

SPE REVIEW

LONDON



2016 SPE President elect visits London
Production Efficiency in the UK North Sea
SPE London YP continues to create opportunities

Contents

NEWS

Production Efficiency UK North Sea 3

This initiative embodies 3 of the SPE's 4 strategic objectives – capability development, knowledge transfer, and promoting professionalism.

SPE London YP offers uniquely practical opportunities for its members 7

Unique, informative and practical – attendees' enthusiastic description of the PVT Knowledge day at Expro Fluid Analysis Centre (FAC) in Reading.

Successful Ambassador Lecture Program South by London SPE YP Committee 7

The ALP is one of the events organised by the SPE specifically aimed at students. It is an evening where they have the opportunity to find out more about the oil and gas business first hand.

FEATURE

2016 SPE President elect visits London 4

Nathan Meehan, the 2016 SPE President Elect, focuses on new ideas and optimising profitability through innovation.

ABOUT US

The Society of Petroleum Engineers (SPE) is a not-for-profit professional association whose members are engaged in energy resources

development and production. SPE serves more than 110,000 members in 141 countries worldwide. SPE is a key resource for technical knowledge related to the oil and gas exploration and production industry and provides services through its publications, events, training courses and online resources at www.spe.org

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If you need to change any of your membership details, please visit the 'Update your profile' link at the foot of the homepage at <http://london.spe.org/home>

Looking Ahead

Here it – SPE Review, online. We hope you enjoy it!

As we mentioned in our last print edition, we've chosen to focus our resources on providing higher quality content online. In addition, by reducing SPE Review costs, we will focus on developing further knowledge outreach initiatives to the benefit of all.

Moving to digital production allows for detailed events reports, and feature more in-depth interviews with industry leaders – such as the exclusive Q&A with the 2016 SPE President Elect, Nathan Meehan. Read about his experiences, strong belief in the industry's future, and sage advice on optimising profitability through innovation on page 4.

Elsewhere in this issue, you will read about SPE London's successful Ambassador lecture programme, on page 7, aimed at providing young people with clear insights into our industry. And about a joint London and Aberdeen initiative sponsoring the foundation of a new Special Interest Group (SiG) that embodies three strategic objectives – capability development, knowledge transfer, and promoting professionalism – on page 3. The SiG focuses on Production Efficiency in the UK North Sea, and has already received expressions of interest from other jurisdictions in re-using what is developed in the UK.

As always, we continue to rely on the support and contribution of our membership, and are committed to invest the organisation's resources to best effect. An excellent example is the upcoming SPE London seminar on Unconventional Resources, providing an opportunity for technical insights from industry experts involved in Heavy Oil and Shale. More information on this April 23 seminar on page 7.

On a local level, the SPE London Section continues to work closely with industry, government, institutes and academia by holding cross-disciplinary meetings and Continuing Education Seminars. The London Section also sponsors Student Chapters at Imperial College, London Southbank and the Universities of Leeds, Manchester, Salford and Portsmouth.

We will continue to work together to ensure a strong, technically superior and community-aware industry that continues to be proud of its place as a global leader.

On our cover



L-R: Miles Cudmore, Resource Appraisal Director in BP for tight gas; Nathan Meehan, SPE president; and Carlos Chalbaud, SPE Regional Director for the North Sea.

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2016 SPE President elect visits London

On a visit to London in March, Nathan Meehan, the 2016 SPE President Elect, met the student chapters of the SPE London section at LSBU, together with executives and YPs in BP Sunbury. He also took time to answer questions about the industry's challenges and opportunities in 2015.

What are the biggest challenges and opportunities in 2015?

Clearly, low product prices are going to affect the economics of every project. Even at prior prices, the cost structure in the North Sea led to the review of big projects, and some projects will be deferred until there's a product price affirmative.

Here's an interesting, relevant parable: a professor had a beautiful house, and a lovely lake in the back with many trees around it. You could only get to the lake from the front. Over time, leaves filled in the lake; an expert said the lake would turn into a bog unless a foot of sand was spread over the entire lake. Initial bids were expensive, and involved knocking down part of the garage, bringing in heavy equipment and so on. And the professor spent some time trying to negotiate costs down. Eventually, the problem was solved with a new approach, and a new contractor – for a fraction of the cost. The solution: buy the sand, wait until January when the lake freezes over, and put a foot of sand on top of the ice, and then we'll wait for the Spring thaw and the problem will be solved.

The point is – no amount of cost-cutting negotiation, using the old thought processes, would have solved the problem. The challenge we face now is one of imagination, and new ideas and innovations.

