

DNV Energy News

Information from DNV to the energy industries No. 2 September 2007



Carbon is bubbling in the North Sea

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- Petrobras: Deeper and deeper
- Harmonising industry standards for the Barents Sea
- Norwegian Prime Minister: DNV has the key to the climate solution



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Front cover photo:
Getty Images/Ulrich Kerth



The UN's Inter-governmental Panel on Climate Change pictures a rather disturbing state of the earth. The key message is that we have to invest now to have a future to live in.

Even though there are promising technological developments on cleaner and renewable energy, we all know that the traditional sources of energy – oil, gas and coal – will continue to dominate the future energy picture.

Fortunately, I believe that the year of 2007 has so far been a milestone when it comes to realising the global challenges, and the industrial, public and political agenda have never been more focused on the earth's most vital issue.

I strongly believe that the Carbon Capture and Storage (CCS) option is the enabler for a cleaner and more sustainable development of the earth. However, there are still a great number of obstacles that need to be dealt with – all related to the regulatory, legal, economic and technological risks involved in developing and operating a CCS system. The solution is not obvious as it requires diligent balance of many and even conflicting goals. In addition there are many different stakeholders with different interests and views. Hence the agenda is a complex one.

Paralleled with the CO₂ challenges, it is also vital for the world to have a reliable energy supply produced at the lowest possible risk for health and the environment. This becomes even more crucial as energy sources are located in deeper and harsher areas.

DNV is an independent foundation, and our role for 143 years has been to assist in balancing the needs of business and society. In parallel, the world's energy challenges are exactly about balancing these needs. This is illustrated through our CO₂ role together with the industry and Governments in Norway, UK, and USA, in addition to the Joint Industry Projects DNV has launched.

For our energy customers it's all about achieving security of supply and operations excellence by safely and responsibly creating value for all stakeholders. To achieve this, the operator must rely on state-of-the technology and practices. Read about this in *DNV Energy News*, where for example Petrobras has taken its responsibilities on many dimensions.

Today, it's obvious that single companies and countries no longer can isolate their responsibilities. We believe that DNV's industry, technology and risk management experience will bridge this reality to a safe and sustainable future.

It's no longer about you and I – it's about us.

Hari Vamadevan, Director of Operations in Europe and North Africa, DNV Energy

DNV assists Shell with information security

Shell and DNV are now putting in place systems and procedures to secure the gas production at Nyhamna at the Norwegian west coast.

DACA (Data Acquisition and Control Architecture) is a framework that Shell has developed to secure the systems in the Process Control Domain (PCD). It specifies how a process facility is to be structured, maintained and operated. At the same time, DACA sets standards for how IT systems and information in a production facility shall be secured.

“The project for Ormen Lange, which will provide 20 per cent of the UK gas demand for the next 40 years, aims to fulfil all the requirements in the DACA standard, in addition to meeting the Norwegian Oil Industry Association (OLF) security requirements. The OLF standard, Information Security Baseline Requirements (ISBR), is developed by DNV in cooperation with the operators on the Norwegian continental shelf and their suppliers. This project will also form the basis for applying for certification and, if we succeed, Ormen Lange will be one of the first process facilities to achieve certification in information security,” says Hans



It is vital that IT systems and information in the Ormen Lange production facility is secured.
Illustration: Hydro

Jørgen Wimpelmann, PCD information security manager for Ormen Lange.

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Papers presented at Offshore Europe 2007 in Aberdeen

Key Learnings from Audits of Offshore Maintenance Management

Speaker: Ian Wright, head of section, Pressure systems, materials & corrosion, DNV Energy.

The ageing UK offshore oil and gas infrastructure and a higher oil price are bringing new challenges to those with responsibilities for maintaining effective, safe and reliable operation. While the knowledge and experience of the physical degradation mechanisms which can compromise integrity, reliability and availability are widely documented and freely available, there are many critical activities essential to assure a successful maintenance regime to promote and support high levels of production and safety.

This report shares the qualitative findings and impressions of assessors from the results of 152 interviews with

personnel onshore and offshore, working within four offshore operating companies with eight offshore and one onshore installation. The information was gathered and interpreted from 2005 to 2007, and is believed to reflect some of the main challenges affecting the activities supporting maintenance in the current operating climate in the North Sea.

WindStore, Large-Scale Energy Storage Offshore

Contacts: Gus Cammaert (DNV), John McCurry (PGL), Martin McAdam (Airticity), Thomas Boehme (DNV).

WindStore is a research project focusing on compressed air energy storage (CAES) in the UK and Ireland, both onshore and offshore. CAES uses low-cost electricity at off-peak times or from renewable projects to compress air into a subsurface void or reservoir for storage. At peak times or when required the compressed air and additional fuel drive a turbine to generate electricity. This paper describes the applications

and likely economics of small and large CAES plants located offshore, with focus on the North Sea. It is outlined how CAES can allow a more economic use of high-voltage DC transmission links in future offshore networks.

Qualification of CO₂ Capture Technology

Contact: Kaare Helle, DNV.

It is expected that a significant part of the world's future need for electrical energy and heat will come from burning of natural gas, oil and coal, implying increased CO₂ emissions to the atmosphere. A strong technology development of the CO₂ capture technology is therefore needed to mitigate the effect on the climate. The energy sector, especially the oil and gas segment, has historically been slow in employing new technology. Thus, there is a need to develop and qualify new technological solutions that capture CO₂ when burning fossil fuels.

Audits for BP Alternative Energy

BP Alternative Energy has awarded DNV Energy a contract to support in the delivery of a series of operational and maintenance audits of their Europe and Asia alternative energy assets.

