

DIALOGUE

A JOURNAL FROM THE PETROLEUM SAFETY AUTHORITY NORWAY



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FUTURE VISIONS



PREPARED FOR THE FUTURE

It is easy to look ahead and think that everything will be the same, that trends will follow the same path.

But perhaps things will turn out differently. Perhaps something unexpected happens. What do we do then? Are we prepared?

This issue of *Dialogue* takes a close look at the future – not over 12 or 24 months, but 17 years down the road. We present four visions about how health, safety and the environment (HSE) in the industry might look in 2035.

Based on a major analysis conducted by the PSA, these four scenarios point in fairly different directions. Used properly, however, they can help ensure that decisions taken today are best tailored for tackling the future.

But we open this issue with a presentation of the PSA's main issue for 2019 – *Safe, Strong, Clear*.

That also addresses the future, and conveys a clear message to the industry as well as to the PSA.

Enjoy.

Øyvind Midttun
Editor

*Front cover: Frode Alfheim, president of the Norwegian Union of Industry and Energy Workers, at the PSA's 2018 Top Executive Conference.
(Photo: Marie von Krogh)*



CONTENTS

Safe, Strong, Clear	4
Responding to the challenge	6
Reconciling fast advances with slow change	12
Challenging established truths	16
Thinking the unthinkable	18
Preparing for tomorrow	20
Familiar tunes, unknown future	22
Under the microscope	32



Safe, **Strong**, Clear

The PSA's main issue for 2019 emphasises where responsibility for safety rests in the industry – with the companies. But it also signals greater vigilance by the supervisory authority.

Clear messages are being sent to the industry by the choice of Safe, Strong and Clear as the main issue. In addition to the division of responsibility, this highlights the requirement for continuous improvement in the level of safety.

The Storting (parliament) considered the White Paper on health, safety and the environment (HSE) in the petroleum sector this June.

"It found that Norway's offshore safety regime is robust and well-functioning – and should be maintained," observes PSA director general Anne Myhrvold.

"At the same time, the White Paper called for a stronger and clearer PSA. That's something we take seriously. A strong supervisor is a cornerstone of the Norwegian model."

Toolbox "We've now reviewed our practice, and decided that we need to make clearer use of our toolbox," she emphasises. "That covers the choice of supervisory methods, use of enforcement powers and more checks to ensure the industry is correcting nonconformities."

Myhrvold admits that the PSA could have underestimated the significance of intervening early and clearly enough in demanding conditions.

"I hope our current study of the Goliat, Aasta Hansteen and Ivar Aasen projects on the Norwegian

continental shelf (NCS) will identify good lessons for both us and the industry [see page 32].

"The Storting also has clear expectations of the industry – that it will emphasise collaboration between employers, unions and government and continue to seek continuous safety improvements.

"'Good enough' isn't good enough. The ambition is that Norway's petroleum sector will be a world leader for HSE. That goal remains unchanged."

Clear The main issue for 2019 is therefore also a clear order to the industry, Myhrvold says. "Both sides are duty-bound to help fulfil this ambition, both separately and collectively.

"It's up to the companies to ensure progress. They're the ones who have and must accept responsibility for the prudent conduct of operations at all times."

Noting that the PSA has seen examples where the companies have not shown such responsibility, Myhrvold characterises this as unacceptable.

"The companies must respect the regime, know their role and get to grips with safety issues. They must work methodically to reduce risk, prioritise safety and ensure continuous improvement.

"We'll be working in the time to come to make responsibilities clear – the PSA will strengthen its supervision, the companies will ensure progress."



Responding to the challenge

Key elements in the PSA's main issue for 2019 concern the duties of employers and unions, where responsibility lies, and the demand for continuous improvement. Three key decision-makers give their views on these aspects and on the expectations they involve for the companies.

Frode Alfheim, president, Norwegian Union of Industry and Energy Workers (Industry Energy):

I think Safe, Strong, Clear hits the spot in relation both to where we are today and to where we want be – in any event for a good many years to come.

The big interest in investment on the NCS will mean that we'll be busy dealing with the new companies which will be coming in, as both operators and licensees.

I find that the PSA has maintained a tight grip and is good at keeping tabs on what the companies are up to in downturns. My union's had to sound a warning, and I feel we've been listened to.

