History of North Sea Oil & Gas

PIPELINE INDUSTRIES GUILD SEMINAR – 14TH MARCH 2017

By: Steve Wayman, Wood Group

Former President, Pipeline Industries Guild

AGENDA

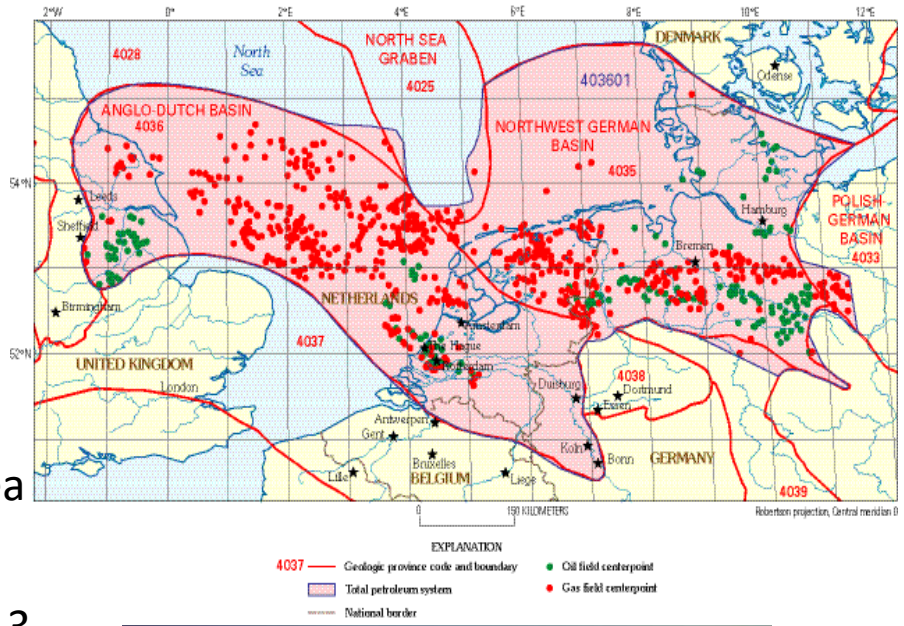
- North Sea Oil & Gas - How it all began
- Why Me? …and my 1st proper job
- Oil is discovered
- Building Platforms & Pipelines
- Facts & figures
- Maps & Distances
- Stepping into the deep – West of Shetland
- Highs & Lows
- The Circle of (Business) Life

IT ALL STARTED WITH GAS

1st N Sea well drilled by Amoseas in 1964 – DRY!

Prolific Geology:
Lower Permian Rotliegendes sandstone;
Danian Chalk and Kimmeridge Clays

Discovery:
BP's *Sea Gem* rig strikes gas in **West Sole Field**
September 1965 - 1st commercial find in **UK** N Sea

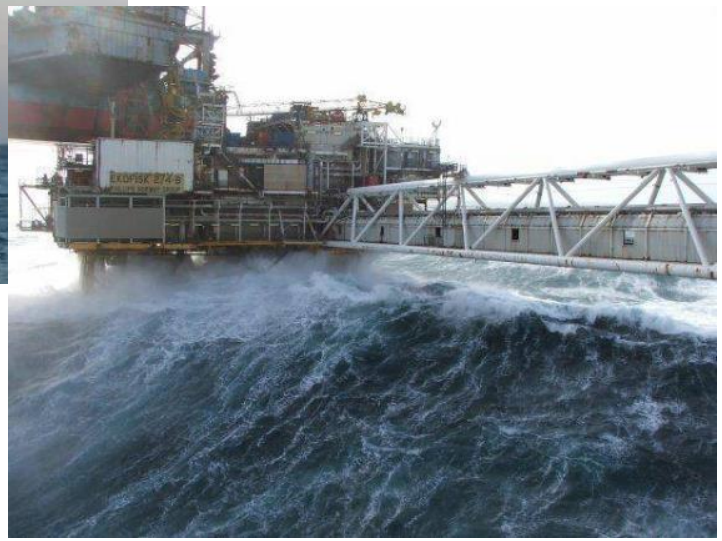


Followed by tragedy:
Celebrations short-lived - "Sea Gem" sank with 13 lives lost after leg collapsed when moving off discovery well

Start-Up: West Sole came onstream in May 1967
Between 1968 & 1976 UK consumers converted from Town Gas to N Sea gas
North Sea had started as it meant to go on…
Mix of Mighty Successes and Terrifying Failures

WHY ME? Oct 1970 BLACK GOLD RUSH!