BP was one of the first major energy companies to publicly acknowledge the need to reduce carbon emissions. BP Alternative Energy was set up in 2005 and aims to invest USD eight billion in solar, wind, hydrogen and natural gas power technology over the next ten years.



Carl Jaske has received the highest recognition from ASME.

Today, BP Alternative Energy has established operations in Spain, Korea, The Netherlands, UK, and India. All of the locations will be subject to review.

The sites involve both wind farms and combined cycle gas turbine power plants (CCGTs), and DNV Energy consultants will be required to not only understand the HSE risk implications of the activities but also comment on the effectiveness of the operational and maintenance processes.

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BP will invest USD eight billion in alternative energy. Photo: BP

DNV CCT veteran receives highest honor

Carl Jaske, senior project manager for DNV CCT, has received the Pressure Vessel and Piping Medal from the American Society of Mechanical Engineers (ASME). This medal is the highest award from the ASME Pressure Vessel and Piping Division.

DNV CCT is a DNV-owned company specialising in corrosion, materials and integrity evaluation.

"We are very pleased and grateful for Carl Jaske's contribution to Pressure Vessel and Piping (PVP) over the years and wish to honour him with the PVP Medal

in 2007," explained James Cory, PVP Division executive committee vice chair.

Carl Jaske received the award for his significant contribution to the field of pressure vessel and piping technology, particularly for advancing the state-of-the-art in the development of remaining life assessment of structures and equipment with emphasis on in-service ageing, stress-corrosion degradation and failure of engineering components.

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DNV services to the energy industry

Enterprise Risk Management

- Company-wide risk management
- Integrated risk management
- Project risk management
- Change management and process improvement
- Due diligence

SHE Risk Management

- Management systems and performance standards
- Technical risk and consequence assessment
- Emergency planning, response and investigation
- Human factors and occupational health
- Environmental impact and risk assessment

Operations Excellence

- Investment risk and solution screening
- Asset technology and lifecycle economics
- Performance forecasting

- Asset appraisal
- Operation optimisation
- Lifetime extension
- Asset safety system reliability

Offshore Classification

- Classification related to building and operation of MOUs and FPSOs
- Classification of tanker conversions to FPSOs

Verification

- Risk-based plant verification
- Risk-based subsea verification
- Risk-based structures and facilities verification
- Risk-based pipeline verification
- Product verification
- Marine operation verification and warranty services
- Rules/standards/regulations consulting

Technology Qualification

- Qualification of new technical solutions

- Materials technology
- Technical analysis
- Development of technical standards
- Laboratory services

IT Risk Management

- IT service management
- Software process improvement
- Information security
- Information management

Training

- Risk management
- Pipelines
- Materials and corrosion
- Industry standards and recommended practices
- Safety management
- Management systems

Certification

- Management system certification
- Climate Change
- Corporate Responsibility

China's largest FPSO hull built to DNV class

China's largest and one of the world's largest FPSO hulls has been delivered recently from Shanghai Waigaoqiao Shipbuilding to DNV class. This reflects an important milestone in China's largest offshore oil field development



The completed 300,000dwt FPSO hull – 323m long, 63m wide, 32.5m in depth. With a capacity of processing more than 190,000 barrels of oil per day and a storage capacity of two million barrels.

project – Bohai Phase II in Penglai Oil-field 19-3 area.

The project is being developed by Conoco Phillips China in partnership with China National Offshore Oil Corporation.

The Shanghai Waigaoqiao Shipbuilding Co (SWS) spent only 18 months to construct the biggest FPSO hull ever built in China, demonstrating that it is among the top shipbuilders in the global offshore engineering industry. The classification of the FPSO hull and mooring system is according to DNV offshore standards. All other installations are certified according to Chinese Safety Rules. These classification and certification activities are carried out by DNV.

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DNV class for Keppel FELS N-Class

Keppel FELS and DNV have signed an agreement for classification and statutory certification of three units of the new N-Class exploration jackup design. The N-Class is intended for operation in the Norwegian sector of the North Sea, and signals Keppel FELS' intention to re-enter this market segment.

The rigs on order will be built with both drilling and future production in mind. The rig owner, Skeie Drilling & Production ASA, is thought to have based this decision on a careful analysis of the needs of the oil and gas industry operating in the North Sea. The choice is a departure from the recent stream of orders for lower-spec jackup units for benign environments.

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The welding of the thick-walled pipes requires advanced equipment and process control, in order to ensure the necessary quality and productivity.

DNV assesses Russian pipe mill

DNV has over the past year been working with Vyksa Steel Works and OMK Steel in Russia to verify the quality of their subsea linepipe production work. Now, DNV has given our Russian customers a 'Statement of Compliance' with DNV-OS-F101 'Submarine Pipeline Systems'.

Nils Andreas Masvie, the regional manager for DNV Eurasia, explains that this is the first time DNV has verified a pipe production trial directly for the pipe manu-

facturer. "The normal procedure is to work with the pipeline owner and certify the whole system. However, the Russian manufacturer needed a nod of approval from DNV in order to participate in tenders for submarine pipelines, which have stringent quality control requirements. Over the past year, DNV has closely monitored and verified all aspects of the pipe production, and there is no doubt that the pipe mill fulfils all the requirements," he says.

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Helping Statoil bring subsea compression from idea to commercialisation

Within a few years the Midgard and Mikkell fields, located about 200 km off the coast of mid-Norway, will have hydraulic flow problems due to reduced pressure in the reservoir. Thus, there is a need for a compression solution to maintain the production volume and to avoid accumulation of hydrate inhibitor in the subsea flowlines. However, new subsea

compression technology can eliminate the need for manned offshore installations, hence reducing investments, operating costs and human risk factors.

