Using innovation to help meet the energy demand: solutions to extract more from existing fields

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First Session
Webchat Transcript

Meet your panel

Dick Benschop

President Shell Netherlands

A former Deputy Minister for Foreign Affairs in the Dutch Parliament, Dick joined Shell Energy Europe in 2003. In 2006 he moved to Kuala Lumpur to oversee Shell's Gas & Power business in Malaysia where he spent 3 years. Today, he lives in The Hague with his wife and children.

Didrik Reymert

VP Shell Upstream Projects, EMEA

Didrik joined Shell directly after completing his Masters from the Norwegian Institute of Technology. His assignments have spanned planning and asset management as well as engineering projects, working in Nigeria, Oman, The Philippines and Europe.

Michael Lander

Project Manager, Shell, Schoonebeek Redevelopment Project

Since joining Shell in 1987, Michael has worked in project management, technology development and venture set-up roles across the globe. He is responsible for the Schoonebeek Redevelopment Project.

Hans Wenck

Communication Manager for Innovation, Research and Development, Shell

Hans joined Shell as a research chemist in 1992 and has fulfilled a variety of roles in project management and communications. His affinity with technology brought him to the Netherlands in 2005, where he lives with his wife and teenage children.

Diederik Boersma

Shell R&D Team Leader for Enhanced Oil Recovery

Diederik has 20 years of experience as a reservoir engineer, project manager and chief project engineer. Well versed in the challenges posed by geology, reservoir fluids and recovery mechanisms, he is R&D team leader for enhanced oil recovery in Rijswijk.

Dick Benschop

Hello everyone. Welcome to today's webchat, “Using innovation to help meet the energy demand: solutions to extract more from existing fields.” I'm Dick Benschop, President Shell Netherlands. I’m joined by my team Didrik Reymert, VP Shell Upstream Projects, EMEA, Michael Lander, Project Manager, Shell, Schoonebeek Redevelopment Project, Diederik Boersma, Shell R&D Team Leader for Enhanced Oil Recovery and Hans Wenck, Communication Manager for Innovation, Research and Development, Shell. We are happy to take your questions. Enjoy the session!

Introductory Question

Q. We have also had a couple of questions from the Shell Dialogues forum – see more at www.shelldialogues.com/eor-forum. A question from Mark: Dear Mr. Benschop, For an article in Technisch Weekblad we like to ask you and your specialists the following two questions about enhanced oil recovery: -what technology (measurements in the well, control valves in the well, modelling of the well, control algorythms or anyting else) needs the most R&D-attention in order to force a breakthrough in EOR? -can you explain why this technology is crucial and what kind of R&D is needed? Thank you and best regards, Mark

Diederik Boersma

A. Mark, In EOR the injectant in general (chemicals, gas etc) is often very expensive. Therefore you want to put it to good use. Use them as efficient as possible. Reservoir management through well control is essential. We need control valves in the well to control individual reservoir zones. They need to be reliable... Reliability is the essence; than down hole pressure and temperature sensing which are known technologies for which reliability should also be improved. Next new thing would be downhole compositional analysis, to assess where and when injectant breakthrough, Development of downhole compositional sensing tools and improvement of reliability of existing down hole equipment would be a good R&D area. Thanks for your question!

JHazejager

Q. How much additional reserves can we produce from fields (bbls or percentage of oil remaining in the reservoir)?

Hans Wenck

A. Hi JHazejager, good question but not that easy to answer. Generally we say that EOR techniques could help to extract additional 5 to 20% from a reservoir. The recovery factor we could achieve is very much depending on the respective settings of the reservoir. In case of very difficult geology or difficult oil we might only get some 10% of oil out of the ground, in ideal cases e.g. in a thermal OR project in California we managed to produce more than 80% of the oil in place. Technology enhancements will increase the recovery factors over time.

Introductory Question

Q. What are the strengths of the Dutch Schoonebeek enhanced oil recovery project?

Michael Lander

A. The Schoonebeek reservoir is one of the largest onshore oil fields in Western Europe. The EOR project extracts hydrocarbons from the reservoir that otherwise would have been left

behind. For this we apply the latest technology, using steam injection to make the somewhat 'heavy oil' flow more easily, applying horizontally drilled wells to maximise the contact with the reservoir and relative high volume pumps to evacuate the oil. In doing this we use the existing infrastructure as much as possible.