WHAT COULD BE MORE EXCITING?



MY FIRST PROPER JOB

Easington Gas Terminal &
West Sole Field

OIL TAKES CONTROL – The Early Timeline

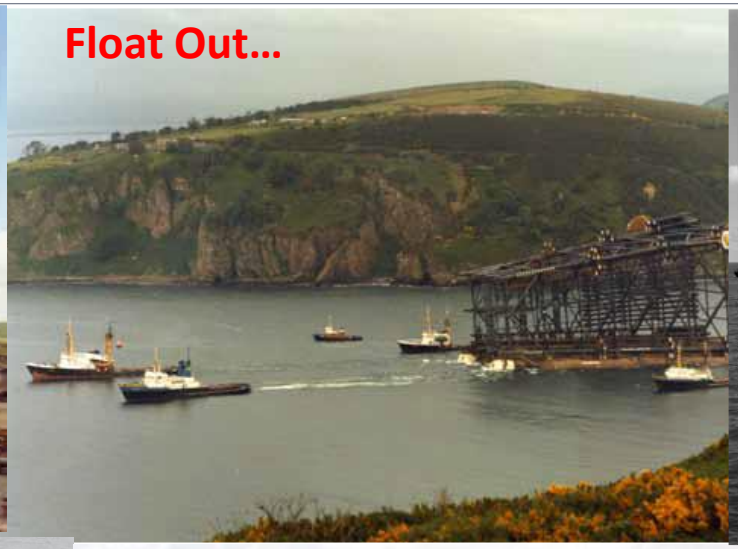
Norwegian Sector 1st:
Discovery of Ekofisk field (Danian Chalk) Dec 1969 – Nearly a Blow out;
Oil "gushing out of the borehole" - took a while to control.
Mud weight had been too low to resist formation pressure.
Thanks to highly competent drilling crew, "kick" was controlled before it became disaster.

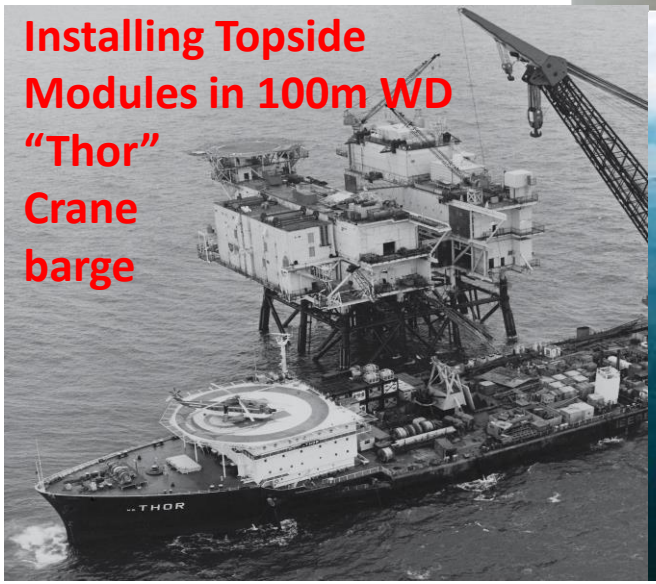
UK Sector:
Same month - Amoco discovers Montrose field

Then in Oct 1970 BP discovers mighty **Forties**

- 1st North Sea oil produced at Ekofisk in 1971
- 1st on UK side - Hamilton Bros. Argyll field (1975)
- Forties field comes onstream in 1975
- In 1971 Shell discovers huge Brent field (start up 1976)

