



Stikords referat Offshore seminar DONG Energy

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Foredragsholdere DONG Energy

Vice president Jesper Nørrelund
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Introduction to DONG Energy
5/98 Hejre
5/98 Hejre
DONG Energy's brug af Achilles JQS
Nini East Development Project
2020 Visionen for Siri-området

Dette referat er udarbejdet på basis af foredragsholdernes power point præsentationer og omhandler kun indlæg fra DONG Energy. For informationer vedr. Achilles henvises til www.beta.achilles.com/Denmark

Til referatet skal tilføjes, at DONG Energy efter endt seminar har oplyst, at såfremt man som underleverandør ønsker kontakt til DONG, vil Vice President, Jesper Nørrelund og Senior Manager Pernille Skipper være behjælpelig med at formidle kontakt til rette kontaktperson i DONG Energy organisationen.

Introduction to DONG Energy

v/ Vice President Jesper Nørrelund

DONG Energy – Business areas



Greifswald

DONG Energy plans to build a coal fired power plant in Germany (2x750MW)

- ♦ German power consumption increases by 2% p.a. Existing plants are old and moving closer to shutdown –together with German nuclear
- ♦ Coal required in struggle to close supply gap
- ♦ DONG Energy efficiency in coal fired power plants –Greifswald efficiency of 47% compared to German average of 37%
- ♦ Final DONG Energy decision on project sanction by end 2008 –with earliest production start in 2H/2012

If all coal-fired power plants were as efficient as DONG Energy's plant in Esbjerg:

- ♦ Global CO₂ from coal: 30%
- ♦ Global CO₂: 9%

Bioethanol

DONG Energy has been conducting bioethanol research for almost ten years

- ♦ First-generation bioethanol production is based on grain, maize, sugar cane and other raw materials
- ♦ DONG Energy's second-generation technology is unique as we are able to produce bioethanol from cellulosic biomass such as straw
- ♦ Symbiosis between a bioethanol plant and a power station in DONG Energy's concept
- ♦ Bioethanol replacing oil consumption will reduce CO₂ emissions noticeably

Renewable energy

DONG Energy has been involved in 5 out of the World's 10 large offshore wind farms We are planning to invest DKK 10 billion wind power from 2008 –2010

- ♦ Horns Rev II
- ♦ Walney
- ♦ Gunfleet Sands I+II
- ♦ and more

Carbon Capture & Storage

DONG Energy targets

- ♦ To secure that coal fired power plants are among the most efficient in Europe
- ♦ Establish Carbon Capture & Storage (CCS) demo plants before 2015
- ♦ We expect technology to be available in 10 to 15 years CCS activities in DONG Energy context
- ♦ Capture and store CO₂ from DONG Energy power plants
- ♦ Develop methodology to use CO₂ for Enhanced Oil Recovery (EOR)
- ♦ Develop new business activities within CCS, e.g. infrastructure, new areas of cooperation and alliances

Electric car cooperation

DONG Energy plans cooperation with "Project Better Place" to establish electric car charging grid in Denmark

- ♦ Electric cars enables use of renewable energy
- ♦ One 2 MW windmill provides electricity for 3,000 electric cars
- ♦ Charging will primarily take place at night with excess wind power production
- ♦ Electric cars are 4 times as energy efficient as hydrogen cars
- ♦ Even if all car electricity came from coal fired power plants, the CO₂ emission would be 50% compared to a conventional car

DONG E&P –Organisation

DONG Energy Values - E&P Value definition frame

Result-oriented

- ♦ We run an efficient company that is focused on creating value
- ♦ E&P: Deliver on our promises

Responsible

- ♦ We show consideration for people, the environment and markets in all our activities
- ♦ **E&P: Respect people and environment**

Responsive

- ♦ We are open to new ideas and willing to act accordingly.
- ♦ **E&P: Notice, reflect and respond proactively**

DONG E&P Focus areas

Producing fields with DONG E&P share

Operators:

Siri/Stine:	DONG
E&PNini:	DONG E&P
Cecilie:	DONG E&P
Syd Arne:	Amerada Hess
Lulita:	Mærsk
Ula:	BP
Gyda:	Talisman
Tambar:	BP
Glitne:	Statoil