DNV now assists Statoil in comparing the risk expenditures of different subsea compression technologies and a topside compression alternative. In addition, DNV is contributing to the process of establishing a technology qualification plan to obtain evidence from analysis and tests of performance margins for critical components according to DNV's RP-A203 qualification of new technology.

"Statoil has mainly been focusing on the investment and operating expenditures. DNV complements this by including risk expenditures, i.e. applying a bottom-up approach that links failure modes and degradation mechanisms with conceptual and financial decisions," says Fredrik Gustavsson, the head of the asset risk management section in DNV Energy.

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Carbon bubbling in the North Sea

A task force was established in 2005 to determine broad, common principles for how and where CO₂ could be stored beneath the North Sea. This was a significant commitment from the highest political levels and major oil and gas players in the UK and Norway. Now, it has delivered its first conclusions to the two countries' Energy Ministers.

Despite significant institutional uncertainties and associated risks, this report reveals a huge potential in reducing CO₂ emissions.

By the end of 2005, an 'Agreed statement by the United Kingdom and Norwegian Governments' had been signed in London by these countries' Energy Ministers. In this statement, they agreed to establish a North Sea Basin Task Force to develop common principles for managing and regulating the transport, injection and permanent storage of CO₂ in deep geological formations beneath the North Sea.

Since then the Task Force, composed of public and private bodies including DNV, has worked to complete its first deliverables. Lord Truscott, Minister of State for Energy in the UK, and Odd Roger Enoksen, Minister of Petroleum and Energy in Norway, have now received the Phase 1 report 'Storing CO₂ under the North Sea Basin'.

"This report is a result of the close cooperation that exists between our two countries. The transport and storage of CO₂ is a major aspect of this work, and the report proposes useful guidelines for the capture and transport of CO₂ with relevance to both countries. This is an important input to our work on how to handle climate challenges," Mr Enoksen said.

"It is very timely in providing sound and consistent guidelines for both our countries on the transport and storage of CO₂ beneath the North Sea. It means that both of us can effectively avoid future CO₂ emissions, and make a real contribution to solving the worldwide problem of climate change," signs Lord Truscott in the report.



Lord Truscott, Minister of State for Energy in the UK, received the first North Sea Basin Task Force report.



Odd Roger Enoksen, Minister of Petroleum and Energy in Norway.

Gap analysis from DNV

"DNV's role in the Task Force included carrying out the gap analysis to identify barriers to the deployment of Carbon Capture and Storage (CCS)," explains Ståle Selmer-Olsen, DNV's representative in the Task Force.

The Task Force report concludes that the benefits to the UK and Norway from the successful deployment of CCS in the North Sea Basin are enormous, but that it is clear that carbon capture and storage suffer from uncertainties and associated risks to be managed. The recommendation is to amend existing North Sea legal and regulatory frameworks to enable carbon capture and storage. Furthermore, DNV's idea of a management approach to carbon capture and storage projects using a risk-based qualification process for storage sites is recommended. Full accreditation of CCS under the EU ETS and

CDM/JI of the Kyoto protocol will be vital as commercial incentive. The benefits of independent verification of CCS projects were recognised.

Phase II in progress

Both Ministers have asked the Task Force to begin the second phase. Phase II will focus on:

1. Legal and Regulatory Frameworks
2. Financial and Other Incentives
3. Stakeholder Acceptance
4. Knowledge Sharing
5. North Sea CO₂ Infrastructure Study (supervising the work initiated by Gordon Brown and Jens Stoltenberg in 2006)

Text: Svein Inge Leirgulen

Key conclusions and recommendations of the report

1. The UK and Norway have a unique window of opportunity to lead the world in CO₂ capture and geological storage (CCS)

2. The UK and Norway stand to reap important potential benefits from CCS:

- Significant volumes of CO₂ emissions avoided by geological storage
- Reliable supplies of low-carbon electricity
- Potential additional domestic revenue and employment from enhanced oil recovery (EOR)

3. CCS still suffers from significant institutional uncertainties and associated risks. Critical issues to be resolved before CCS can be implemented on an industrial scale include:

- The requirement for appropriate legal and regulatory frameworks to enable CCS to
 - a. define a viable approach to long-term liability and stewardship
 - b. define criteria for risk acceptance and site qualification (permitting and licensing)
 - c. establish monitoring, verification, accounting and reporting requirements
 - d. remove barriers to CCS in international conventions affecting the North Sea (including EU directives and emissions trading schemes – ETS)
- Establishing financial and other incentives for CCS
- Ensuring CCS is implemented in a manner acceptable to stakeholders

Sources

- 1) The report: www.dti.gov.uk/files/file40159.pdf
- 2) www.norway.org.uk/policy/news/stoltenberg-brown.htm
- 3) www.hm-treasury.gov.uk/media/E/B/pbr06_carboncapture_uknorway.pdf
- 4) www.regjeringen.no
- 5) www.nsbtf.org/

“You have the key to the climate solution”

“DNV’s efforts represent a prerequisite for the success of our climate change policy,” said the Norwegian Prime Minister Jens Stoltenberg when he visited DNV in June. Aiming for the world’s most ambitious environmental policy, he turned to DNV to discuss international quota trading and CO₂ capture and storage.