This industry's never on an even keel, after all – it's either full steam ahead or into rapid reverse. We're on an upturn at the moment, and I think that some players will be testing the limits in the regulations. So it's important to be strong and clear and to

make sure that things are done safely.

The companies have money, but the challenge will be to get all this onto a track which is secure, safe and well-founded.

We see that the industry's reputation is weakened after a downturn. The parties must take responsibility for ensuring that the upturn happens in a proper way.

Provision must be made for good recruitment to the industry, which needs to come across as responsible – with permanent and secure jobs for young people.

We can't start rushing off again without actually applying the recommendations in the Engen report and the White Paper to the Storting [parliament] this summer.

The work which has been initiated in the Safety Forum must also be completed. We've got to see things through and do the job in a good and proper manner.



Arne Sigve Nylund, Equinor (left), Kristin F Kragseth, Vår Energi, and Frode Alfheim, Industry Energy, were all present when the PSA presented Safe, Strong, Clear as its main issue for 2019. This took place at the authority's Top Executive Conference in late October. Responses to the PSA's signals and expectations are presented on the following pages.

Key elements in the PSA's main issue for 2019 concern the duties of employers and unions, where responsibility lies, and the demand for continuous improvement. Three key decisionmakers give their views on these aspects and on the expectations they involve for the companies.

Kristin F Kragseth, formerly with ExxonMobil and Point Resources, CEO for Vår Energi from December 2018:

Safe, Strong, Clear comes across as very natural for our company, and actually for the whole industry.

This is about being unambiguous as managers and pursuing a dialogue with all employees to build a strong team which works well together. The elements in the PSA's main issue for 2019 could have been values in our company as well, and in virtually all the others.

The point at issue is how we as an operator can be clearer in everything we do, and how the authorities can make unambiguous demands on the operators.

How can company managements become more lucid, so that everyone in the organisation understands what we mean? It's easy to believe our employees know they have the duty – and the permission – to push the stop button. But have we communicated this clearly enough?

When we read in the RNNP study on trends in the risk level that a number of employees believe production comes before safety, or say they take shortcuts because they want the job done, we haven't made it sufficiently clear that this isn't positive.

I think everyone can take note of the main issue and formulate it to be meaningful for each individual. I see, for example, that documentation was much more extensive and complicated before.

On newer installations, such as Goliat, they have a greater degree of process flow in their procedures, which makes everything clearer.

Getting the message across is an art, and you must by all means say things in different ways to ensure that they're understood correctly by everyone.

I believe we need more straight talking from regulators, but they must also be willing to listen to the industry. There's no one truth.

This is an industry which has developed on the basis of dialogue and collaboration, and it's therefore important to pose open questions and to invite answers. One party doesn't necessarily own the truth while the others have got it wrong.

We've occasionally felt that the actual audits could be carried out differently. Then we must dare to speak out, and the PSA must be open to our views.

That allows us to avoid a culture of fear, and we can be open and honest about what we do and think. I believe the PSA would also appreciate that. We want to help each other to improve.

I don't think the PSA has been weak. It's been very hands-on, and we as operator companies have taken note of what it's had to say.

We often say we're Norway's most important industry. Everything we do also attracts public attention – for better and worse.

During my 26 years in the industry, it's the tripartite collaboration and the open dialogue which have made the difference.

Daring to tell the PSA or my employees what I think, while getting honest responses back – that's how we get better, with openness, honesty and respect for each other. We don't always agree, and that must be acceptable now and again.



Safe
Strong
Clear



"The elements in the PSA's main issue for 2019 could have been values in our company as well," says Kristin F Kragseth, who is to lead the new operator company Vår Energi.

DIALOGUE 9
PSA 2018



Key elements in the PSA's main issue for 2019 concern the duties of employers and unions, where responsibility lies, and the demand for continuous improvement. Three key decisionmakers give their views on these aspects and on the expectations they involve for the companies.

Arne Sigve Nylund, executive vice president, development and production Norway, Equinor:

I think Safe, Strong, Clear is a very good issue, which we in the industry can support. It provides perspective, not least on our need for good and strong supervision which helps us improve.

It also addresses our need to be clear in our message on safety, and to continue developing the sector in order to make it robust for meeting the future.

Management must be unambiguous about what we want and expect in terms of culture and the use of procedures and governing documentation. We mustn't cut corners, and need to communicate expectations clearly.

The main issue fits well both with the PSA's mandate and with Equinor's goal of being a predictable, safe and robust operator.