DONG Energy meets every challenge



5/98 Hejre

v/ Asset manager Kristian Kudsk Andreasen og Morten Rosenløve

Licence 5/98 :

DONG E&P A/S	50 %
StatoilHydro	25 %
PetroCanada	25 %

Licence 01/06 :

DONG E&P A/S	40 %
Hydro	20 %
PetroCanada	20 %
Danish North Sea Partner	20 %

Hejre Development status

- ♦ **1998:** License granted
- ♦ **2001:** Hejre 1 drilled -showed hydrocarbons, but poor well logging results, no production test
- ♦ **2004:** Hejre 2 drilled with promising results -production test better than expected
- ♦ **2004-2005:** Evaluation of well results
- ♦ **2005 July:** Decided after debate (Decision Risk Analysis) in the license to pursue development and not appraisal. COPNO sets up Hejre Team
- ♦ **2006 March:** COPNO tries to pass internal decision gate with phase development concept –decision gate postponed
- ♦ **2006 October:** COPNO fails to get support for development in COPNO Management -> proposes to drill new appraisal wells. PetroCanada also seems to be interested in appraisal wells. Hydro and DONG favours development.
- ♦ **2007 January:** COPNO decides to try to sell Hejre. Work in license is slow
- ♦ **2007 March:** DONG Energy acquires ConocoPhillips Denmark(5/98,01/05 and 4/98)
- ♦ **2007 May:** DONG takeover of Hejre Operatorship
- ♦ **2007 July:** Project Team with 10 persons
- ♦ **2008 May:** Dong E&P team with 35 people working on Hejre

Hejre Development ProjectSub Surface

- ♦ Two wells have been drilled in the Hejre field, and challenges arise from the close proximity of the two wells...Are they representative and do they give enough information about the entire field?...
- ♦ One of the most important parameters for quantifying volumes is the oil-water contact (OWC). Geological and reservoir modelling is ongoing to evaluate uncertainties and the range of volumes...
- ♦ 2-3 wells is planned to be drilled prior to installing the process platform and they will target the center of the field. The following wells will have a longer step out from the platform...
- ♦ A conservative approach is used when planning the wells with relatively simple wells as a base case... Horizontal wells are being evaluated as an opportunity for optimising productivity...
- ♦ Hejre is among the most challenging High Pressure High Temperature fields in the North Sea

Hejre Development Project Export solutions

- ♦ Hejre -Infrastructure Host options
- ♦ Hejre InfrastructureExport Options –Status May 2008

Hejre Development Project

- ♦ Hejre Development Project Organisation –Analysis phase
- ♦ Hejre -Key challenges/decisions
 - 1. Subsurface:** Extent and Productivity of reservoir? How can we cost effectively drain the reservoir ?
Drill centres –One or more?
 - 2. Wells:**HPHT challenges. Vertical, deviated or horizontal? Extent of pre-drilling before production?
 - 3.Host/Platform solution:** Several concepts are possible. What is most cost effective and still flexible ?
 - 4.Export routes:** Hejre to connect into existing Oil, NGL and Gas infrastructure. Several opportunities exist. Solutions will have impact on Platform solutions
 - 5.Markets situation:** Limited yard and vessel capacity and Long lead items.How can we be flexible in our concepts to utilise the challenging market situation ?

Hejre –Terminology

Hejre NGL Study conclusion:

- ♦ Excess NGL –Too much to maintain concurrent Dry Gas and Stab. Oil export spec's
- ♦ Overall infrastructure must provide NGL value capture

Hejre Development – Key Data

- ♦ Water depth 70 m. Generally silty sand with clay layers. Minor variations in water depth
- ♦ Reservoir is HPHT. Initial wellhead conditions of some 835 bar and 145 oC. Pressure Protection system needed towards topsides piping
- ♦ Standalone Concept (Live Oil) has oil and dry gas pipeline export. WPUQ topsides weight estimated 10800 ton (dry).
- ♦ Standalone Concept (Rich Gas) has rich gas pipeline export. Oil goes to pipeline or Storage Tank 300-500,000 bbl. WPUQ topsides weight estimated 8800 ton (dry).
- ♦ Number of wells: Preferably 3 predrilled and total in range 6 -9
- ♦ Expected total fluids production rates 35-45,000 bpd. Gas compression requirements 115-145 mmscfd export gas.
- ♦ No initial produced water. Less than 2000 bwpd is expected later in field life.
- ♦ Pipelines to be fully buried and trenched, preferably by plough method