“It is crucial that society at large has trust and confidence in the way the Clean Development Mechanism works. And this is where DNV comes into the picture: as an independent third-party verifier. You have the key to resolve the climate issue. What you are doing is extremely valuable to the environment,” said Norwegian Prime Minister Jens Stoltenberg (right) while visiting DNV’s headquarters, here with DNV CEO Henrik O. Madsen. Photo: Knut A. Andersen

Having issued an ambitious white paper regarding CO₂ emissions reduction, the Norwegian Government aims to take the world lead in green thinking and action. The white paper comprises the most ambitious climate goals any government in any country has presented in a document for a parliament to discuss.

The government promises that Norway will be carbon neutral by 2050 and that Norwegian emissions will be reduced by 30 per cent from 1990 to 2020. In addition, Norway will more than fulfil its Kyoto commitments by ten per cent.

“Norway will be a pioneering country as regards environmental policy. In order for future generations to have access to a healthy environment and unsullied nature, environmental considerations must be a part of everything we

do. We will develop our environmental policy based on the principle of sustainable development, which includes a requirement of solidarity with future generations, both internationally and in Norway,” said the Prime Minister.

Aiming to bring his country to the absolute forefront of climate friendly regimes, the Prime Minister spends much time studying all facets of the CO₂ emissions issue.

He arrived at DNV’s headquarters in June, accompanied by four key advisors, to discuss international quota trading and CO₂ capture and storage technology with DNV’s experts. Mr Stoltenberg had expressed an interest in paying DNV a visit to discuss and learn more about technological challenges and the quota trading mechanisms.

Text: Eva Halvorsen

Deeper and deeper

South America's number one producer of oil and gas has just achieved Brazil's long-standing goal of having a self-sufficient oil industry. Recently, Petrobras has also won recognised awards for its transparency, sustainability and technology, and is now diving deeper into the Brazilian basin to double its production during the coming years. However, a number of challenges have to be overcome first.

DNV Energy News wanted to discover what is going on deep below the Brazilian sea level and within the Petrobras organisation, so we asked Cristina Pinho, Petrobras' general manager of production installation, for an update from the Latin-American oil major.

Pinho appears to be a charismatic mix of a skilled business manager and a mechanical engineer. Before taking up her present position, she had a long technical career within the company, ranging from facilities installation manager to offshore production manager at a number of platforms and mooring and maritime terminal manager. So obviously, she knows her business very well from a number of angles. Our talk with her also revealed a broad knowledge of international business and politics – skills which no doubt smooth Petrobras' progress deeper into the Brazilian basin and its worldwide operations in the fields of oil, gas and alternative energy.

"The challenges are numerous, but we will solve them," she laughs confidently.

Doubling production despite a lack of resources

Brazil wants to double its oil production by 2015 and maintain its newly won oil self-sufficiency – and increase its gas production. To reach these goals, Petrobras will make substantial investments by 2015.

"We will invest USD 17.5 billion per year with one major goal: to almost double our production to 3.5 million barrels per day. And more than half of our investments are related to exploration and production," she explains.

The challenge is not the amount of money, but the lack of human and industrial resources in Brazil. "This is a general problem for our country, and we have so many projects that the local industry can't support all of them at the same time. Brazil today has more than 60 per cent local participation in projects, and we even want to increase this significantly. It's

good for the country and for the industry to support local interests," she states.

Being the major driver in Brazil's oil and gas business, Petrobras has a responsibility to deal with this challenge to develop the country's industry. "That's why the government launched the Programme of Mobilisation of the National Industry of Oil and Natural Gas together with Petrobras. This programme's objective is to improve the industry, the shipyards and human resources. We work very hard in order to obtain this support from the Brazilian market. It can be a challenge, but we put great efforts into this capacitating programme by sponsoring and pushing," she points out.

Deep diving into the basin

Petrobras also has a number of technology development programmes. "I would like to mention our PROCAP evolution, which started in 1986 with the PROCAP 1000. At that time, the main objective was to explore and produce oil down to depths of 1,000 metres. Today we have advanced to the PROCAP 3000 technology programme for ultra-deep water exploration and production, which deals with our operations to 3,000 metres. Actually, all the new developments are in deep waters of more than 1,000 metres, so apparently it was not meant to be easy to find oil in this country – it's not like in the Emirates where all you need is a hint of irony.

"Our reservoirs contain both light and heavy oil, but we want to discover more light oil and gas so as to significantly reduce the amount we import. Also, the increased demand from the Brazilian market is a major reason to increase exploration and production. Today, gas counts for only ten per cent of the Brazilian energy matrix, and we want to increase this to 15 per cent during the coming years, and of course Petrobras has a very important role to play in reaching this goal. Regard-

Petrobras

- Established in 1953 and is today a semi-public corporation with accounts to render to the Brazilian society
- Owns more than 100 production platforms, 16 refineries, 30,000 kilometres of pipelines and more than 6,000 gas stations
- Headquarter in Rio de Janeiro
- Present in 23 countries
- Operates in four business areas – Exploration & Production, Downstream, Gas & Energy, and International
- Reserves of 11,458 billion barrels of oil and gas equivalent
- Produced in 2006, more than 2.0 million barrels of oil equivalent per day
- Tanker fleet of 155 vessels



"Petrobras will invest USD 17.5 billion per year with one major goal: to almost double our production to 3.5 million barrels per day," says Cristina Pinho, Petrobras' general manager of production installation.

ing gas, we want to reduce our dependence on Bolivia and, by the end of 2008, we will increase our production by 30 per cent to 40 million standard cubic metres per day," she says.