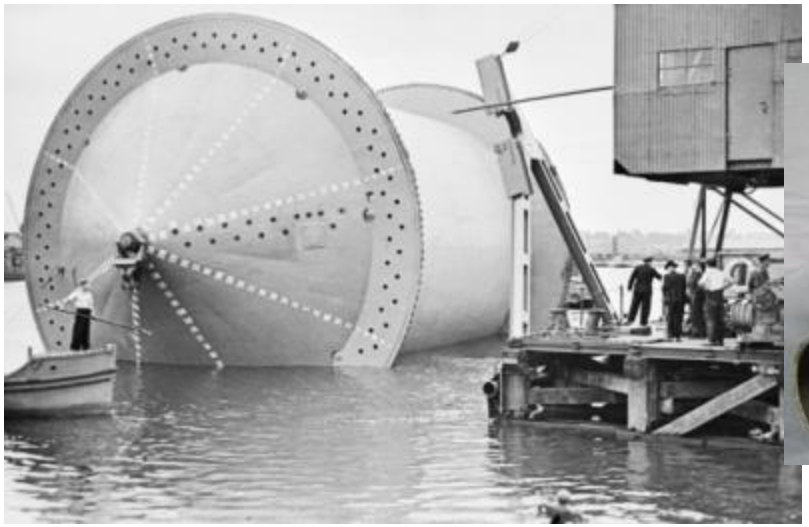
BUILDING EARLY PLATFORMS

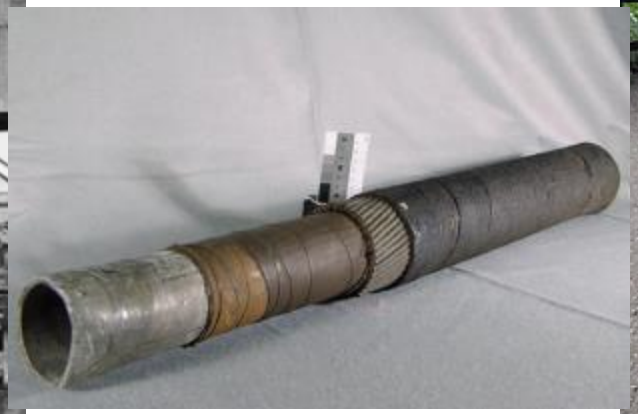


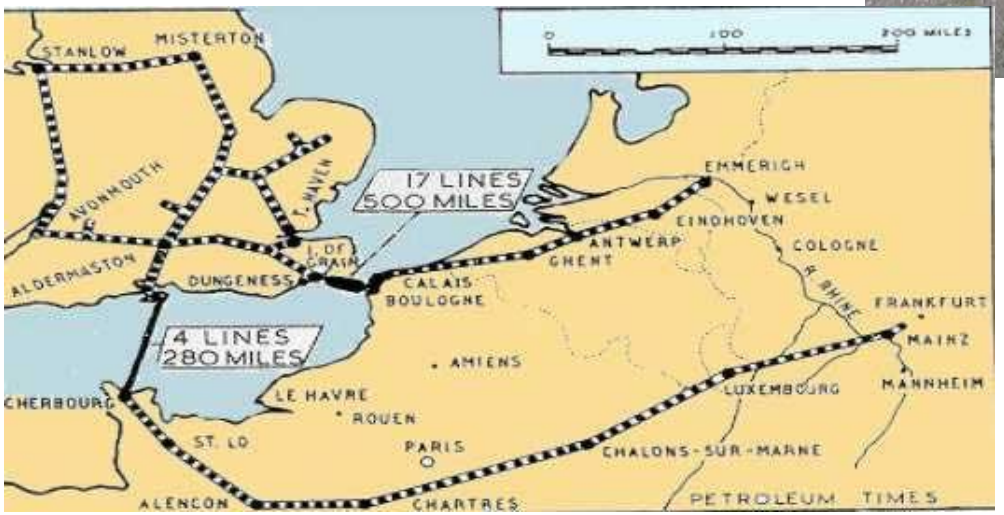


When installed in 1996 it was **tallest & heaviest** object ever to be moved by man across face of the earth (472m high and 684,000 T dry [double that when ballasted])

