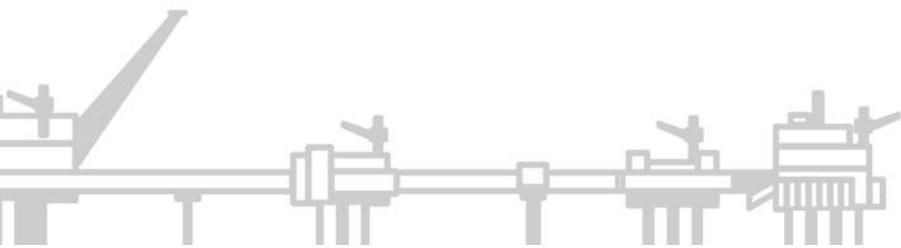


Erfaringer med Seabox felttest på Ekofisk

**Sigbjørn Aarekol**

Manager, Innovation and Technology

  
**ConocoPhillips**



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# Our Worldwide Operations

📍 Exploration   📍 Production   📍 Exploration and Production   ★ Headquarters   ▲ Commercial Office   □ Terminal



 **13**

**OPERATIONS AND ACTIVITIES IN 13 COUNTRIES**  
(As of Dec. 2021)

**1,747**

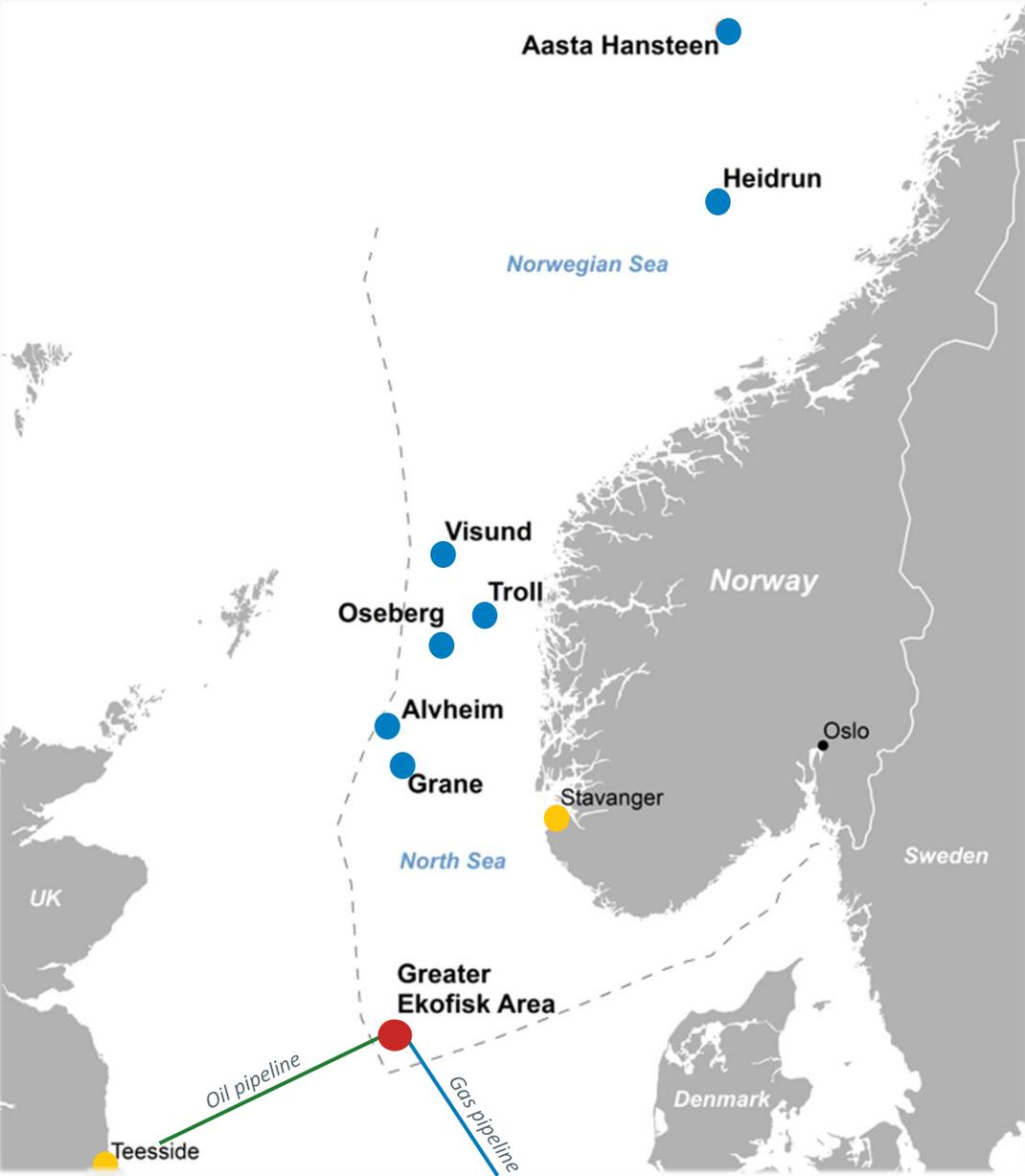
**THOUSAND BARRELS OF OIL EQUIVALENT PRODUCED PER DAY FIRST QUARTER 2022**

**6.1**

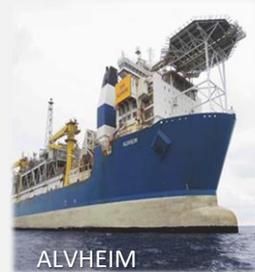
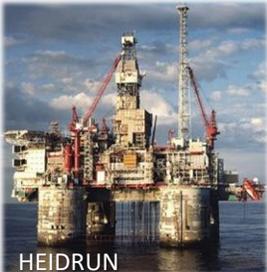
**BILLION BARRELS OF OIL EQUIVALENT - 2021 PROVEN RESERVES**