"We have reservoirs of light oil, but in some cases it's difficult to drill there and sometimes there are high levels of contaminants, especially mercury. In one area, we have to drill 11 km between the

soil and reservoir. This is a record for us. The good news is that we are going to establish a new programme which combines different disciplines to address these new challenges.

"However, the new Santos basin is promising and is rich in light oil and gas. We have big plans for this area, with more than ten new units expected to be installed in the next 15 years. Parallel to

this, there are huge fields of ultra-heavy oil in the Campos basin that we will develop until 2011 using two new installations. In Brazil, the heavy oil doesn't have so many contaminants. It's heavy, but environmentally friendly – and actually not so difficult to process in our refineries," Cristina Pinho explains.

A big focus for Petrobras in future will be subsea separation. "We've established a four-year research project in which we will separate oil from water and re-inject this water into the reservoir," she says. "We are using an oil and gas separation system with boosting (VASPS). This equipment has been in operation since 2004 in the Campos Basin, and has increased our oil production by 1.5 million barrels in three years."

Good for business: Transparent, sustainable and social

Petrobras is increasingly being recognised as a highly sustainable company that contributes to the development of Brazil. Goldman Sachs' 2005 report on the Sustainable Investment Energy Sector cited the company as one of the world's six best investment opportunities. Furthermore, Petrobras rose from seventh to second place in the ranking of the Management and Excellence Annual Multi-Client Study 2006, which highlights the 15 most sustainable and ethical oil companies in the world.

Petrobras has now also been included in the Dow Jones Sustainability World Index, which acknowledges the most sustainable companies in the world. "This is an important recognition for us because we take economic, environmental and social questions seriously, and at the same time obtain good results," Cristina Pinho states.

"In addition to the operational aspects, Petrobras has a huge focus on the social impact of its operations. This is in line with our efforts towards social responsibility, highlighted by the Zero Hunger Program and the Petrobras Environmental Program," she says.

Last year, Petrobras was also listed on the New York Stock Exchange. This is very important for Petrobras' image and gives the company worldwide credibility. To



Petrobras emphasises its huge social responsibility and is deeply concerned with environmental preservation.

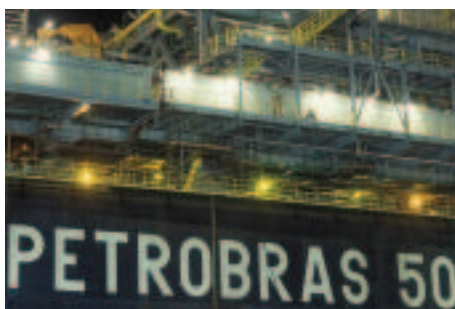
achieve a listing here, a company must have tight governance, processes and transparency, while keeping its operations very well organised.

Petrobras also achieved a high rating in the Dow Jones transparency evaluation. “The main reason for this is that we have put a set of instruments in place to ensure the transparency of our management throughout the organisation. Not least, in 2003 a direct link was established between the ombudsman’s office and the board of directors to strengthen Petrobras’ ethical conduct and transparency,” she explains.

Safety first

Although Petrobras has huge growth ambitions, she emphasises that these cannot be achieved at the expense of health, safety and the environment. Back in 2002, the company experienced two major accidents, leading to an even greater focus on reducing the risks posed to employees and the environment.

Cristina Pinho explains: “Due to these accidents, we started a programme to ensure the excellence of operational issues which aims to increase the safety on our platforms and onshore stations, in addition to our programme for excellence in environmental and operational safety. Both programmes have already led to dramatic improvements. In 2006, Petrobras recorded the lowest accident rate with injury leave in its 53 years of existence, with 0.76 accidents per million man-hours of exposure to risk. This number is below



Petrobras owns more than 100 production platforms, 63 exploration rigs, 16 refineries, and 30,000 kilometres of pipelines.

the world average for the oil and gas sector and also represents a decrease of ten per cent compared to the previous year.

“Clearly, one of our most important programmes is GIEN (Integrated Management of Naval Engineering), which gives us an instant response in the case of incidents. We established this together with DNV, and I’m convinced it’s unique and very advanced.

“The main emergency centre is located in Macaé city, north of Rio de Janeiro state, and is supported 24/7/365 by DNV. Here we store and can access all the platforms’ and installations’ instantly-updated main documents, and also have online access to response resources. For example, we can obtain immediate verifications and analyses of installations, such as stability checks and how to correct errors or accidents.

“In addition, we have connected protection centres in a number of strategic places in Brazil. Every centre is equipped with necessary devices such as computers, updated documentation, and knowledge of the societies and our technology. With this in place, we can mitigate accidents quickly whether they occur at sea or on shore,” she points out.

Alternative energy in balance

In addition to oil and gas, last year Petrobras focused more of its attention on bio diesel and alternative energy. “Even though we are already producing ethanol or bio diesel, the country must plant a lot of new sugar cane to meet the extended demand. However, this will have to compete with other vegetables and plants. So, there will always be a balance between gas, ethanol, diesel and petrochemicals.

“The world will not have a substitute that can replace petrochemical products in the coming 100 years. Of this I am quite sure. 100 years pass quickly, but I think we will have the solution by then. The big issue now, however, is CO₂ emissions. We are addressing this issue seriously by working hard to reduce our emissions of CO₂. Although we have been increasing our activities, we reduced our CO₂ emissions in 2006 by ten per cent,” Cristina Pinho concludes.

*Text: Svein Inge Leirgulen
Photo: Petrobras*

Dirty, uncertain and expensive?