We have a general desire to raise the level of safety and ensure that everyone comes home at

least as healthy as when they went to work.

This is the main ambition for us all – government agency, operator, union official or safety delegate. We have slightly different views on the approach, but that's the ultimate goal.

We've pursued a number of measures in Equinor. One example is the campaign we've called "I am safety", which focuses on the personal responsibility each of us has for in this area.

And the "life-saving rules" are simple but important guidelines for the way in which we plan and execute work operations in a safe manner.

We've also introduced an annual "wheel" with quarterly topics, where people work on avoiding hydrocarbon leaks, dropped objects and personal injuries, and on improving our working environment.

It's important to pursue these issues over time, so that the organisation gets the opportunity to mature and implement activities which have lasting effect.

"The main issue fits well both with the PSA's mandate and with Equinor's goal of being a predictable, safe and robust operator," affirms Arne Sigve Nylund, Equinor's executive vice president for development and production Norway.

Reconciling fast advances with slow change

Converting 37 000 people to life in a digital workplace is a question of cultural adaptation, maintains TechnipFMC's Ann-Christin Andersen. And that calls for small steps at a time.





"Successful digitalisation saves time, improves quality and contributes to improved safety for people and the environment," says Ann-Christin Andersen at contractor TechnipFMC.

Andersen chose to locate the headquarters for this drive to Norway after being hand-picked last autumn for the job of chief digital officer at the subsea giant.

"Although a great deal of digital development takes place elsewhere, this country is very advanced when it comes to adopting the technology," she observes. "So it's a good place to try out what the transformation means for an industry like ours."

Plans Rapid technical advances mean Andersen has dropped three-year plans in favour of ones spanning just nine months at a time. But she does not regard the transformation as a revolution.

"The biggest conflict I experience is the breakneck speed of technological progress," she says. "At the same time, the cultural upgrade needed to utilise these developments is pretty slow."

TechnipFMC took a strategic decision at an early stage that it would not become a digital company, Andersen reports.

"Rather, we're trying to inject digital technology and new ways of working into the existing organisation. Our approach is therefore to develop our employees and the way we address customer problems and requirements."

Gap Andersen believes that leading the petroleum industry into a digital future depends on understanding the gap between rapid technological progress and the need for staged cultural change.

"You must grasp what's achievable," she says. "You can't just snap your fingers and say the culture's now upgraded. There's 37 000 of us in TechnipFMC, so this must happen step by step."

At the same time, she emphasises, the company must not underestimate the expertise needed to maintain existing technology. The new aspects are not the only things which count.

"Nor is everything being upgraded at the same time. Both old and new will be mixing with each other, so we must continue to retain a breadth of expertise."

"Right now, we're working to get the organisation to describe more clearly what problems it wants to see solved rather than what technologies it would like to use."

"If we manage to define a problem, it's much easier to determine which digital solutions give the best value. That's an important part of our cultural upgrading."

“But such success depends on good interaction between the parties. We have a tradition of making this happen in Norway, so I’m confident the NCS can be an inspiration to other nations.”

Future When the digital supremo looks into her crystal ball, she sees a future for the oil industry where it employs far fewer people than at present.

Many operations are being moved ashore, while those personnel who are left offshore will have digital aids which make them better equipped to take difficult decisions.

Andersen believes this trend will help to boost safety. “And ICT security will become a fundamental value in the same way that we’ve focused attention on HSE.

“Many of the new solutions improve data security. It could be more secure to store information in the cloud than on your own PC in the back room.

“However, the consequences of a data intrusion could be greater when everything’s interconnected. So ICT security will be much more important in the time to come.”

Integrity Andersen highlights technical integrity resulting from digitalisation and new technology as an important factor in managing major accident risk.

This will contribute to greater insight and better decisions when extending the producing life of infra-

structure and conducting safety-critical well operations, she says.

“It’s possible to acquire operating data which give increased understanding of both technical condition and operational status.

“That’ll improve the basis for assessing residual producing life and profitable measures for getting more out of the infrastructure – without cutting safety.”

Competitiveness A number of recommendations for securing the competitiveness of the NCS were presented in a report published by the KonKraft collaboration in February 2018.

Many of these proposals involve adopting digital technologies and ensuring data sharing, so that company decisions could give a greater return to the collective.

“Successful digitalisation saves time, improves quality and contributes to improved safety for people and the environment,” Andersen affirms.