Introductory Question

Q. How do innovation and technology help maximise value from energy resources?

Dick Benschop

A. Hi,
The world's remaining oil and gas supplies are in harder-to-reach places: in deep waters, in the frozen Arctic or in rocks from which they cannot be easily freed. Human ingenuity, and technology and innovation hold the key to unlocking the energy our customers need to power their life.
For example, currently the industry recovers around 35% on average from an oil reservoir. We have developed new recovery techniques that allow us to extract more oil from existing fields. By using these techniques in light oil reservoirs, an extra 5-20% can be extracted. For heavy oil the increase in recovery can be as high as 70-80%.

inspector gadget

Q. It is assumed that air or water ? fills cavity left when oil is extracted ? Some thing must replace oil, so send down video camera to see if more reserve oil. The camera would need to be fitted with a light and wiper. It may be the extraction pipe is simply not in oil reservoir.

Diederik Boersma

A. Thanks for the suggestion. When extracting oil from a reservoir the oil is naturally replaced by down hole formation water. Video cameras are sometimes used in oil production wells. They are continuously flushed with clean water to keep the visibility up. We can than see where the oil is flowing into the well.

Introductory Question

Q. How can we make the most of mature oil fields?

Didrik Reymert

A. There are several ways; most includes various Enhanced Oil Recovery (EOR) techniques - generally involving thermal, gas flood, and chemical - that have the potential to add significantly to the amounts of oil that may be extracted from mature conventional oil fields. Mature fields account for some 70% of world’s oil production and typically only 30-35 % of the oil in place is recovered by conventional production. By using EOR in light oil reservoirs an additional recovery of 5-20% can be achieved. For fields with heavy oil, the increase in recovery can be as high as 70-80%. According to the Energy Information Administration (EIA), oil production on stream will decline by two thirds by 2030. This means that around 50 mill. barrels of oil per day will have to be developed. EOR can play a critical role in closing this gap.

Dimitri Schildmeijer

Q. I'd like to know what is the potential for EOR in terms of global supply, and also what will be the impact on CO2 emissions? Do you expect CO2 capturing will reduce emissions dramatically?

Dick Benschop

A. Dimitri,
Studies indicate that a 1% increase in the efficiency of hydrocarbon recovery globally would expand conventional oil reserves by up to 88 billion barrels - the equivalent of three year's annual oil production at today's level. So, the potential is huge.
Carbon capture and storage is an important technology development that will contribute to CO2 abatement. Over time it has the potential to make an important contribution.

Roland

Q. Which EOR technique do you see as the most powerful?

Michael Lander

A. Roland, thank you for this question. I don't think there is one technique that that covers all as each reservoir is different. So depending on reservoir depth, viscosity of the oil and other reservoir features the best technique is selected. On the Schoonebeek project I'm currently working on we inject steam as we are able to lower the initial reservoir pressure to maximise the benefits of this technique. Other techniques are the use of polymers or miscible gas to enhance the oil recovery

bigpictureguy

Q. Since EOR involves the injection of fluids (water, chemicals, bacterial nutrients, gas) has shell considered the advantages of using better injection methods?

Diederik Boersma

A. This is a nice bigpicture question. Indeed we are always looking into most efficient injection methods for the various injectants. For heavier liquids (heavier than oil/gas like water) gravity is often used to aid the injection for gases compression is commonly used. For complicated injection formulations, specific designed mixing and injection trains have been designed.

adamoz

Q. What is the potential for large scale use of power station derived CO2 in EOR around the world and what are the main impediments?

Hans Wenck

A. Hello Adamoz.
Using man-made CO2 to increase oil recovery is really an attractive option we look into. On one hand it would help to reduce CO2 emissions on the other hand it would provide additional oil required to cover the increasing global energy demand. It is on technology which falls in the category of miscible gas injection. However there are numerous challenges attached to CO2 EOR. The CO2 sources need to be close to the reservoir where we consider

to apply EOR, the CO2 stream needs to be of high quality (concentration, clean) and not all reservoirs are suitable for CO2 EOR. Therefore the scope is limited but we are looking into it. For example in the USA (Wasson Field) we operated successfully a CO2 EOR project and gained great field experience.