# Norway's Asset Portfolio

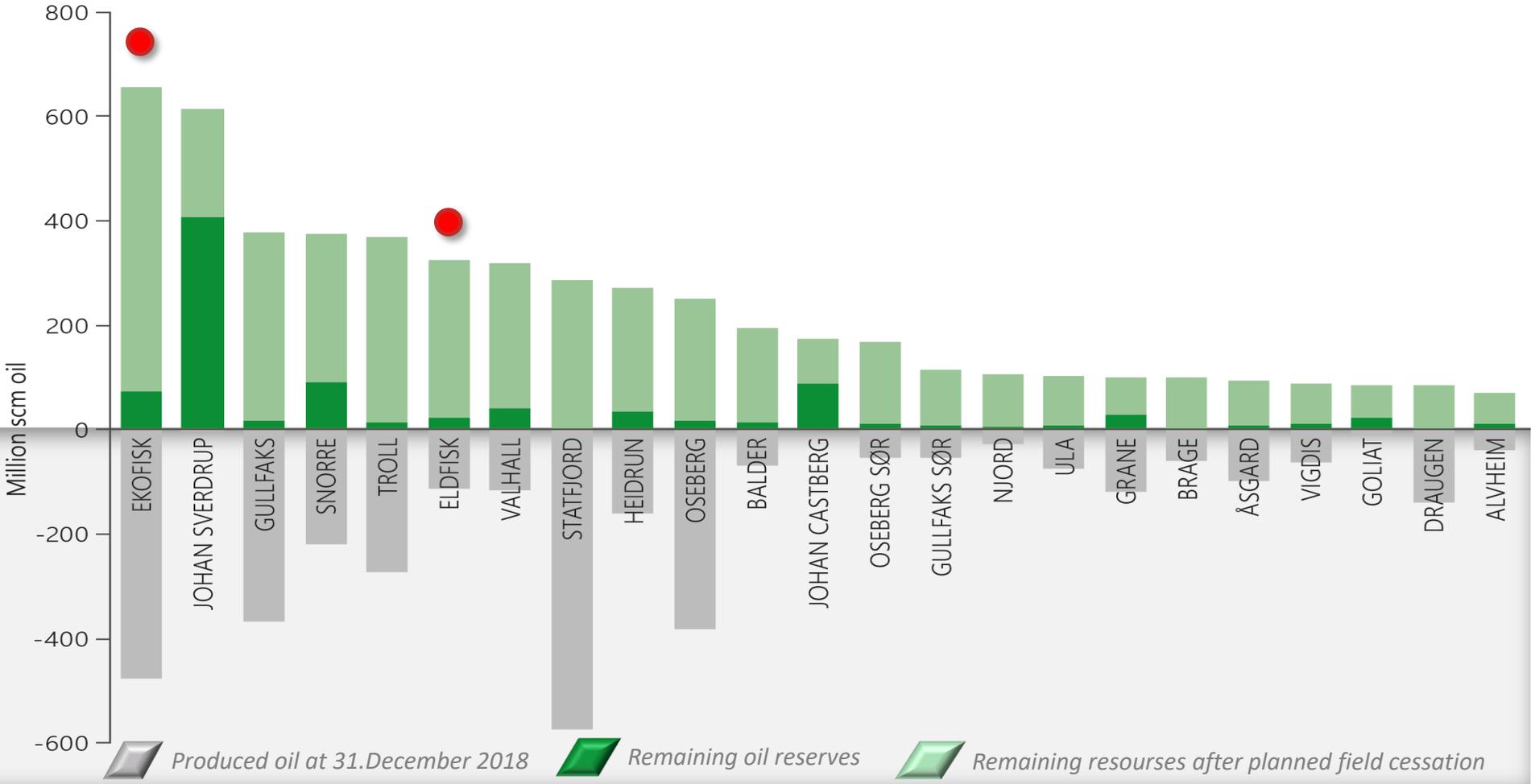
## OPERATED



## PARTNER OPERATED



# Distribution of Oil Reserves and Resources



**HIGHLIGHT**

Greater Ekofisk Area production licenses extended

APRIL 12th, 2022

**2048**

# Ekofisk - the Pioneer in the North Sea



Til Ekofisk