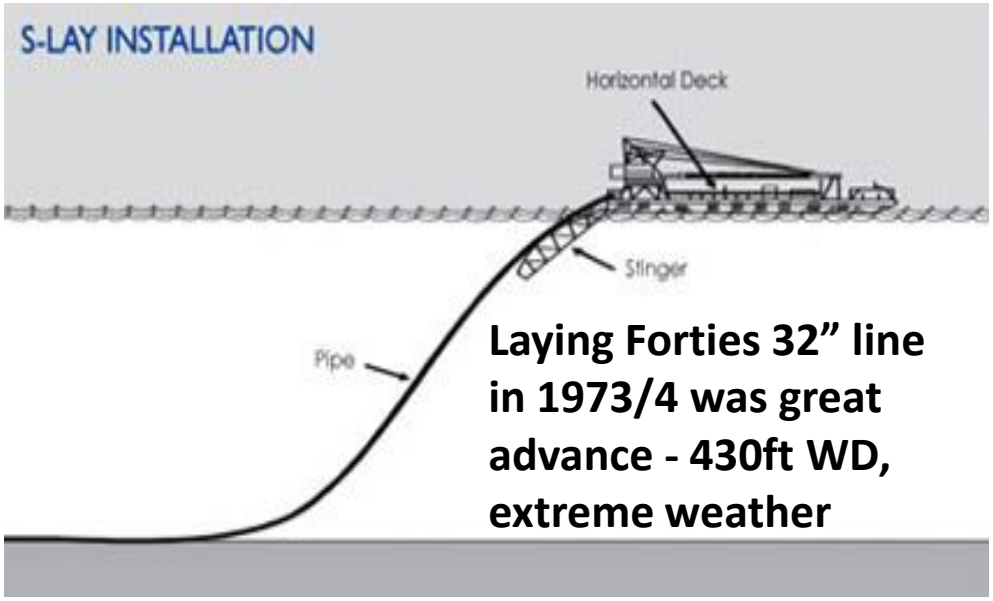
OFFSHORE PIPELINES BEGAN 40 YEARS EARLIER WITH "PLUTO"







OFFSHORE S-LAY EVOLUTION



Laying Forties 32” line in 1973/4 was great advance - 430ft WD, extreme weather

B&R “LB Meaders” & Saipem “Castoro One” met in middle, 65mls offshore in 300’ WD and did mid-line tie in

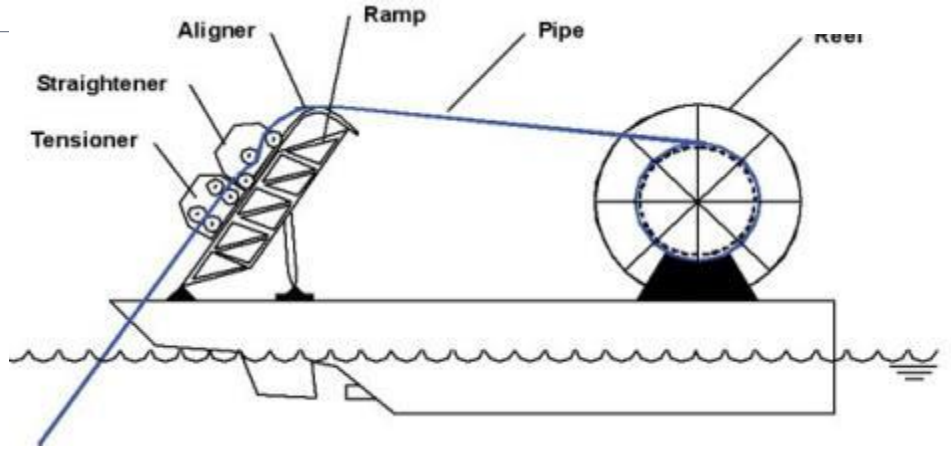
2nd Gen LB Courtesy: Saipem

Technology Advances:

- **Side Slot > Centre Slot**
- **Manual > Automatic welding**
- **Moorings to D.P.**
- **Double jointing**
- **Increased Tensioner capacity**
- **Rigid to Variable buoyancy stingers**