“But such success depends on good interaction between the parties. We have a tradition of making this happen in Norway, so I’m confident the NCS can be an inspiration to other nations.”



Challenging established truths

Predicting the future is not easy. But scenario analysis makes it possible to lift the veil a little by providing visions of what tomorrow could look like.

These indicate the possible trajectories which developments could take, what might happen, what opportunities could become available and what challenges might have to be overcome.

"Scenarios aren't forecasts or projections, but are meant to contribute to creativity, better decisions and improved preparedness for change," says Kristin Karlsrud Haugse.

A managing consultant at Rambøll Management Consultant, she has assisted the PSA in preparing a scenario analysis which has yielded four possible futures up to 2035 (pages 22-31).

Questions This exercise has addressed a series of questions which include how the petroleum industry could develop and what the HSE position might be in 2035.

Another is what measures must be adopted by the PSA to ensure that the Norwegian petroleum industry continues to be a world leader for HSE.

The resulting four scenarios point in fairly different directions.

"Their purpose isn't to show exactly what the world will look like, but to describe extremities

which collectively delineate the opportunity space," explains Haugse.

"The world of 2035 is unlikely to look exactly like the description in any of these visions, but the aim is to be prepared for developments which can take different paths."

She notes that the analysis cannot predict specific incidents, but can identify key driving forces and trends which could influence future developments.

"The goal is to provide insights and challenge established truths, so that managers and decision-makers question their own assumptions," Haugse says.

"Scenarios also help to give decision-makers a broad and long-term perspective. An important effect is to move discussion from 'what will happen?' to 'what do we do if this happens?'"

Systematising "We like to think the world will stay unchanged," she observes. "Imagining alternatives is hard. But acquiring and systematising data about drivers and trends can reveal new aspects.

"It can also allow us to see what we already know



"The goal of scenario analysis is to provide insights and challenge established truths, so that managers and decision-makers question their own assumptions," explains Kristin Karlsrud Haugse at Rambøll Management Consulting.

with new eyes, and get us prepared in a different way.”

Taking good decisions is often a matter of identifying the current problem and solving it, Haugse notes. But concentrating on this alone can lead to big surprises.

“Technological changes, new business models and different ways of working are examples of conditions which can alter in dramatic ways.

“In purely practical terms, we can test ideas and decisions to see if they’re robust, or we can make changes which might fit several of the scenarios. Decisions or investments can sometimes be delayed until we see which of the outcomes we’re heading for.”

Benefits A scenario project can yield various benefits, Haugse notes, with its visions of the

future as perhaps the most visible.

“The insights and preparedness for change which emerge from the actual work are equally important, though. In both cases, the process is significant.

“The goal is for the work to have an effect, and it’s important that the pictures painted are recognisable. So entrenchment in the organisation is very significant.”

She emphasises that scenarios must be incorporated in a strategic dialogue, both internal and external, and involve stakeholders and partners.

“This type of analysis has a long shelf life and will be useful and valid for many years to come. But you need to use it actively and keep an eye on which scenario is developing.

“The future sometimes arrives more quickly than you can imagine.”

Thinking the unthinkable

Scenario analyses were devised to win wars, and proved useful when the oil crisis hit in the 1970s. Today, they are contributing to better decisions in a number of areas of society.

This methodology was originally developed on behalf of the US armed forces as a tool to support military planning after the Second World War.

The aim was to combine certain knowledge with relevant unknown variables such as development aspects, driving forces and trends, and use this to describe the future in the form of visions.

Military strategist Herman Kahn, who headed the work on these analyses, applied the term “scenarios” to the resulting descriptions.

Extended The technique of “thinking the unthinkable” was extended to non-military applications, with big multinationals applying it from the 1960s. Royal Dutch/Shell is among the best known.

In the early decades after 1945, reconstruction and stable growth dominated the world. A global oil group like Shell needed – then as now – to optimise management of resources and investment.

It adopted computing, and introduced an advanced computer system known as the unified planning machinery (UPM) in the mid-1960s to give all parts of the group an overview of the future.

Large quantities of data were systematised and used as the basis for predicting commercial developments and investment requirements.

The system gave Shell a six-year projection, but

that quickly proved too short. It did not take account of uncertain and unknown variables, and primarily delivered “more of the same”.

As a result, the UPM was phased out by Shell in the early 1970s and replaced with a commitment to scenario analysis. Its combination of the known and the unknown helped to structure thinking about alternative trajectories for the future.