**Discovery,  
Production**  
1969/ 1971



**IOR, Water  
Injection**  
1981/ 1987



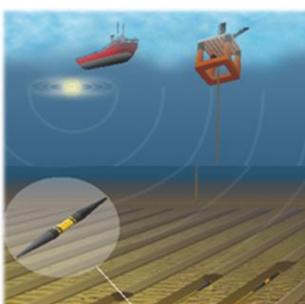
**Subsidence,  
Jacking**  
1984/ 1987



**Footprint**  
significantly reduced  
1998<sub>Ekofisk</sub>/ 1999<sub>Eldfisk</sub>



**Subsea  
Development**  
2010<sub>Inj.</sub> / 2020<sub>Prod.</sub>



**Life of Field  
Seismic**  
2011



**Eldfisk Bravo**  
Remote operation  
2021

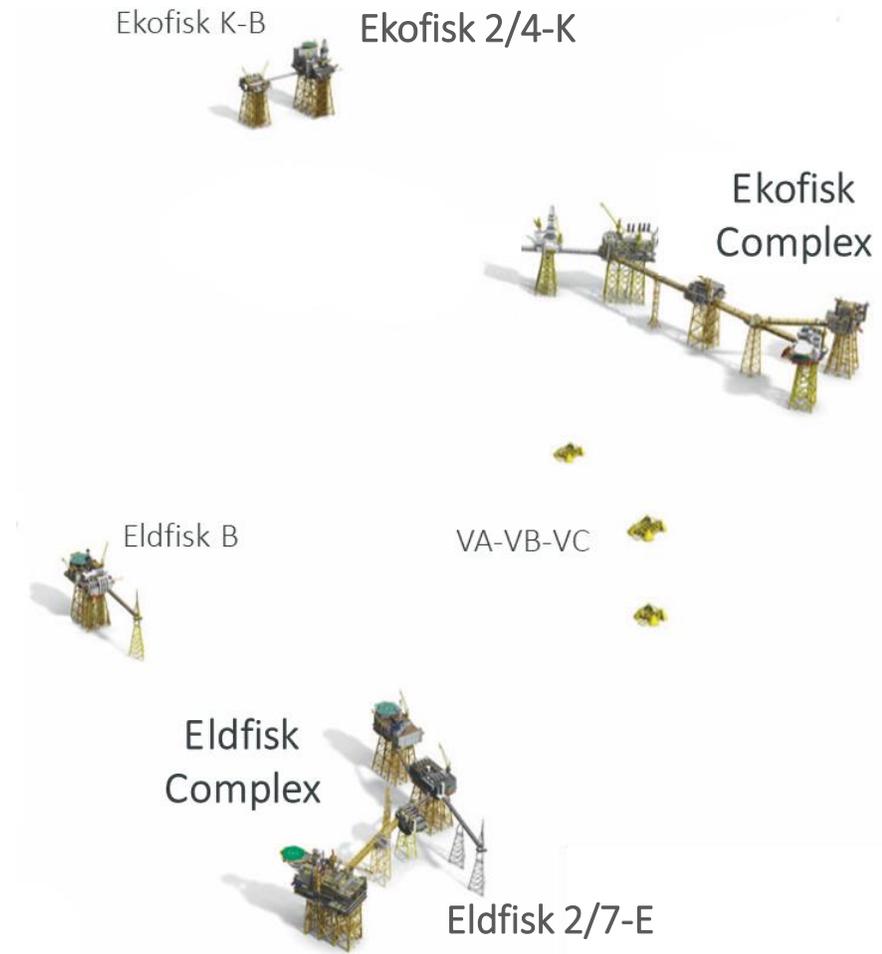
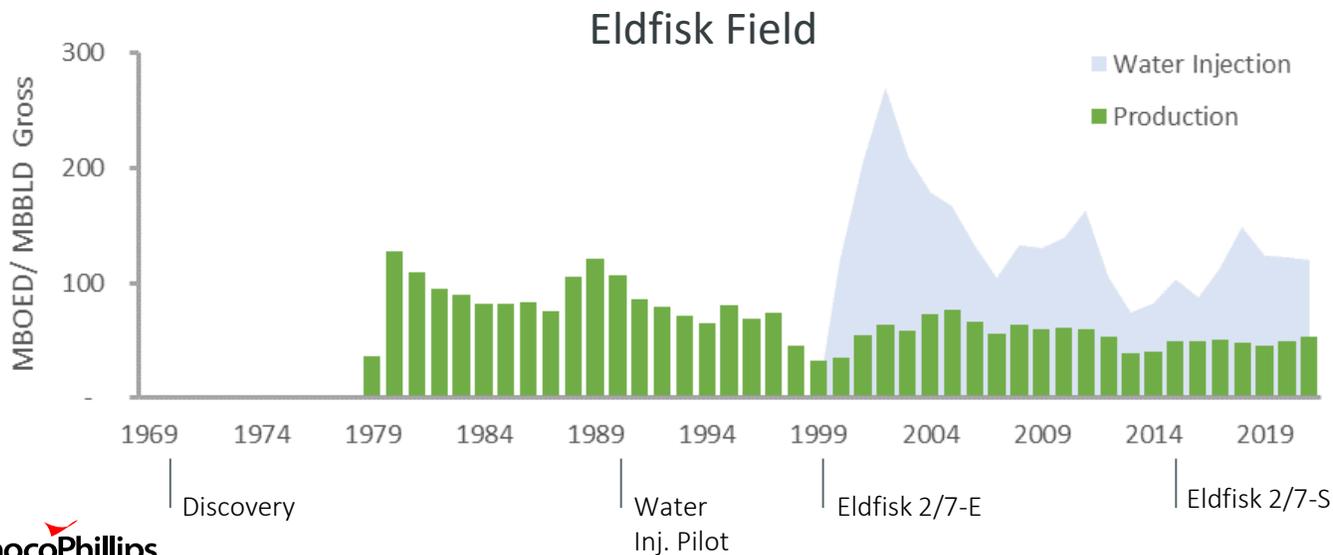
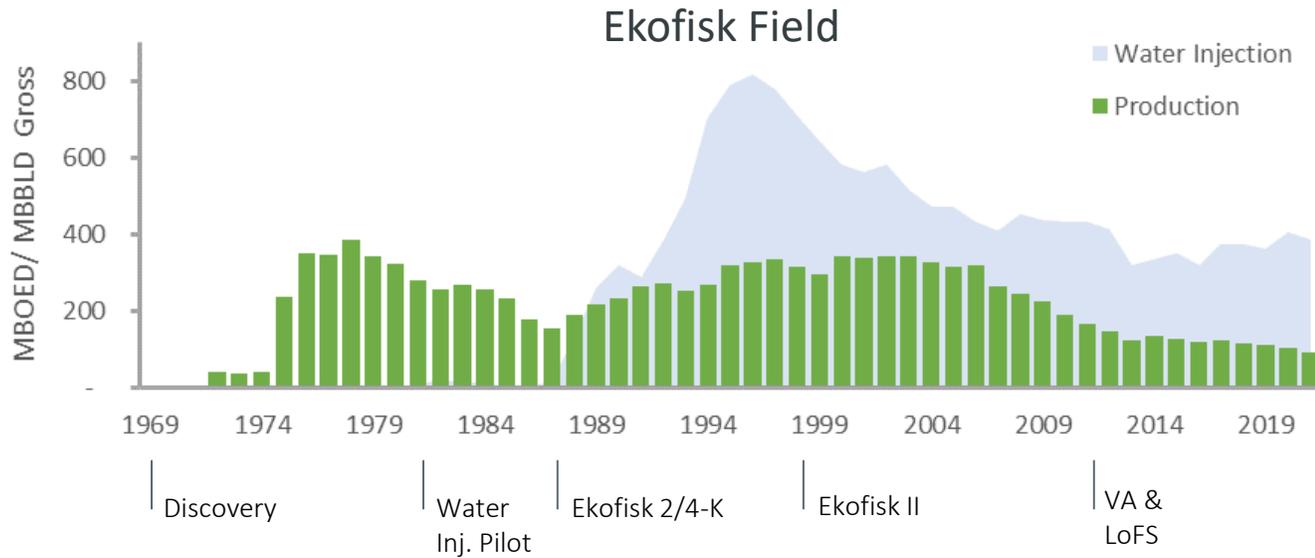
POSITION FOR  
LONG-TERM SUCCESS

