Dual-lateral capability and 180° turn in K-28 demonstrate the versatility of CTD



3

## Estimated Potential for Increased Production & Recovery

- ▶ A lower-cost drilling approach unlocks economic access to small bypassed reserves, allowing for optimization of areal sweep & offtake
- ▶ Other opportunities may include re-establishing production lost to well failure, accessing multiple targets from a single slot, testing flank boundaries