Turbulence Shell’s timing was good. The stable postwar development gave way in the 1970s to economic turbulence – made explicit by the 1973-74 oil crisis.

This was unleashed when the Organisation of Petroleum Exporting Countries (Opec) imposed boycotts on many oil importers and drove prices sky-high. Both the market and the rules of the game in the international petroleum sector were altered.

Shell is said to have been one of the few oil companies which was prepared when the crisis erupted because of its systematic use of scenario analyses internally.

This meant the group was better equipped to position itself, and it thereby managed to emerge strengthened from the challenging conditions.

“When the oil crisis came, Shell was prepared for change,” explains scenario expert Kristin Karlsrud Hauge at Rambøll Management Consulting.

“It didn’t foresee the actual event. But one of its scenarios outlined a number of assumptions about market trends which turned out to be correct.

“This dealt with a pipeline accident with consequences for market supply and demand. Once the crisis occurred, Shell was therefore ready for that kind of change.

“It could adjust more quickly than its competitors. To this day, scenario analysis remains a tool Shell uses to make provision for new shocks and changes.”

Valuable Many companies and organisations now use this method to prepare for the future. It is particularly valuable in sectors with long time frames, big changes or an important social role.

“Communications, construction, health and social care, education and petroleum are all examples of areas where long-term thinking is needed,” Hauge observes.

“Decisions taken in these sectors are often highly significant for society and have consequences which extend far into the future.

“Within these industries, scenario analysis can not only contribute to adapting successfully but also actually help to shape tomorrow.”



*German motorists fill up with petrol in Denmark during the 1973-74 oil crisis, which hit large parts of the world.
(Photo: TT Nyhetsbyrå)*

Preparing for tomorrow

Four scenarios can make it easier to meet the future for the energy sector – both in the PSA and in the rest of the industry.

“Nobody can know with any certainty what tomorrow holds for Norway’s petroleum activity,” says Ingvill H Foss, one of the PSA’s directors of supervision.

But she points out that the authority knows a good deal about trends, development aspects and what it has called certain drivers, which are listed on page 23.

“We’ve now assembled what we know – and not least what we don’t know. On that basis, we’ve created visions which we believe can help us to move forward – regardless of what happens.”

Methods Many companies pursue scenario analyses or similar methods, says Foss, who has been the PSA’s project manager in its collaboration with Rambøll.

“But the primary concern for most of the players is the resource position, access to exploration acreage, finding rates and prospects for oil and gas sales.

“Our work has had a different perspective, and it could therefore be useful for the companies to incorporate these findings in their strategic thinking.

“The analysis we’ve carried out shows large variations in trajectories for safety developments. They are bigger than those which usually emerge from discussions.”

Important subjects have been brought out with particular clarity through the work, Foss says. Examples include trends for regulation and collaboration between the parties.

“Several of the scenarios describe increased pressure on tripartite collaboration and challenges with supervising expertise. We must all be very conscious of these areas.”

Reflections Although the work is primarily intended to prepare the PSA for coming changes, she hopes that others in the sector will utilise the material in their reflections on the future.

“We’ve identified a lot of interesting and relevant information about coming challenges related to HSE. These visions will be good tools for discussion by all sides of the industry.

“Nobody knows for certain what tomorrow will look like. But the point is to be ready when it comes.”

SCENARIO
2018-2035



Familiar tunes, unknown future



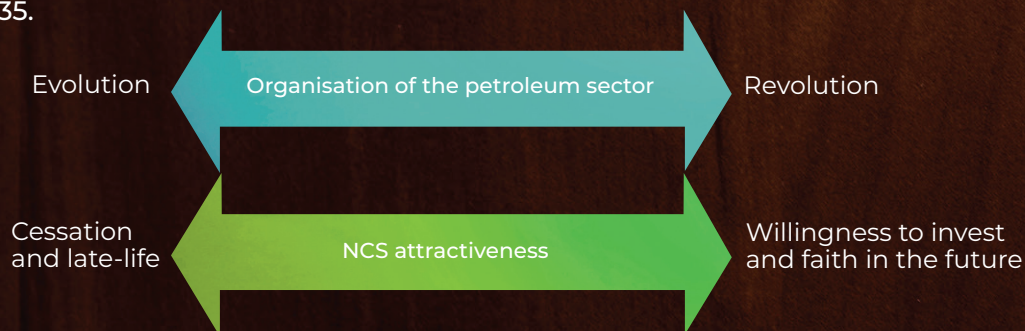
The Beatles provided the inspiration in naming the PSA's four forward-looking scenarios. *Norwegian Wood*, *Yesterday*, *Ticket to Ride* and *Hello, Goodbye* reflect different trends.