Hejre Stand-alone Facility

- ♦ **Topsides:**
 - Well bay for around 12 wells
 - Topsides with full processing. Stabilised or Live oil. Gas export to fit host infrastructure
 - Utilities and Living Quarters
- ♦ **Substructure:**
 - Jacket, or
 - Integrated subsea Oil Storage of 500,000 bbl with offshore loading to tankers

- ♦ **Pipelines and Tie-in:**
 - Gas: 14" Pipeline to 3rdparty pipeline
 - Oil: As above or 2 km 20" Pipeline to Offloading system (SAL or similar)
- ♦ **Concepts:**
 - Jacket + Topside
 - Pre-drilling
 - Self installed unit?

Hejre CPP Facility at Host

- ♦ **Hejre wellhead platform**
 - Unmanned wellhead platform with 12 well slots, 4-legged jacket and helideck
- ♦ **Pipeline to CPP**
 - 12" Multiphase Pipeline
- ♦ **Process Platform (CPP)**
 - Located next to Host platform and connected via bridge
 - Full processing and Utilities. Two power turbines. Sharing opportunity with host
- ♦ **Host platform**
 - Bridge landing and tie-in modifications
 - Accommodation
 - Sharing oil storage/export and gas export

Hejre – central Development in Denmark – more to come

DONG Energy's brug af Achilles JQS

v/ Senior Manager Pernille Skipper

Lovgivning

- ♦ DONG Energy er underlagt Forsyningsvirksomhedsdirektivet
- ♦ Alle køb over DKK 3 mio. skal konkurrenceudsættes
- ♦ Skal offentliggøres eller køres igennem et kvalifikationssystem

Achilles JQS

- ♦ Anvendes siden 1999 i DONG E&P
 - ♦ Adgang til ca. 2000 prækvalificerede leverandører inden for olie og gas
 - ♦ Forkortet og forenklet procedure
 - ♦ Gennemskuelig oversigt over kompetencer
 - ♦ Efterfølgende yderligere shortlisting
 - ♦ Ofte mere målrettet end EU-udbud
 - ♦ Anvender Sellichia (eI-markedet) og Connexio (Tyskland)
 - ♦ Samarbejder med Achilles omkring samkøring af krav (f.eks. QHSE og CSR)
 - ♦ Aktiv markedsføring på hjemmeside
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Nini East Development Project

v/Projektleder Svend-Erik Jensen

General Overview

Nini East Development Project -License 4/95 Partners

- ♦ DONG E & P A/S –40% (Operator)
- ♦ RWE DeaAG –30%
- ♦ Noreco–30%

Nini East Development Project – Field Location

Nini East Development Project – Project Data

- ♦ Total investments DKK 2.1 billion (ex. WI replacement)
- ♦ Estimated reserves 17 mio. barrels
- ♦ Water depth: app. 60m
- ♦ Design life: 12 years
- ♦ Pipeline main design code: DNV-OS-F101
- ♦ Platform main design codes: ISO / DS / NORSOK / API
- ♦ Non-sour service
- ♦ Design pressures: 93 / 234 / 247 bar
- ♦ Design temperatures:
 - max 80 C
 - min –10/-43 C

Nini East Development Concept

Nini East Development Project – Subsurface

- ♦ Siri Area Fields –Oil migration route along southern edge of Siri Valley
- ♦ Nini Field Area
- ♦ Nini East Well Locations –500 m grid –Top Hermod –5m CI –FWL, GOC
- ♦ Nini East Base Case Well Pattern, 3 P + 2 WI
 - Five wells are included in the base case well pattern, only three wells will be drilled initially. The remaining two wells will only be drilled if concluded necessary based on field production experience