Introductory Question

Q. What drives today's global energy demand and supply?

Dick Benschop

A. Hi, A big question.
Demand is driven by population growth (about 9 billion people by 2050 vs 6.7 billion now and increasing wealth, especially in emerging economies. The world should welcome this growth in demand - it reflects that hundreds of millions of people will come out of poverty. Supply will need to match the increase in demand - both from new, often more difficult resources and by increasing recovery from existing resources.
We can add the challenge of climate change to this!

Marit Paulsen

Q. Following up Dimitri's question: Have you consider using captured CO2 for EOR purposes?

Dick Benschop

A. Marit,
Thanks. We have been applying CO2 flood schemes for over 25 years and indeed can apply this expertise to new CO2 EOR developments around the world that require not only proved development techniques but also CO2 capture and separation technologies.

Christopher Ouizeman

Q. Technology comes at a cost which must eventually pass down to the consumer. Is it therefore correct to assume that if the oil price inreased by a factor of x% that it would become cost effective to drill deeper to extract what has up until now been uneconomical latent reserves and would this yeild greater returns than attempting to extract residual oil from existing fields?

Dick Benschop

A. Christopher,
Thanks. Indeed higher oil prices allow resources to be developed that were uneconomic before. At the same time applying new technologies at scale will bring the cost down over time. To meet the world's fast growing demand for energy we will need both increased recovery from existing resources as well as the development of new resources.

inspector gadget

Q. Oil floats on water so pump sea water in to oil reserve to flush out remaining oil.

Michael Lander

A. Inspector, thanks and indeed; using water to flush out the remaining oil is basic technique already in use. Often we use the water that comes with oil production in the later field life as this is already compatible with the reservoir. However in the latest techniques we go a bit

further by for instance enhancing the injection fluid properties by adding polymers or convert the water to steam as we do in Schoonebeek.

Marit Paulsen

Q. Good morning! Do Shell have any plans for any offshore EOR testing and applications?

Didrik Reymert

A. Marit
We are at the moment looking at some EOR opportunities offshore and I expect that as the offshore fields mature we may see more opportunities for EOR offshore. We already have heavy deepwater production in Gulf of Mexico and Brazil where we use a novel subsea boosting technique to pump the heavy oil from the sea bottom to the surface.

inspector gadget

Q. Would the money be better spent developing environmentally, renewable technologies ? once electric vehicles achieve there market share there will not be a need for oil, which will come as a premium.

Hans Wenck

A. Dear Inspector Gadget, to cover the increasing global energy demands we actually have to invest in both renewable energies and advancement of the production of traditional hydrocarbon based energy. The importance of renewable energies is expected to significantly increase in the next decades but hydrocarbons will remain to be the main source of energy for the foreseeable future. Electric mobility is also expected to increase over the next decades but the take up is very much linked to the advancements made in battery technology. The electricity demand for electric cars cannot be covered by renewable energies but for a long time still needs to be produced from hydrocarbons. Hence investing in EOR techniques to produce extra barrels makes much sense to cover increasing global energy demand.

janfromholland

Q. In the formation "canals" will be formed during the recovery of oil. Thes canals are an easy way for transporting water from the formation to the well bore. Pumping a compound in the oil field that will harden within a certain period in these canals will reduce the water flow and the flow of oil will be increased. Fracturing the formation after the compound has set could give a better performance again. Is this technology a possibility or has it ever been applied.

Diederik Boersma

A. Nice technical question! Indeed, often channelling occurs. We have several tools in our development tool kit to deal with this. We often use polymer injection schemes to improve the mobility ratio between oil and water reducing the channelling. There is also a commercial product on the market called "Bright Water" which can be injected and gains viscosity at a preset time/distance from the injection well. Sometimes a reversal can be designed in by designing product degradation in or by injecting different chemicals to decrease the viscosity again. For gas channelling, foam can be used. Thanks for your interest.

Andrew

Q. Do you see any social and/or environmental factors that will constrain the industry's ability to further increase recvoery rates (i.e. shale gas fracking)?

Dick Benschop

A. Andrew,
Good question! It is absolutely necessary to develop oil and gas resources in such a way that the impact on the environment is minimised and that local communities are involved and see the benefits.
Your example of shale gas fracking: Slightly different topic, but we believe that shale gas can be developed responsibly with the proper standards for example for drilling and well completion.

yuyu

Q. Hi my name is yusuf ikharia, what are the measure we can use to determine and limit the negative effect from heat exchanges in oil operating environment?

