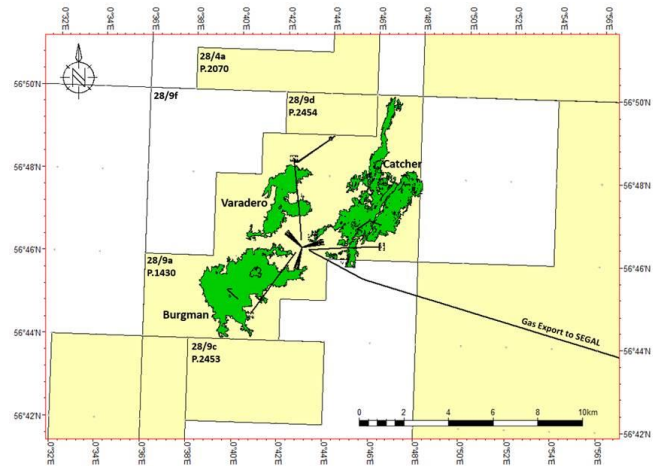


Infrastructure Code of Practice

The Greater Catcher Area Development



Location

The BW Catcher is a Floating Production, Storage and Offloading facility (“FPSO”) that is located 173km to the SE of Aberdeen. The BW Catcher currently produces from 3 fields (Catcher, Varadero and Burgman). These three fields have 15 producers and 4 injectors.

KEY FACTS	
Fields	Catcher, Varadero and Burgman
Block	28/4a, 28/9
Sector	Central North Sea, UK Continental Shelf
Approx. distance to land	173 kilometres SE of Aberdeen
Water Depth	110 metres
Hydrocarbons Produced	Oil and gas
Manned / Unmanned	Manned
Operated /Non-Operated	Operated
% of Harbour Equity	50.0%
First Production	2017
Accommodation Onboard	Maximum POB: 120

The BW Catcher was installed in 2017. First oil was late in that year. A programme of development drilling is planned by Operator.

Outline of subsea Facilities

The FPSO is located at the centre of the three fields approximately 3.5 kms from each. The subsea layout of each field is effectively identical. A pipe in pipe bundle system carries gas lift, water injection and comms/power/chemicals from the FPSO to the wells and production fluids back from the wells. Each end of the bundle has a large tow head housing valves, subsea routing modules etc. The riser base tow head connects to the FPSO via flexible risers & umbilicals over mid water arches, the drill manifold tow head houses a subsea multiphase flowmeter and routing valves. This manifold is hard piped to the wells mounted in 2 x 4 well drilling templates. The subsea control modules are mounted on the trees in these drilling templates.

Processing facilities

Oil from the Catcher, Burgman and Varadero fields arrives at the FPSO via flexible risers and enters the processing facilities through a turret mounted swivel, these fluids are then routed via heaters to the inlet or test separators, water is taken off both vessels to the Produced Water Collection Vessel (PWCV) where it is de-gassed, pumped at a constant rate through Hydrocyclones and re-injected into the WI wells along with treated desulphonated seawater.

The oil streams of the inlet and test separators comeingle and flow via heaters to a single common second stage separator then on through an electrostatic coalescer. Produced water taken off the second stage separator & electrostatic coalescer is pumped to the PWCV.

Ofgas from the inlet & test separators is routed to the suction of a 2 stage, 2 x 100% booster compressor train where it is compressed from 7 bar to 22 bar then again to 68 bar. Ofgas from the low pressure 2nd stage separator is compressed by a single train flash gas compressor and routed to the suction of the booster compressors. The booster compressor discharge gas is then dehydrated and routed through CO2 removal membranes to bring the gas to export pipeline spec of 1.6% Mol CO2. The rich CO2 permeate stream is routed to mix with fuel gas and is burnt in the 3 Solar turbines for power generation. The now on-spec gas is fed to a low temperature separator for dew point control then on to the suction of the 2 x 100% export compressors. Its pressure is raised from 42 bar to 150 bar and is sent to gas export or gas lift.

Export facilities

The BW Catcher has stabilised crude oil storage of 650,000 barrels. Oil is exported via shuttle tanker. Gas export is to a SEGAL tee 61km to the E of the FPSO.

Future third party tie-ins

The FPSO has 4 spare riser slots in its buoy/turret assembly for a production riser, gas lift riser, water injection riser and dynamic umbilical to be pulled in if needed. It is also possible to 'daisy chain' onto the end of any of the drill manifold tow heads.

Entry specifications

- Crude Oil: Produced fluids should not contain any material that would affect the merchantable value of Catcher products.
- Gas: Free of odours, materials, sand and solids/fluids that might interfere or damage the proper operation of the Catcher FPSO facilities.

Export specifications

- Crude oil: Dehydrated medium quality (25-31°API)
- Gas must meet the SEGAL specification
 - H2S: 15ppm vol
 - CO2: 1.6 mol %
 - Max export pressure: 172.4 bar(g)

Available capacities

The capacity information is portrayed by colour coded traffic lights that reflect thresholds of availability over the next 5 years.

Processing Facility	Total Capacity	2021	2022	2023	2024	2025	Comments
Crude oil capacity	66,000bbl/d						
Total liquids capacity	125,000 bbls/d						
Produced water handling capacity	125,0000 bbls/d						
Total water injection capacity	125,000 bbls/d						
Gas compression capacity	60 mmscf/d						For export/gas lift

>25% capacity available	
5% - 25% capacity available	
<5% capacity available	

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Disclaimer:

While this information has been prepared in good faith, no warranty or representation (implied or expressed) is made as to its accuracy, completeness or relevance for use by any other party and no liability is accepted by Harbour Energy under any circumstances relating to the information and the use thereof

Contact Information

info@harbourenergy.com

T: 44 (0) 1224 618900