Nini East Effect on Nini Main Production

- ♦ Nini East will increase the manifold pressure at the Niniplatform. This will cause reductions in Ninirates.
- ♦ The reductions have been estimated using iterations with Eclipse and Hysys
- ♦ A negative incremental-profile for NiniMain has been estimated
- ♦ The incremental profile has been subtracted from the stand-alone NiniEast profile to form the net NiniEast profile

- ♦ It should be noted that this approach is conservative, as the incremental profile is treated as lost oil. This oil is likely to be produced at later times

Nini East Development Project – Drilling & Completion Work

- ♦ Rig or vessel installs the drilling template (2008)
- ♦ Drilling of up to three wells to top reservoir prior to Platform installation
- ♦ Mudline suspension of wells
- ♦ Drilling of (up to 3) reservoir sections & well completions after PF installation
- ♦ Drilling and well location under planning
- ♦ Facilities and Transport Systems

Nini East Development Project – Development Concept

- ♦ Wellhead platform tied-back to existing Nini platform
- ♦ Local water injection
- ♦ Base case 5 wells –3 wells up to first oil –platform prepared for 10 wells
- ♦ Modification of the Nini platform
- ♦ Control system at Nini and Siri to be upgraded
- ♦ Tie-back by (utilising pre-installed risers)
- ♦ 8" Multiphase Flow line
- ♦ 4" Gas Lift line
- ♦ 10" Water injection line
- ♦ Replacement of existing 32 km 10" WI pipeline between Siri and Nini

Nini East Development Project - Nini East Platform Works

- ♦ Complete platform with topsides and substructure
- ♦ Based on a design similar to the Nini platform (tender based on functional specification)
 - Controlled from Siri with Line-of-Sight (LOS)
 - PPPS on multiphase pipeline
 - Pig receivers and launcher
 - Hydrate (Mono Ethylene Glycol -MEG) wax, corrosion and scale inhibitor injection tanks on the platform
 - Metering and power generation
- ♦ Future caisson with 12", 10", 6" and 4" risers all rated for maximum gas injection shut-in pressure
- ♦ Expected weights:
 - Jacket approx. 2000 tons
 - Topside approx. 650 tons

Nini East Development Project - Nini Platform Modification Works

- ♦ Tie-in to production manifold from pre-installed riser, including ESDVs
- ♦ Tie-in to gas-lift and water injection manifolds from pre-installed risers, incl. ESDVs
- ♦ Pigging by-pass
- ♦ Deck extension (for chemical skid (MEG) and pig launcher/receiver)
- ♦ Instrumentation
- ♦ Tie-in to existing Control and Power Supply systems
- ♦ Commissioning

Nini East Development Project - Siri Platform Works

- ♦ Primary modifications on Siri will be related to the Safety and Automation System (SAS):
- ♦ Establishment of new operator displays
- ♦ Expanding the Trend server license to accommodate the new Nini East data
- ♦ Updating of the production database server
- ♦ Other minor modifications will be related to the Line of Sight and radio systems

Nini East Development Project – Nini East subsea pipelines

- ♦ 8” insulated production pipeline between Nini and Nini East.
- ♦ 10” water injection pipeline between Nini and Nini East.
- ♦ 4” gas injection pipeline piggy-backed to 10” WI pipeline.
- ♦ All pipelines to be ploughed/jetted to safe depth and dumped with rock at tie-in spools connection at Nini and Nini East.
- ♦ Pipeline design to follow DNV-OS-F101. Steel shall meet the requirements of ISO-15156-2
- ♦ Pipelines to be laid J-lay vessel (Falcon).

