

Reducing CO₂ emissions for Offshore oil and gas Operations under ETS



Reducing CO2 emissions for Offshore operations under ETS

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What is the Emissions Trading Scheme (ETS)?

What is ETS?

- EU Emissions Trading Scheme (ETS) is aimed at combating the threat of anthropogenic climate change
- Introduced in 2003 to achieve the EU's targets for reducing Greenhouse Gas (GHG) emissions under the Kyoto Protocol
 - Development in phases (trading periods), currently in Phase III (2013 2020)
- First and largest world wide system for trading GHG emission allowances
 - 11,000 power stations and industrial plants in 31 countries, as well as airlines

- Works on the 'cap and trade' principle.
 - Total cap set for GHG / CO2 emissions
 - Phase III CO2 emissions reduced by 1.74% annually
 - Purchase and trade of EU allowances (EUAs)
 - Receive free allowances, if eligibility criteria are met (Also account for 'carbon leakage')
 - Purchase EU allowances and/or credits from approved energy saving projects worldwide
- Companies within ETS
 - Must annually surrender EUAs for every tonne of CO₂ emitted in the previous year



How much does ETS cost?

- Cost for EUAs
 - Demand collapsed during economic recession 2008/9
 - 2013 €4 / te CO2, 2015 €7 / te CO2
- EU are increasing price of EUAs
 - 2014 deferred auction of 900 million allowances
 - Market Stability Reserve (MSR) to manage supply of allowances from 2019
- 30 25 EUA Spot Price (€/te CO₂e) 20 15 10 5 August 2015 predicted average 0 2008 2009 2010 2011 2012 2013 2014 2015 Source: ICIS Heren, Intercontinental Exchange
- No explicit carbon price target but anticipated €20-30 / te CO2

Direct costs of ETS for Offshore oil and gas operations

- Upstream E&P (100 offshore installations & 26 onshore terminals)
 - Emitted 14.7 million tonnes of CO2 equivalent (mainly CO2 and methane) in 2014
 - 3% of total UK GHG emissions
 - CO2 emissions from combustion of fuels for electricity generation and compression and emergency flaring
 - Phase III £20 £25 million per year
 - Phase IV post 2020, if carbon price €25
 / te CO2, cost will be £125 £150
 million per year



Direct costs of ETS for Offshore oil and gas operations

- 37% decline in CO2 equivalent emissions 1996 2014
 - Decline in production and decommissioning in UKCS
 - Efforts to minimise all avoidable emissions and improve energy efficiency / emissions intensity
 - Energy consumption and flaring in Europe lower than elsewhere in the world due to stringent environmental and safety regulations (IOGP)



ETS compliance costs

- Regulatory compliance
 - €100 tonne mandatory fine for failure to surrender allowances equivalent to CO2 emissions
 - €20 tonne fine for Noncompliance with reporting requirements



ExxonMobil fined 'record' £2.8m over carbon dioxide emissions

() 19 February 2012 | Edinburgh, Fife & East Scotland

Energy giant ExxonMobil was fined £2.8m for failing to report carbon dioxide emissions from its Mosmorran chemical plant in Fife, it has emerged.

The Scottish Environment Protection Agency said there had been no direct environmental impact.

The fine, believed to be the biggest ever in the UK, dates to 2010 but the details have only just been published.



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In its 2008 report to Sepa the company failed to account for 33,000 tonnes of carbon dioxide from its ethylene plant in Mosmorran and Sepa issued the fine in 2010



Premier Oil UK Ltd

- Company Profile
 - Aberdeen office, 250
 staff; 5 Environmental
 Advisors
 - Three key UKBU offshore assets Balmoral, Solan, Catcher



- UK Business Unit wide ETS Management
 - Ensure Implications of ETS understood throughout all asset / project
 - Roles and Responsibilities
 - Resourcing / competency

ETS case studies - Balmoral FPV

- Balmoral Floating Production Vessel (FPV)
 - FPV commissioned 1986
 - Production Hub for Balmoral, Brenda, Glamis, Stirling and Nicol fields and also Talisman-Sinopec operated Beauly and Burghley fields
 - Oil Export to Forties Pipeline System (FPS)
 - No Gas Export / Import facility gas is used as gas lift for wells, fuel gas and flaring



Balmoral FPV – ETS CO2 emissions

- CO2 emissions
 - Current oil production 7,000
 bbls/day
 - Power generation Dual Fuel
 Solar Turbine, Ruston Turbines
 - Power demand 6.5MW th
 - Fuel sources are fuel gas and diesel
 - Emitted 85,000 tonnes of CO2 in 2014
 - 79% combustion processes for power generation (majority of power generation is electricity), 21% flaring



Reducing CO₂ emissions on ageing assets

- General Issues
 - Equipment and infrastructure already in place (pre ETS era)
 - Obsolete / inadequate metering & data management
- Power Generation Strategy
 - Use of fuel gas rather than diesel
 - Reduced spinning reserve / number of turbines online
 - Optimise the control set points in Energy Management System
 - Turbine engine overhaul / replacement with spares

Case Study – Catcher Development

- Catcher development – 3 subsea tiebacks: Catcher, Varadero and Burgman
- New FPSO and gas export/import line Production of hydrocarbons via gas lift and water injection
- Export of oil via tanker and initial export of gas to Fulmar gas line

Catcher development – ETS CO2 emissions

- CO2 emissions
 - Total oil production peak at 47,000 bbls/day
 - Fuel gas export / import
 - Power demand 17-39 MW th
 - Estimated 388,733 te/year CO2 emissions
 - Estimated cost €3 million per year
 (based on €8/te CO2)
 - Mitigation measures planned:
 - Gas Export / Import
 - Waste heat recovery
 - Flare recovery package

Source: Catcher Development Environmental Impact Assessment

Reducing CO2 emissions for new developments

- ETS and new developments
 - Process / power generation designed and operated to minimise emissions
 - Measurement (metering / sampling) appropriate
 - Automated data gathering & production modelling
- All of this has to be integrated into planning / commissioning from the earliest project stages

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Summary

- ETS is important and evolving
 - Need to be aware that ETS scheme (Phase IV) and compliance is changing
- In short term key issue is compliance
- In longer term need to consider total emissions (EUA's) as well as compliance
- Key actions to support reduction in CO₂ emissions are:
 - Improving production / operational efficiency
 - Need to consider during project planning
- Decisions to invest have to recognise the importance of ETS