Michael Lander

A. Hi Yusuf. I work on the Schoonebeek EOR project. In this project we are driven to be as energy efficient as we can be. So for generating steam we use a combined heat and power plant to generate both steam and power in one go as opposed to, for instance, a direct fired steam-boiler. Overall we look at the overall energy efficiency as a key measure.

Introductory Question

Q. On the Shell Dialogues forum, dcotov asks: How does Shell develop new innovative technologies of enhanced oil recovery? In-house R&D? Outsourcing to global service providers? Via Shell Technology Ventures Fund? Thank you. Denis

Hans Wenck

A. Hi Denis,
Thanks for your question. EOR is one of the key topics on our EOR agenda. We are developing innovative EOR technologies in-house as well as in partnership with research institutes and universities. For example we are working closely with the University of Texas and with Delft University of Technology in The Netherlands. Main reason for partnering is to accelerate the development of new technologies and also to get as much expertise as possible behind our projects. To my knowledge Shell Technology Venture funds are not used for EOR technology developments.

Sonny

Q. What is the average EOR thermal technique efficiency in sandstones as compared to carbonates?

Diederik Boersma

A. Sonny, thanks for this big question. Thermal efficiency depends on many things. Amongst others it is related to the amount of rock and formation water that needs to be heated compared to the amount of oil and to the heat losses to bottom and top of the reservoir compared to the reservoir volume. This indicates that thin reservoirs (low volume of rock compared to top and bottom area), reservoirs with low porosity (little pore space that holds

oil compared to bulk rock volume) and large volumes of water (fields with a water injection history) are the more heat inefficient reservoirs. As porosity in carbonates is in general lower than in sandstone reservoirs, one could argue that the process would b more efficient in sandstones than in carbonates. No general rule though!

serdar

Q. What are the EOR techniques currently SHELL using and also developing in R&D stage?

Hans Wenck

A. Hi Serdar, thanks for your question. Actually we are working on the whole range of EOR techniques covering all three families of EOR: thermal, miscible gas injection, chemical EOR. We have also gained field experience in all of the above. In our R&D work we focus on two areas: to further improve the efficiency of EOR techniques and also to develop new techniques. In the latter category I'd like to mention Designer Water Flooding. This about increasing the sweep efficiency by adapting the salt content of the injected water to the conditions found in the reservoir. We are also working on new, more efficient polymers for chemical EOR (polymer flooding).

neilm

Q. With regard to extracting oil from mature fields, does the UK Government's changes to oil tax inevitably shorten the life of some of Shell's older North Sea fields ?

Dick Benschop

A. Neil,
The field life from a technical perspective would not change, however the commercial field life is always a function of various metrics including fiscal treatment - as any such material change to fiscal treatment may have an impact. This must however be reviewed on a case by case basis.

Marit Paulsen

Q. What do you consider to be the biggest challenges in offshore EOR?

Didrik Reymert

A. Marit
I see several challenges for offshore EOR, cost and environmental performance being key ones. EOR generally require quite extensive facilities and complicated treatment of the oil, which is a lot more expensive to install offshore compared to onshore. Generally EOR will increase water production, and offshore treatment and disposal of big volumes of water is a challenge. When EOR is applied to existing facilities, normally late in the field life and as an extension of the original design life, there will be the normal challenges about maintaining integrity, weight control and extension of design life. Offshore EOR will also result increased logistics and maintenance.

Andrew

Q. Follow up question for Mr Benschop: Regarding shale gas fracking, sorry, I was actually using this as an example of issues being felt in a similar industry. From your response I gather that you believe proper management in the extraction process will mitigate social and

environmental issues in oil extraction (something that has not been properly managed in the shale gas fracking industry). Is this assumption correct? Do you see any other potential issues with current techniques?

Dick Benschop

A. Andrew,
Yes - it is about proper standards and the disciplined applications of those standards and (best) practices.

Andrew

Q. Questions for Mr Lander: Can you please expand on the steam injection technique that you are utilising on the Schoonebeek project. Do you see this as becoming a more widely used technique?

Michael Lander

A. Andrew, thank you for this question. It is worth noting that Shell already started pioneering steam injection in California in the 1930's. We have moved on and improved the technique over the years with each application. Steam injection significantly reduces the viscosity of the oil and is therefore best suited for the 'heavier oil' reservoirs. So yes steam injection is one of the EOR techniques available and is already applied globally, but with each reservoir having its own specific features, other techniques will also play a significant role in maximising the oil recovery from existing oil fields.