At INTSOK's International Oil and Gas Business Days, DNV Energy's COO Remi Eriksen was asked to draw a picture of the forthcoming risks facing the world's oil and gas operations. "Oil, gas and coal will dominate the energy picture and, unless we do something, our future will be dirty, uncertain and expensive," was his conclusion.

INTSOK – Norwegian Oil and Gas Partners – arranged its annual 'International Oil and Gas Business Days' on 27–28 August. This event and meeting place attracts a worldwide audience of the most prominent top management within the oil industry and public authority sector.

At the end of the first day, Remi Eriksen was asked to provide closing remarks on the keynote session and give a macro presentation of the risk management challenges facing the energy industry.

The following were the key trends highlighted by the speakers from the Norwegian Ministry of Petroleum and Energy, Douglas-Westwood, ENI, Shell, Gaz de France, Woodside and Pemex:

- The energy demand is increasing fast
- The world will be dependent on oil, gas and coal for many decades
- Tight supply and demand balance, increasing import dependency and growing concern about the security of supply
- Many new developments face great delays and escalating costs
- Global warming and its impact is a major concern

"Unless we do something different, and very quickly, I can only define the future as dirty, uncertain and expensive," Eriksen told the international oil and gas audience.

New areas create a new risk reality

"The oil and gas reserves in developed areas are diminishing. This is forcing oil companies to move into new areas which are short of infrastructure, politically unstable, harsher and more environmentally sensitive and technologically demanding. If we add to this the traditional challenges facing oil and gas development projects, ranging from reservoir uncertainties to the possibilities of overruns and delays in the engineering and construction of the facilities needed, it is obvious that the task at hand is quite challenging," he pointed out.



The INTSOK participants were also guests at the BBQ at DNV's head office later in the evening.

He continued: "The systematics offered by risk management practices allow the threats and opportunities associated with an investment to be identified and managed. Through this insight, the decision-makers can develop suitable risk strategies and action plans to manage and mitigate potential project threats and exploit potential project opportunities."

Eriksen recognises that the world is not running out of energy resources, but there are accumulating risks in a strategy based on a continued expansion of oil and gas production from the conventional sources that have historically been relied upon. To mitigate these risks, all energy sources, e.g. nuclear, renewables and unconventional oil and gas, will have to be expanded, which again introduces new risks.

"We are facing a new risk reality and the future belongs to those who can master risk in all dimensions," Remi Eriksen concluded.

Read more on www.intsok.no

Text: Svein Inge Leirgulen



Remi Eriksen, DNV Energy's COO, is afraid the future will be dirty, uncertain and expensive unless we do something different, and very quickly.

Harmonising industry standards for the Barents Sea

DNV is to head up a project of harmonising industry standards for health, safety and the environment for the Barents Sea. The Norwegian Ministry of Foreign Affairs will partly finance the project, and both Russian and Norwegian participants will be involved.

The standards will contribute to a level of safety at least as high as that in the North Sea and which also takes into account the demanding conditions in the High North. The project is the first to be realised under the 'Barents 2020' initiative, and was presented on 27 August in Tromsø by Norway's Foreign Minister, Jonas Gahr Støre, Norway's Minister of Oil and Energy, Odd Roger Enoksen, and DNV's CEO, Henrik O. Madsen.

Standards for extreme conditions

Says Erling Sæbø, the project manager from DNV Energy: "The objective is to ensure that current and future oil and gas activities and shipping movements in the Barents Sea are undertaken in accordance with standards that are appropriate for the extreme conditions that exist in the Arctic. DNV will be heading up the project of harmonising a set of industry standards to apply on both sides of the Russian-Norwegian border covering the health, safety and the environmental aspects. The aim is also to arrive at standards that are seen as relevant by the industry, both in Norway and Russia."

The Snøhvit field will later this year become the first in the Barents Sea to produce oil. More will be following in the years to come, on both the Norwegian and the Russian sides. Oil companies, the service industry and shipowners who transport oil and gas therefore need appropriate standards to ensure that production and transport are carried out safely and securely.

DNV will head up the project of improving and harmonising industry such standards to be used on both sides of the border. This work will also provide a basis for closer partnership between the Norwegian and Russian authorities on legislation and regulations applicable to the Barents Sea.

Expert groups

Sæbø explains that the work will comprise three phases: "The first is to map out existing industry standards. A workshop



The Norwegian Minister of Foreign Affairs Jonas Gahr Støre (left) and DNV's CEO Henrik O. Madsen in Tromsø, North Norway. Photo: Torggrim Rath Olsen

will then be arranged to conclude on those problems that are critical and need to be prioritised. In the last phase, expert groups will be established to propose specific recommendations for standards. Both Norwegian and Russian potential participants have expressed their interest to take part."

The project will last three years and have a budget of NOK 27 million. The Norwegian authorities are financing the first two phases (NOK 10 million). For the last phase industrial participants will be contributing 50 per cent of the financing. DNV has contacted relevant Norwegian

participants and received positive feedback on the project proposal. DNV will also be drawing on its close links with Russian companies, including Gazprom, Lukoil, Rosneft, shipowners and the Russian Register – the Russian classification society.

Text: Eva Halvorsen

Contact: Erling.Saebø@dnv.com

Nexen presents exceptional Buzzard award to DNV

Nexen Petroleum has presented DNV with an exceptional performance award for verification services provided on the Buzzard field development – one of the largest recent discoveries in the UK sector of the North Sea.

