

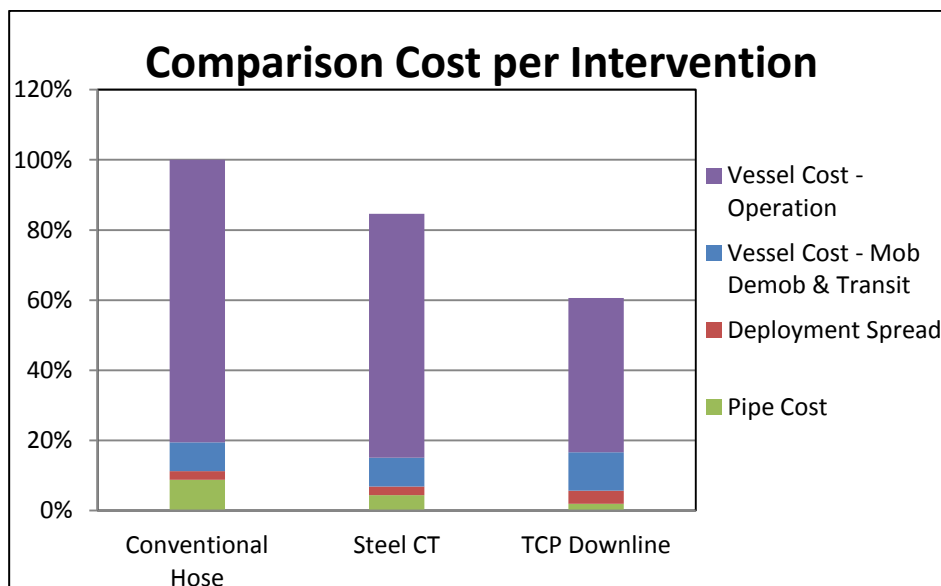
## Introduction

The fully bonded TCP Downline has advantages that are particularly beneficial when used for Subsea Intervention, Pipeline Pre-commissioning and Plug & Abandonment applications. In these applications, light weight, easy of handling and superior fatigue performance lead to significant lower cost per intervention campaign. Compared to steel coiled tubing and to conventional (clamped) hoses, radical cost savings in excess of 30% on cost per intervention campaign are achieved with a TCP Downline. In addition to these direct cost saving benefits, the use of a TCP Downline reduces schedule risk and creates value by increasing oil recovery ratios.



Figure 1 TCP Downline

Airborne Oil & Gas have an extensive track record with multiple downlines in the field, completing more than 65 deployments to date up to a water depth of over 2140 meters. Based on this field data on the TCP Downline, as well as feedback on the conventional hoses and steel Coiled Tubing, a business case is derived, showing the benefits in cost per intervention campaign.



### Cost per intervention campaign - comparison

The TCP Downline compares as follows to conventional hoses and to steel coiled tubing:

- Vessel cost – operation
  - The ease of handling and fast deployment leads to proven significant reduction in running time, reducing the time required per intervention
  - The single large bore avoids bundling and pressure testing of multiple lines
  - The free-hanging TCP Downline avoids the need for time consuming clamping of hoses to a pod wire
  - The collapse resistance avoids any pressure monitoring and avoids risks for hose collapse
- Vessel cost – mob and demob
  - The minimum bend radius of the TCP Downline, being a single, large bore pipe, is larger compared to hoses or steel Coiled Tubing. Hence the mob and demob takes longer
- Deployment spread
  - The deployment reel for the TCP Downline is dedicated to the TCP Downline; the tensioner is a standard flowline tensioner
  - The deployment reel is built for one single length TCP Downline, and avoids having to clamp buoyancy or weight modules to the TCP Downline during deployment
- Deployment configuration
  - The TCP Downline with Jumper allows for small offset intervention in combination with wireline intervention
  - The TCP Downline is pre-fitted with a clump weight, allowing it to be run fast to seabed
- Pipe cost
  - The TCP Downline is fully qualified for 200+ deployments, reducing cost per intervention

### The prize: Increased Recovery Ratios and Schedule De-risking

In addition to the direct cost benefits, the TCP Downline creates value in subsea well intervention:

- The large flowrates with very small pressure drop leads to effective bull heading of the reservoir
- The long life of the TCP ensures the operation can be completed, de-risking the schedule