4th Gen LB Courtesy: Saipem

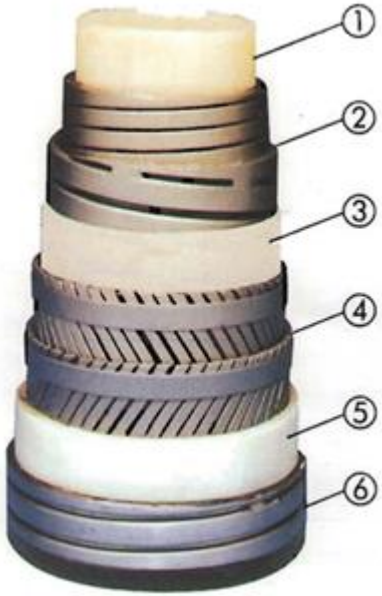
REELING STEEL PIPE



- **Horizontal Carousel > Vertical Reel**
- **Onshore Spool-base fab. continuous lengths**
- **Self Propelled, faster lay speeds**
- **Up to 16” diam. in deep water**
- **Typ. 60 deg. departure angle**
- **Specially resilient FBE Coatings**

Courtesy: Technip

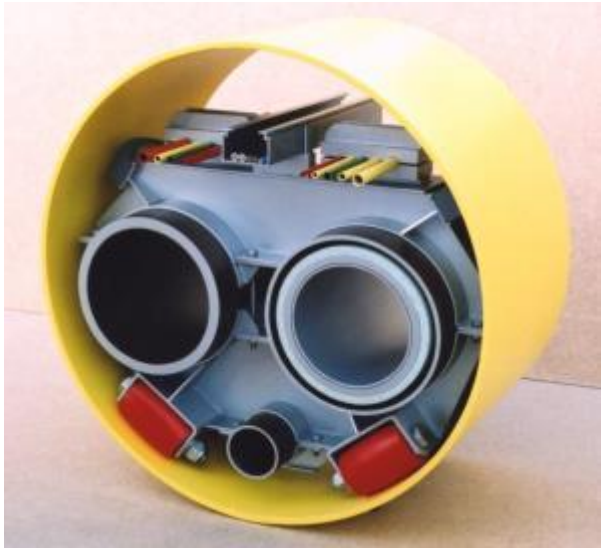
ADVENT OF FLEXIBLES



UNBONDED
Steel +
Thermoplastic

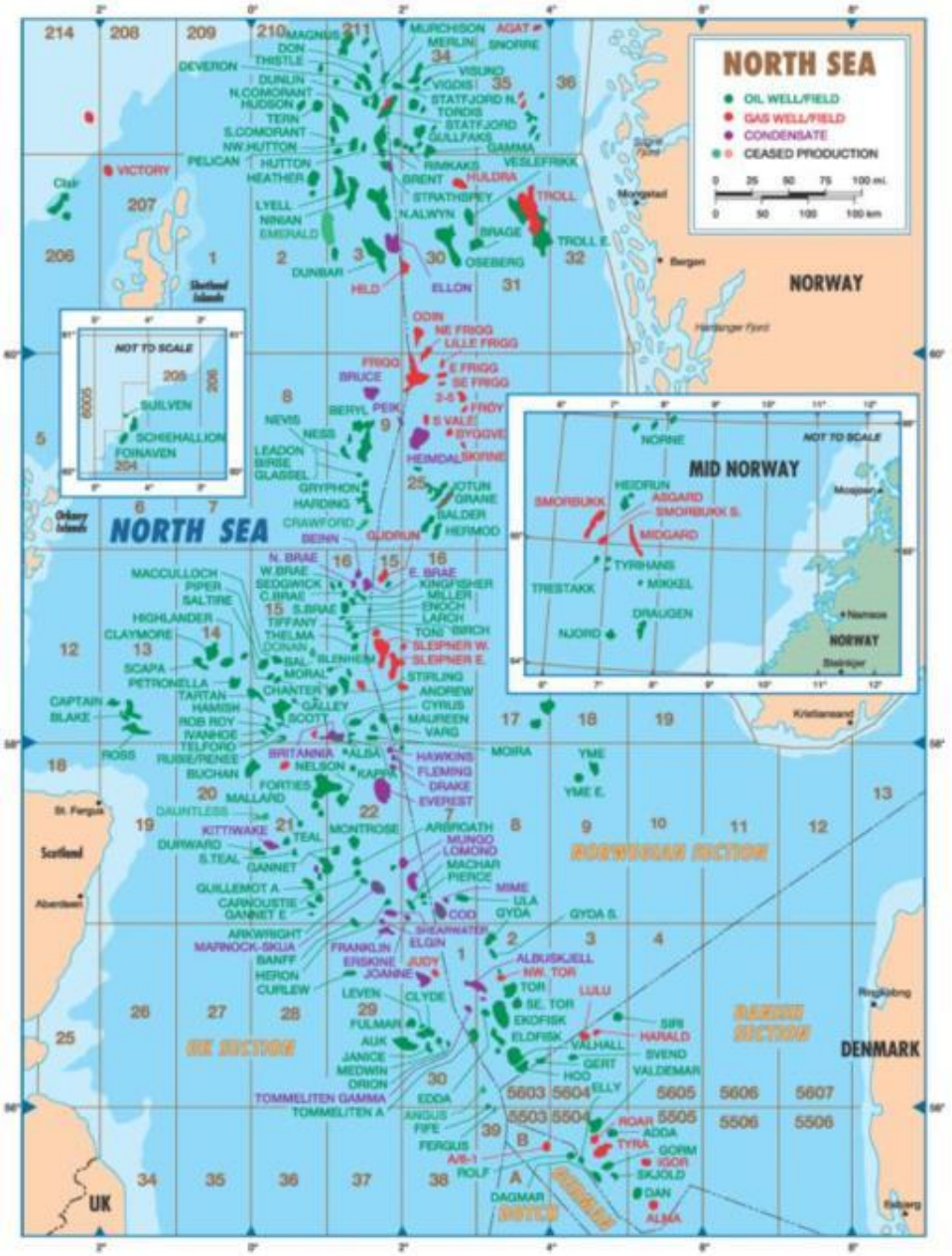
- **Continuous lengths reeled Onshore**
- **Quicker to install (typ. 500m/hr)**