- ↑ Production
- ↓ Cost
- ↓ Emissions

Always Safe



# Two Injection Centers and Pipelines to connect the Fields



## OPPORTUNITY TO REDUCE COST AND GHG EMISSIONS

- Subsea water treatment solution
- Zero hazardous discharge
- Energy efficient and low maintenance



### Disinfect Raw Seawater

- Electrochlorinator (EC) – produces hypochlorite for primary disinfection
- Hydroxyl Radical Generator (HRG) – produces oxidizing hydroxyl radicals for secondary disinfection

### Remove Particles

- Still room - gravimetric particle settlement and prolonged chlorine disinfection
- Particle settlement tray

- Capacity: 40,000 BWPD
- Weight: 80 tonnes

# Ekofisk Pilot of Seabox™



## Purpose

Find a flexible and cost- efficient water injection solution for new developments

## Key Objective

- Verify operational functionality and regularity
  - Ease of installation and retrieval
  - Particle removal efficiency
  - Disinfection efficiency
- Determine short-term reservoir effects
  - Reservoir injectivity (plugging tendencies)

PROJECT START

January  
2018

INSTALLATION COMMISSIONING INJECTION START

August September

November

FLOW-BACK

May

RETRIEVAL

September  
2019

# Ekofisk Pilot of Seabox™ | Execution

- Pilot executed safely according to schedule
- 6 months water injection and well produced back for investigation
- Seabox™ Unit processed **12,000,000** barrels of water
- **500,000** barrels of water were injected in well
- **12,500** barrels of fluid was produced back
- Thorough data acquisition program during pilot



PROJECT START

January  
2018

INSTALLATION COMMISSIONING INJECTION START

August September

November

FLOW-BACK

May

RETRIEVAL

September  
2019

- Seabox installation and retrieval operations were successful
- No deterioration of injectivity into the reservoir was observed
- Flowback analysis concluded no or very limited H<sub>2</sub>S bio-generation

## Highlights



## Challenges

- Descaling mechanism (polar reverse) failed during commissioning
- The electro-chlorination cells did not achieve expected efficiency
- Hydroxyl radical generator (HRG) failed



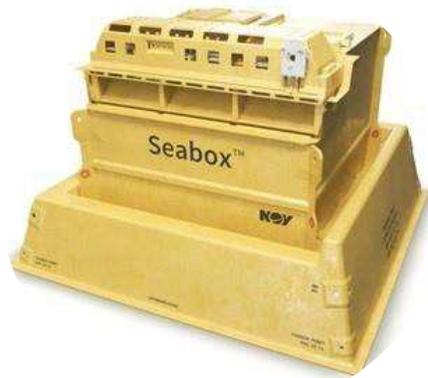
- Seabox has the potential to deliver acceptable water quality for injection in the Ekofisk field
- No short-term negative impact to reservoir souring or loss of injectivity was observed
- 4-years maintenance-free design life not confirmed. Optimization of several components of Seabox™ was identified during the test
- Technology limited to wells with tubing metallurgy that can withstand the increased corrosion potential

# Seabox™ | one potential building block in the Future

## SEABOX™

*Potential cost-efficient water injection treatment module*

- Subsea, localized where needed
- Energy efficient
- Low complexity



## SUBSEA PUMP

*High-pressure water injection pumps*

- Ongoing JIP
- Omnirise HydroMag™ Subsea Pumping System



## GREEN POWER

*Power required for water injection*

- Commitment to sustainable reduce GHG emissions
- Energy efficient solutions
- Local wind turbine study ongoing