Marit Paulsen

Q. What challenges do you see in separating oil/water when polymers have been added to the well? how do you solve these challenges?

Diederik Boersma

A. Marit, a very topical question. We are involved in a large scale polymer project. It came on stream over a year ago. Challenges we envisage are related to an increase of oil and water separation time due to the higher viscosity of the produced water. The polymers also might cause some additional emulsification. We are currently testing several chemicals, polymer shear devices to deal with potential future problems. We do that in flow loops in which we can pump around significant volumes and test various production streams. It remains a challenge to emulate in the lab the nature of the produced fluids. So we prepare ourselves by considering all possible production problems and make sure we are ready to deal with them if and when they occur.

P.RAM

Q. My name is P. Ramalingam. I am a Petrophysicst in Shell Technology Centre – Bangalore. The Cobalt and Nickel –Molybdenum-Zinc alloy catalyst with little amount of electricity can split water into H2 and O. This can be achieved in the bottom hole with a horizontal or “J” type of well These gases can be made to recombine in a exothermic reaction inside the reservoir. This will give much needed heat and pressure to extract more oil from the rock. This explosive energy can be used for fracturing the rock also. Is SHELL interested in this type of work? Will it investigate and take up the above concept as a “Game changer” Project?

Hans Wenck

A. Hello P Ramalingam,
Sounds to be a good proposal to me. Ni–Mo-Zn alloys have been investigated for many years to split up water into its elements, a development I followed with great interest. To use H2 and O2 downhole either for heating up the reservoir or to frack the rock sounds really interesting to me. I encourage you to submit your proposal as GameChanger project.

SAli

Q. Hello, Innovation requires research, investment and collaboration so how much investment is made by Shell in this area?

Dick Benschop

A. Hi.
In 2010 we spend over 1 billion US$ on research and development - on a range of key topics and challenges. We are leading amongst the major IOC's in developing technology for the future.

peterh

Q. Is CO2 eg from carbon capture a useful tool to enhance oil extraction?

Diederik Boersma

A. CO2 injection as an EOR method is proven. You need to have the right oil reservoir though. Oil composition temperature and pressure of the reservoir are important parameters. The next thing is that CO2 needs to be available at an affordable price. Often Carbon extraction from the air/flue gasses and the CO2 compression are too expensive to design and economic EOR project. We are continuously looking at this opportunity though. We feel that a value loop approach, where potentially the air used in power plants is pre treated to remove the nitrogen, can make a difference.

janfromholland

Q. When steam is injected this should be under "high"pressure and high temperature because the formation pressure and temperature are pretty high as well . Could you give an example of temperature and pressure of the steam in relation to the formation temperature and pressure

Michael Lander

A. Jan, let me talk about Schoonebeek project as an example.
The temperature of steam injected is around 200 °C, with the initial reservoir temperature being well below 100 °C. With this we reduce the viscosity of the oil by about a factor 40. The reservoir is at some 70 barg, but for the steam injection we are first lowering the reservoir pressure to 40 barg, by pump off oil in the initial phase.

wwygnanski

Q. New attractive concepts are frequently conceived and developed by small but inventive companies, can you suggest the best way to convert such concepts in commercially available products.

Hans Wenck

A. Hello,
Good point. Yes indeed we are aware that quite many innovative concepts are developed by either small companies or inventors. In order to help mature and commercialise novel technologies we have set up Shell GameChanger. Since 1996, GameChanger has invested more than $250 million in more than 2,000 ideas and helped turn 200 ideas into successful projects.

inspector gadget

Q. Are environmental concerns taken into account with method used ?

Didrik Reymert

A. Thanks for your question
Health, safety and environment (HSE) issues are priorities for Shell just as they are for our EOR projects and indeed environmental considerations are key when we consider EOR projects and which EOR techniques to be used.
As part of Shell's overall strategy to reduce its environmental footprint and ensure safe operations, we continuously strive to develop and improve our operations: from logistics, handling, water cleanup and the disposal of chemicals, to carbon dioxide (CO2) emissions and heat with thermal recovery and, finally, with miscible gas (gas that can dissolve in oil) applications, corrosion and CO2 containment issues.

socioeco

Q. Is shell consider any bio (or bio-nano) techniques for EOR? Will be grateful to recieve a response and whom we can contact

Diederik Boersma

A. We indeed have research ongoing on bio and on nano technology in relation to EOR. We have an open game changer panel in which this research is addressed. Please contact our website on innovation and you can find GameChanger contacts there.