In presenting the award Gerry Smith, Nexen's quality manager for new developments, stated: "Nexen has selected DNV for this award for what we consider to be an exceptional performance, over and above what would normally be expected for a contract of this nature. In every area of activity where DNV's surveyors have been involved they have been pro-active in assisting us in achieving our objective of demonstratively meeting the Buzzard Performance Standards and the enacted European Directives. Nexen would specifically like to record our appreciation of the work performed by DNV, and a number of surveyors in particular, whose tireless dedication to the success of the Buzzard Development Project has been outstanding."

This was one of just twenty awards to be presented during the course of the project, which involved over 500 contractors, subcontractors and suppliers.

UK's largest discovery

The Buzzard field is one of the largest discoveries made in recent years in the UK sector of the North Sea, with an estimated 550 mbbbls of recoverable reserves. It is located in the Outer Moray Firth, 100 km northeast of Aberdeen and 55 km from the nearest landfall at Peterhead. It is operated by Nexen Petroleum U.K. Limited.

The field has been developed by a bridge-linked complex made up of three piled steel jackets supporting a Quarters-Utilities (QU) deck, production deck and wellhead deck. It was discovered in May 2001, with development leading to first-oil in early January 2007.

A number of challenges

DNV's project manager, John Harper, says: "The size and extensive nature of the project meant Nexen and its contractors faced many logistical and technical challenges during the course of the project. This was also reflected in the verification scope of work to be completed by DNV.

"DNV ensured the availability of additional engineers and surveyors at key moments in the project. Also, the rigorous



Gerry Smith (right), the Quality Manager for new developments within Nexen, visited DNV's London office to hand over the award to John Harper, DNV's project manager on Buzzard.

approach ensured that the safety critical systems were subject to detailed scrutiny in the design and construction phase, as well as thorough testing prior to being brought into service."

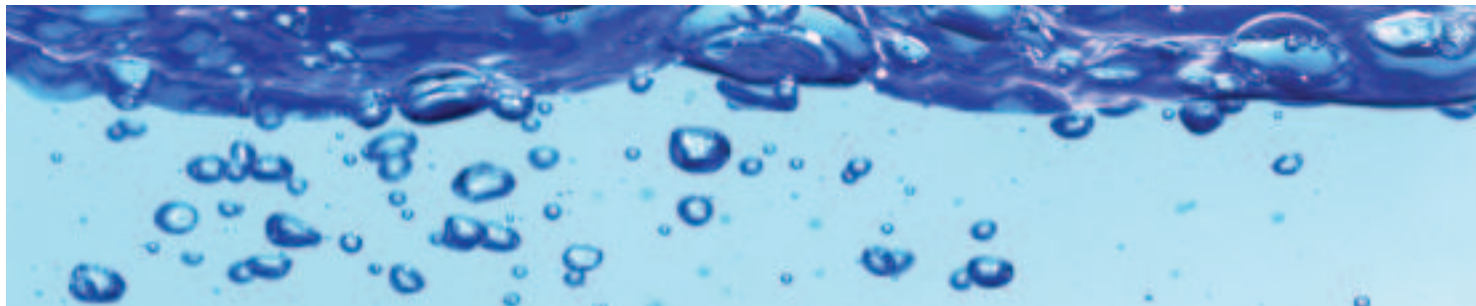
Nexen awarded DNV a contract to provide verification services according to UK offshore regulations and notified body services according to the Pressure Equipment Directive. DNV's work on the project commenced in January 2003 and was completed in July 2007, although an extension to contract has also been awarded to cover 'in-service' verification into 2008.

The contract was managed from DNV Energy's London Approval and Service Centre, with support from DNV Energy offices in Aberdeen, Rotterdam, Høvik and Bergen. Additionally, site surveyors at most of the major construction yards was provided by DNV Maritime offices in Newcastle, Great Yarmouth, Trondheim and Cadiz.



The Buzzard field is one of the largest discoveries made in recent years in the UK sector of the North Sea, with an estimated 550 mbbbls of recoverable reserves.

DNV invites the industry to develop CO₂ standards



Proper standards and best practices for capture, transmission and storage of CO₂, as well as adequate qualification procedures, do not currently exist in the oil and gas industry. In order to develop such important guidelines and standards, DNV is inviting international industry leaders and key stakeholders to join three significant Joint Industry Projects.

The three joint projects aim to provide a path forward for the industrial opportunity on Carbon Capture and Storage (CCS). The outcome from the projects will provide international standards, methodologies, and guidelines that will form the basis for industrial agreements, and become valuable input to implementation of national requirements. The new standards aim to facilitate and speed up CCS project development, decision processes and ongoing regulatory development, both in Europe and worldwide.

The key challenges the projects will address include how to store CO₂ in sub-seabed formations in a safe manner, how to qualify CO₂ storage projects and new CO₂ capture technology, and what should be the industrial standard for transmission



Elisabeth Tørstad, Director of Operations Cleaner Energy and Utilities, invites the industry to three CO₂ cooperation projects.

of CO₂ in pipelines. Industrial standards and best practices addressing these challenges do not currently exist.

“There are obstacles that need to be dealt with regarding CCS. These are related to the regulatory, legal, economical and technological risks involved in developing and operating a CCS system. Also, there are many stakeholders with different interests and views. So the agenda is complex. By facilitating these projects on capture, transmission, and storage of CO₂, DNV is contributing to the removal of several important barriers in order to realise the full vision of CCS,” says Elisabeth Tørstad, Director of Operations Cleaner Energy and Utilities.

“Due to DNV’s in-depth knowledge coupled with our role as independent

partner, we are every year facilitating a great number of Joint Industry Projects in order to safeguard life, property and the environment. DNV is an independent foundation, and our role for 143 years has been to assist in balancing the needs of business and society. The CCS challenge is exactly about balancing the needs of business and society,” she points out.