Each of these songs naturally suggests its own mood. Read about the global visions they refer to on the following eight pages.

The PSA's scenario project has been a major job. The texts presented on the following pages are short extracts from the four development trajectories described in the analysis.

Uncertain drivers

The PSA's four scenarios are distributed around the intersection between uncertain and critical driving forces which will affect both petroleum operations and HSE status off Norway up to 2035.



Scenarios for the industry and HSE status



Certain drivers

As a contrast to the uncertain forces, the analysis is based on conditions which are fairly certain to influence developments in 2018-35.

1. Oil prices will fluctuate
2. Efficiency gains and cost cuts will characterise the industry
3. Technology developments and digitalisation will continue
4. Work organisation and interaction will change
5. Use of vessels will increase
6. Environmental protection and sustainability will become more important
7. Late life, tail production and cessation will characterise the industry

Scenario A

Norwegian Wood



Renewable sources have greatly expanded, but are still unable to meet energy demand on a global basis. Oil, and not least gas, remain important components in the mix. Crude prices are relatively high. A high level of demand has led to extensive exploration, and substantial discoveries have been made.

Trends 2018-35

Many people have wanted to see a swift transition to renewable energy during this period. But oil, and not least gas, remain important components in the global energy mix in the scenario.

A high level of demand for Norwegian oil and gas leads to great interest in both exploring new areas and improving recovery from existing developments.

Some big discoveries are made in the Barents Sea around 2020, and declining production from the North and Norwegian Seas has been combated with new technology and specialisation.

Gradual technological progress has been made throughout the period. New intelligent solutions have helped to cut costs and boost productivity.

However, the advances have been smaller than the technology optimists hoped in 2018. People generally, both inside and outside the industry, nevertheless have faith in the future.

Oil prices remain on average around USD 80 per barrel during the period, but with big fluctuations.

HSE status in 2035

A high level of activity has created competition over personnel and expertise. Many assignments are outsourced to contractors and sub-contractors.

The physical workload has been reduced compared with 2018. Fewer people are now exposed to a burdensome working environment and hazardous conditions offshore.

Employers, unions and government continue to collaborate, but the unions seldom agree on joint action. Constant conflicts over staffing changes and restructuring are seen in 2035.



Scenario B

Yesterday



Norway's petroleum sector is now yesterday's news. After a period of exploration and technological optimism, most people have accepted the approaching end of the oil and gas adventure. Renewable energy forges ahead in investment terms.

Trends 2018-35

Global demand for oil and gas is lower than most people envisaged in 2018. Crude prices have lain around USD 30 per barrel during the period, but with big fluctuations. Nobody any longer believes that they could return to USD 100.

A number of exploration prospects with high expectations have failed during the period. The big older fields are being operated by large energy companies, while tail output has been offloaded to specialists.

Existing facilities are characterised by demolitions and repairs.

The petroleum sector is now a sunset industry.

HSE status in 2035

Attracting key expertise is difficult. The physical workload has been reduced from 2018, especially on the newest facilities. Digitalisation and automation have cut the most hazardous jobs.

The feeling of being under surveillance and an uncertain future create stress and discontent among workers. Tripartite collaboration still functions at industry level, but is strongly coloured by politics. Few want to be a safety delegate.

Everyone knows maintenance offshore is inadequate. Public opinion increasingly sees the petroleum sector as a burden, and nobody wants stricter standards than in other industries.



Scenario C

Ticket to Ride



Oil and gas face strong competition from renewable energy, but remain necessary elements in the energy mix for a world with sharply rising demand. People have got used to low oil prices, and the industry has been forced to make drastic changes. Extensive exploration and big new discoveries mean that an optimistic mood nevertheless prevails on the NCS.

Trends 2018-35

Climate-friendly solutions such as power from shore and carbon capture and storage (CCS) have improved the industry's reputation in this scenario.

At the same time, digital solutions characterise the sector. Substantial discoveries have been made in both mature and frontier areas, and the NCS is known for innovative solutions.