Marit Paulsen

Q. Do you have any plans to invite external companies to take part in EOR studies by issuing Request for Tenders ?

Didrik Reymert

A. Marit
I do not think we have any concrete request for tenders at the moment for offshore EOR projects, but through our regular engagements with our contractors and suppliers we do regularly discuss in general terms upcoming opportunities/developments/projects.

socioeco

Q. It has been previously assumed that growth drives oil/gas demand, wether it is the volume demand through population or economic growth- the global economy is currently going through recession and several several recession dips- this could continue. The impact will be significant on 4 billion people living on less than $3,260 a year and could go largely unserved,

more so in the energy. These people have to make a choice between eat or heat - any initiatives shell has that transforms 'eat or heat' to 'eat and heat'.

Dick Benschop

A. Hi,
We are very much aware that hundreds of millions of people struggle with very basic choices. Through the Shell Foundation we are participating in projects to provide cook stoves that will allow people to prepare food with less energy and less harmful emissions. Please check the Shell Foundation website.

Roland

Q. Do you see any issues with the supply of a sufficient amount of chemicals/polymers etc. for your EOR projects?

Diederik Boersma

A. Roland, there are definitely issues with logistics and supply of chemicals. When chemical EOR takes off, as we believe it will, it is envisaged that significant additional production capacity is required. Current market research indicates that the raw material for the required chemicals is available in abundant quantities. So it will be a challenge, but a solvable one.

Mark

Q. Diederik, thank you for your answers, article will be published in Technisch Weekblad next week, best regards, Mark

Diederik Boersma

A. Mark, thanks for your reaction. Glad to be of help.

JHazejager

Q. Dear Panel, when you look at the business opportunity of EOR, how do we ensure/achieve that all pockets of knowledge and expertise in our company are helping to solve the challenges. What do you see as the biggest challenge to get ahead and stay ahead of the competition? Thanks, Johan

Hans Wenck

A. Hi Johan,
Knowledge management is indeed a major challenge in a major organisation like Shell. We have a Centre of Expertise for EOR in place to manage knowledge in that area. The biggest challenge is probably to get technologies applied in the field. Developing new technologies is often easier than getting filed experience in the application of novel technologies. Those companies that manage to adapt quickly to new challenges, develop technologies to overcome these and deploy the technologies rapidly will win probably be the winners. Sustained high investment in innovative technology (R&D) is crucial to stay at the forefront of technology and stay a long-term competitive company.

Marit Paulsen

Q. Didrik, thank you for your reply on the offshore testing plans. What are your thoughts on using chemical EOR (surfactants, polymers) for offshore use?

Didrik Reymert

A. Marit
These are some of the techniques being considered, but is all pending on the characteristics of the field and the logistics constraints etc as mentioned in my previous answer

peterh

Q. how transferable is the EOR technology to other areas of the world?

Diederik Boersma

A. EOR technology is transferable; at least the learning from one area is transferrable to the other. Technically, often EOR is very reservoir specific. Economically, viability of EOR is often dependent on the fiscal regime and the cost base use in a specific region. People wise we often rotate people to transplant knowledge and skills from one region to the other.

ManLu

Q. How would better 'visibility' by sensors (be it video, accoustic etc) help in the EOR and well management? What are the primary hurdles to use these technologies more in this respect?

Diederik Boersma

A. Visibility would definitely help to increase efficiency of the EOR process. Improvement in the area of type of sensors (compositional) and the reliability of permanent down hole sensing tools is required.

Lars Rengersen (2elevate)

Q. There is a lot of attention for technological improvements, but how about people? For example, how do you support your reservoir engineers to do a better / easier / more fun job?

Hans Wenck

A. Hi Lars,
You are right, technology and people have to be in balance. The innovative technologies need to be applied and used hence you need well trained and motivated technical staff. We invest quite a lot in training staff and we of course do our best to keep staff working in Shell motivated. Based on experience, working as a reservoir engineer in Shell is exciting and challenging, therefore these people are very motivated.

Dick Benschop

Everyone,
Thank you so much for joining us today. We hope you enjoyed the webchat and that we've provided answers to some of your questions. The team really enjoyed reading your thought-provoking contributions and suggestions.
Please let us know your thoughts on this webchat on our survey. We really value your feedback and suggestions.