There is a need for developing an industry guideline or recommended practice for:

Qualification of technologies for power generation with capture of CO₂

New partners are invited to do case studies and test new elements on power technologies with capture of CO₂ in accordance with the new guideline under development. Aker Kværner, Statoil, Hydro, and Statkraft are already involved. Contact: Kaare.Helle@dnv.com

Transmission of CO₂ in pipelines

Relevant companies and organisations are invited to become partners in a Joint Industry Project which will develop and recommend best practice as an industry guideline for transportation of CO₂ in pipelines.

Contact: Froydis.Eldevik@dnv.com

Qualification of sites and projects for geological storage of CO₂

Relevant companies and organisations are invited to become partners in a Joint Industry Project developing a methodology and recommended practice (RP) to select and qualify sites and projects for storage of CO₂ in sub-seabed formations.

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Text: Svein Inge Leirgulen

Joint Industry Projects covering subsea pipeline integrity management

Today, there are no recognised specifications or recommended practices available for Subsea Pipeline Integrity Management Systems. Therefore, DNV is currently launching two Joint Industry Projects covering these aspects.

The first Joint Industry Project (JIP) invites oil and gas companies, survey companies and authorities worldwide to participate in developing a DNV Recommended Practice – RP-F116 Subsea Pipeline System Integrity Management.

The second JIP will be leading to a 'Guideline for the development of a Subsea Pipeline Integrity Management Program for the Gulf of Mexico'. Due to current industry practices, a significant

percentage of unpiggable pipelines, local regulatory requirements and Gulf of Mexico reporting requirements, a local guideline is required for pipelines in this area. The outcome of this JIP will be referred to, or incorporated into the DNV RP-F116.

In addition, the DNV OS-F101 is being updated; the 2007 revision will introduce a requirement of a Pipeline Integrity Management system within the oil and gas operators' organisations.



Bente Leinum, principal engineer, invites the industry to two JIPs on subsea pipeline integrity.

For more information contact Bente.Leinum@dnv.com

How do UKCS operators approach risk management across their entire business?

Two years ago, DNV carried out a survey among top managers of Norwegian operators and licence holders in the North Sea regarding Enterprise Risk Management. A similar survey is now to be launched addressing this issue in the UK sector.

"With higher oil and gas prices driving up expectations, the stakes on executives are higher than ever; their ability to select and manage the appropriate risks in order to allow this upside is now as important as minimising the downside consequences of failures. As a result, we are seeing the management of enterprise-wide risks in an integrated manner to be an increasing focus of companies in the energy sector," says Hari Vamadevan, DNV Energy's Director of Operations in Europe and North Africa.

"The Norwegian respondents of the Norwegian operators in 2005 were actively seeking risks in the traditionally strong risk management areas of the oil and gas industry, i.e. in exploration and field development, and we saw some strong practices for managing finance and market risks," Vamadevan explains.

"However, many of the respondents

confirmed that their focus was more on avoiding mistakes than on capturing opportunities. Risk management is usually perceived as a loss prevention mechanism or as part of a defensive strategy. Now that access to new acreage is the most important business driver, a more aggressive risk strategy is vital," he says.

DNV is soon to launch a comparative survey among top managers of operators and licence holders in the UK sector. Individual company information will remain confidential, with results issued in aggregate and in an anonymous format only.

"We will be in touch with UK CEOs, MDs and CFOs shortly to seek their input to the survey," Vamadevan continues. "Our survey will identify common experiences, issues, thoughts and practices used for enterprise risk management. The ultimate aim is to understand the areas of risk focus within the industry, but it could also



If you are an executive of a UKCS operator and would like to be involved, please contact Hari Vamadevan, Hari.Vamadevan@dnv.com

help assess changes in risk focus over the past two years and identify whether there are any national differences across the North Sea.

"I am confident that the industry in general and the participating operators in particular will gain useful insight from this study," Hari Vamadevan concludes.

DNV hosted G8 barbecue at the Veritas Park

On 21 June, DNV hosted a barbecue for 150 distinguished guests from the public sectors and industries of the G8 countries.

The barbecue was a part of the G8 International Energy Agency (IEA) and Carbon Sequestration Leadership Forum (CSLF) Assessment Workshop on early opportunities for carbon capture and storage, which was held in Oslo.

Remi Eriksen, COO of DNV Energy welcomed the guests and told the history of the Veritas Park where the barbecue was held.

“Thirty years ago, DNV moved into this very beautiful area here by the seaside. In the old days this was a small, self-sufficient society – with jobs, houses, schools, shops, and a garden nursery. DNV bought the property in 1972 for its new headquarters.

“However, the local authorities demanded that the park had to be available to everyone in the community for recreation, both day and night. We also had to promise to take care of the old trees, the grass, the animals, the shore and the existing old buildings.

“The Veritas Park is today a small ecosystem in itself, with the elements carefully linked together;” he told the guests.

A real industrial option

After this analogy to the global CO₂ challenges, Eriksen expressed his gratitude to the G8 countries for their ambitions to promote Carbon Capture and Storage as a real industrial option. This is very important for both the future energy portfolio and as a mitigation option for generations to come.

Text and photo: Svein Inge Leirgulen



‘CCS’ guests from the G8 countries attended the BBQ at the Veritas Park.

We welcome your thoughts!

DNV is a global provider of services for managing risk. Established in 1864, DNV is an independent foundation with the objective of safeguarding life, property and the environment. DNV comprises 300 offices in 100 countries, with 7,000 employees.

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