- **Static or Dynamic duty (Risers)**
- **Tighter configurations on seafloor**
- **Quicker to tie-in (no spools)**

INTEGRATED BUNDLES



- **Onshore fabrication at specialist site**
- **Multiple lines in one Carrier: Buoyancy + Impact protection**
- **Cheaper vessels to compete against barges**
- **Towhead Manifolds**
- **Various tow methods used**

EVENTUALLY THIS >>>



UK N Sea

302 installations
261 operational
143 manned

Network of 22,000 mls of pipelines

SOME NORTH SEA FACTS & FIGURES

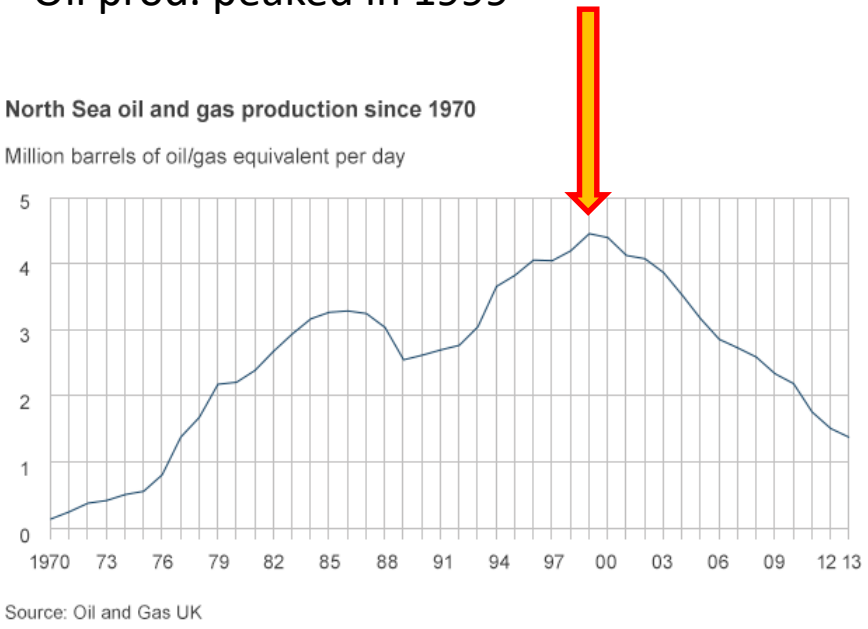
BIGGEST EVER FIELDS:

- **Statfjord 4.2bn**
- **Brent 4bn BOE (peaked at 500kbbd)**
- **Ekofisk 3.6bn**
- **Forties 2.5bn**
- **Oseberg 2.4bn**
- **Gullfaks 2.3bn**
- **Troll W 1.6bn**
- **Snorre 1.6bn**

c. 1/3 of UK NS oil has been produced by just 6 mega fields: Forties, Brent, Ninian, Beryl, Piper & Magnus

Largest UK field discovered in past 25 years - **Buzzard** in June 2001; Producable reserves of c. 400m bbl and average throughput of 180-190,000 bbl/day

- 40bn barrels produced thus far
- Still poss <24bn left (but much harder!)
- In 1984/85 £12bn paid in taxes to UK govt
- 1st NS helicopter flew in 1967; In 1997 479,000 passengers flew to/from NS
- Oil prod. peaked in 1999



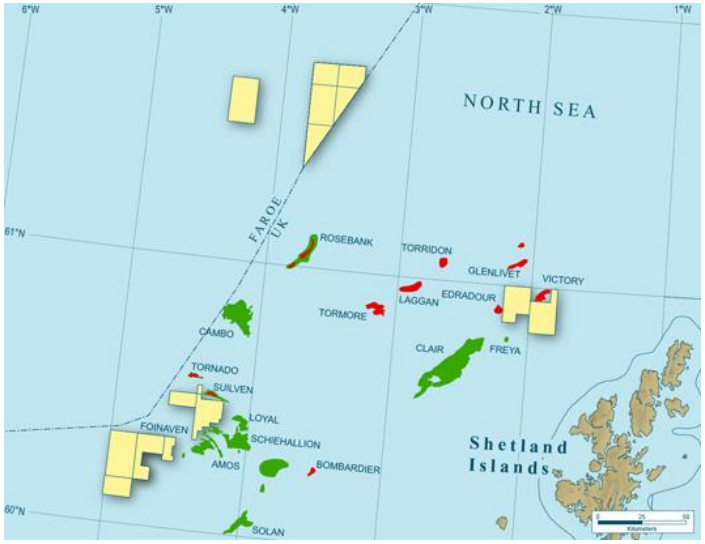
STEPPING OUT – WEST OF SHETLAND

Between 300m-600m WD and even harsher conditions

Clair discovered in 1977 but uneconomic (heavy oil)
Tech. advances > eventually came on-stream 2005
8bn bbls reserve BIGGEST in UK waters (Not N Sea)

In 1993 BP discovered huge **Foinaven** field;
Followed by **Schiehallion** in 1994; Began era of FPSO's

Other notable WoS projects:
Premier **Solan** field
Total **Laggan-Tormore** gas/condensate (pipeline)



Quad 204 replacement project - life extension (new Glen Lyon FPSO)

...AND SOME REAL DISASTERS

Dec. 1965: Sea Gem Jack Up – 13 fatalities; 2 legs collapsed

1980: Alexander Kielland Accommodation Platform: 123 died when it collapsed at Ekofisk field - fatigue failure of bracing, domino effect, lost a leg, capsized

1988 Piper Alpha – 165 killed of 220 onboard; >>Cullen report - Major changes in design, safety, training

1991: Sleipner A sunk in a fjord - design failure

DECOMMISSIONING – THE CIRCLE OF LIFE!!

BRENT BRAVO ANNOUNCEMENT – 150 platforms could be scrapped in next 10 yrs

The Business opportunity = £30-£50bn over next 25 yrs