Siri – Nini WI Pipeline Replacement Considerations

- ♦ Diameter of pipeline
- ♦ Route for new pipeline
- ♦ Material
- ♦ Length of pipeline to be replaced
- ♦ Re-use of risers
- ♦ Re-use of tie-in spools
- ♦ Schedule requirements
- ♦ Abandonment of existing pipeline and equipment

Replacement pipeline specification

- ♦ 10” Carbon steel pipeline between Siri and Nini
- ♦ Pipeline to be placed as close to the existing pipeline as possible
- ♦ 6-8 mm corrosion allowance (original pipeline 4 mm)
- ♦ Re-use of Siri and Nini risers
- ♦ Re-use of spools at Siri
- ♦ New tie-in to Stine wellhead (use of CRA steel under evaluation)

Pipeline laydown at Stine

Nini East Development Project – Nini platform layout (currently)

Nini East Development Project - Nini Platform

Nini East Development Project – Contracts

Nini East Development Project – EPCI Platform Contract

- ♦ Participating Tenderers
 - Bladt Industries (HL by HMC)
 - Heerema Fabrication (Vlissingen) (HL by HMC)
 - SLP Engineering (HL by Seaway)
- ♦ Nominated to proceed to Detailed Evaluation
 - Bladt Industries
 - Heerema Fabrication (Vlissingen)

Nini East Development Project – EPCI Pipelines and Subsea Contract

- ♦ Participating Tenderers
 - Acergy Norway
 - Allseas
 - Helix Energy
 - Saipem UK
 - Technip UK & Norway
- ♦ Nominated to proceed to Detailed Evaluation
 - Acergy Norway
 - Technip UK & Norway

Nini East/WI Pipeline Replacement Projects – Status Contracts

- ♦ Nini East Pipelines/subsea (FA Call-Off No. 1)
 - Contract for call-off 1 signed with Acergy (Frame Agreement)
 - Project Kick-off meeting held in Aberdeen 11/4
- ♦ Siri-Nini WI Replacement Pipeline (FA Call-Off No. 2)
 - Letter of intent issued
 - Contract based on Frame Agreement and Call-Off No.1
- ♦ Wellhead Platform
 - Contract signed with Bladt Industries
 - Project Kick-off meeting held in Aalborg 17/3

Nini East/WI Pipeline Replacement Projects – Contracts cont'd

- ♦ Pre-drilling template
 - Tenders received
 - Evaluation and clarification ongoing
 - Only one supplier/contractor has included installation

Nini East/WI Pipeline Replacement Projects – Contracts cont'd

- ♦ Major subcontractors
 - Acergy:
 - Vallourec-Mannesmann (France/Germany)
 - Logstor (DK) : Insulation
 - DNV (Esbjerg):
 - Third party verification
 - Global Maritime (UK) : Marine Warranty Survey

- Bladt Industries:
- Hereema Marine Contractors (Dutch)
- Ernterbrücke Eisenwerk (Germany): Structural steel
- Valtor (DK) : Valves package
- Marine Aluminum (NO): Helideck + firefighting
- Dreggen (NO): Crane
- DNV (Esbjerg): Third party verification
- Global Maritime (UK) : Marine Warranty Survey

Nini East Development Project - Organisation and schedule

- ◆ Project Organisation -Sep 2007
- ◆ Schedule and Progress

WI Pipeline Replacement Project –Schedule and Progress

2020 Visionen for Siri-området

V/ Director Morten Aagesen, DONG E&P Denmark – Producing Assets

Udbygningen af Siri-feltet blev besluttet i 1997

- ♦ Produktionsstart: 1999
- ♦ Planlagt levetid: ca. 7 år
- ♦ I dag producerer vi fra 5 felter i området
 - Cecilie
 - Siri
 - Stine S1 & S2
 - Nini

Infrastruktur i Siri-området

Kreativitet og ny teknologi: 4D Seismik viser nye boremuligheder

Ny brønd baseret på 4D seismik

Udbygning omkring eksisterende infrastruktur

- ♦ Produktion fra Siri-området
 - Historisk produktion
 - Fremtidig produktion

Omkostningseffektiv produktion

- ♦ Cost Gap McKinsey Benchmarking 2001-2006
- ♦ Total TQ Gap Ranking by Field for Norway and UK North/Central Regions

Levetidsforlængelse –eks: SAL system til offshore loading

Konklusion: hvad skal der til for at opnå succes?

- ♦ Mod
- ♦ Samarbejde
- ♦ Planlægning
- ♦ og sidst men ikke mindst: de rigtige mennesker!