Extensive involvement in the petroleum sector has created growth opportunities for Norway's data processing industry. The NCS has a great variety of players in 2035, and dramatic changes have occurred to contract and collaboration models.

Offshore staffing has almost halved in the space of a few years. Operational centres on land operate a number of installations for several companies.

Crude prices in this scenario have fluctuated around USD 40 per barrel. However, the industry has realised that stepwise cost cuts are not sufficient.

HSE status in 2035

The physical workload declines sharply throughout the period from 2018.

A large proportion of the workforce comprises highly educated self-employed people who are hired in on a project basis. The degree of unionisation is very low.

Improved decision support from machines has reduced the risk of human error. Innovation and technology have almost eliminated traditional risk in the petroleum sector. Nevertheless, concern prevails that new solutions will introduce further risks.



Scenario D

Hello, Goodbye



Stringent environmental standards are imposed by society. No political will exists to open new areas for exploration. Renewable energy has taken big market shares, and oil prices are low. This means goodbye to Norway's golden age of oil and gas. But technological progress says hello to a new era – characterised by exciting solutions.

Trends 2018-35

Agreement is reached in the 2020s on stringent environmental standards for fulfilling international agreements. The period is marked by few petroleum discoveries on the NCS, ever declining demand and little political will to open new areas for drilling.

Renewable energy sources have taken big market shares, and oil prices are low – at around USD 30 per barrel for much of the period.

Society is characterised by big technical advances and new collaboration models. Petroleum operations are run by small departments in the energy companies. Digitalisation and automation have contributed to big cost cuts.

HSE status in 2035

Employment and contractual models have changed dramatically. Few workers are left on facilities and vessels, and most are contractor personnel with specialist expertise.

A number of them lack experience with old equipment. Older workers are squeezed out. New and interesting jobs have emerged on land at the interface between petroleum and other energy forms.

With few traditional oil workers left, the level of unionisation is very low. Collaboration between the parties has in practice withered.

Strict standards are still set offshore to prevent major accidents and environmental pollution, while working environment norms have come under even greater pressure.

New solutions are constantly being introduced – but time is not necessarily available in advance for extensive risk assessment.

Under the microscope

The Goliat, Aasta Hansteen and Ivar Aasen developments are being assessed by the PSA in a bid to learn more about safety challenges with and improvement measures for such projects on the NCS.

Norwegian offshore fields are normally brought into production within the time and cost parameters set in their plan for development and operation (PDO).

But some projects have experienced challenges in the form of substantial cost overruns and delays, which can also be significant for HSE and for quality in design and construction.

So the PSA is now pursuing a study which takes a closer look at such developments. Three have been chosen on the basis of a number of criteria, including project organisation and size.

Others are operator experience and expertise, extent of new solutions or technology, choice and

follow-up of contractor, time taken and money spent, and quality of the facilities at start-up.

A different company has served as operator for each of the trio of developments under consideration:

- Eni Norge (Goliat)
- Equinor (Aasta Hansteen)
- Aker BP (Ivar Aasen).

In addition to these players, the study also covers the other licensees for each field and the role of government.

Every project phase is being addressed – licence award, exploration, feasibility studies, conceptual design, preparation and approval of the PDO,



Goliat Eni Norge



Aasta Hansteen Equinor



Ivar Aasen Equinor

engineering, construction, commissioning, start-up and operation to the present day.

Follow-up “This work is a follow-up to the White Paper on HSE in the petroleum sector which was presented earlier this year,” explains Bjørn Thomas Bache, one of the PSA’s directors of supervision.

“It will result in a report which is to be used for learning lessons and improvements, both in the industry and for government agencies.

“We’ll be summing up experience, identifying possible deficiencies in project execution and learning points, and proposing measures for

further development of our own follow-up.

“In addition, we will assess the appropriate use of our audits and enforcement powers during the early phase of offshore projects.”

Along with challenges and potential improvements, the report will describe experience with measures which have functioned well, he explains.

Being carried out by Acona on behalf of the PSA, the study is due to be completed in the summer of 2019.





Most of the photographs in this edition of *Dialogue* have been taken by Marie von Krogh, who lives and works as a photographer in Stavanger.

Von Krogh took the photograph in this spread during her work on *Oljeliv/Offshore ID*, a documentary project where she followed platform personnel at work and play over a long period.

Oljeliv/Offshore ID has recently been published as a book.

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