Successful innovation in complex environments comes from people collaborating. There is no longer just one great mind that comes up with something so brilliant that it solves everything; we all need to incorporate ideas – from our individual companies, operators, service industries, competitors, and universities – and try to come up with new approaches that will allow us to keep production optimised and find those projects that will be commercial during the low-profit prices.

Is technological advance driven by younger people?

It's refreshing to see young professionals move up the technical and managerial ladders. When we look at SPE membership, we see two peaks in age distribution – one in the 20s and the other in the latter half of the 50s – created in part because of so few graduates in the late 1980s, early '90s. Companies have put a lot of confidence in this group of professionals that has had to mature technically and professionally during the last ten years, where we've had very high product prices. With a relatively small amount of experience, creative young professionals are really moving up the ladder.

That said, if you look at some technological advances, sometimes they're coming from new industries. In my own company's case, we have quantum physicists working for us. (I was a physics major as an undergraduate – who knew we would be using it to design new products?) I remember when the Nobel Prize was awarded for some of the new nano technology inventions, and that's not so long ago. But we are now selling nano technology products on a routine basis.

So, there's a combination of advanced technology and using things from outside the industry to solve these problems – like the sand on the ice instead of in the lake.

What impact will nanotechnology, biotechnology, and sustainable chemistry solutions have on the industry?

Absolutely. The industry has a tremendous need for chemicals, from



Nathan Meehan, 2016 SPE President Elect with the YP group at BP.

hydraulic fracturing, treating produced fluids, corrosion, and inhibition. In the not-too-distant past, the optimisation of those chemicals was very experimental – now, we're looking at quantum electric dynamic modelling to design specific new chemicals. So, we're innovating nano technology into the chemistry. We never want to have a spill, but if we do have one, then we have to make sure it's not something that's going to kill a lot of fish or ruin a lake. So, trying to find things that are biodegradable, or better, is really important for us.

Where are we seeing most of these new technologies and chemistries being developed?

The service industry carried the bulk of the research load for many years. The major oil companies and the national oil companies have also done a significant amount of increased R&D over the past five or 10 years, and academia is doing more of the fundamental-type things.

When you're looking at specific, forward-looking products – for example, generating rubbers and seals and other materials that will hold up in super-high temperature, high H₂S content – the service companies are doing that kind of work.

However, for high-temperature electronics, things that function at high pressures, things that are hydraulically fracturing with radically less water or recycled, produced water – these are driven by research companies as well as service companies.

How can change people's perception of hydraulic fracturing?

Hydraulic fracturing is a mature technology; I pumped my first hydraulic fracture in 1975, and it had been routine for many years prior to that.

However, while there are hundred of thousands of frac jobs done without event, it is a large-scale industrial process. So, people affected by nearby truck traffic, noise and air issues are rightly concerned. We need to do a better job of minimising local impact – for example, drilling more of our wells from central pads, with wells side by side instead of scattered across hundreds of acres.

We also need to do a better job of communicating. I don't think the public has a high degree of trust in oil companies, but I believe individual engineers are not only experts in their technology, but they're also very trustworthy people. As they talk to their neighbours and chat with their friends, they can share an understanding of the real issues. And we don't speak enough about the importance of energy. Every measure of the quality of life is correlated with energy use. Look at infant mortality, education levels, disease levels – most indicators of quality of life – these are highly correlated with energy use.

If you look around the world, there are billions of people who don't have access to modern fuels. The World Health Organization (WHO) identified household air pollution as one of the biggest killers in the entire world. It's a huge problem, especially when you look how important energy is in our lives.

Continued on page 6

Production Efficiency in the UK North Sea

In 2014, the Aberdeen and London SPE Boards agreed to sponsor the foundation of a new Special Interest Group focused on Production Efficiency in the UK North Sea. Alex Spring, founding Chair, explains what the SIG is trying to achieve and why.

Background

In Upstream, Operational Excellence can be segmented into three discrete areas:

- **Reservoir Optimisation** ('RO') focuses on increasing the volume of recoverable hydrocarbons for specific reservoir(s). RO can encompass different disciplines, including seismic reprocessing using 4D time horizons, a variety of different EOR techniques (water flood; CO₂; acid; fracking; etc.), infill drilling, a variety of artificial lift approaches or a combination of 'all of the above'.
- **Production Optimisation** ('PO') focuses on the debottlenecking of the transportation and processing capacity of the physical production system. This could include workovers, riser flow capacity increases, additional artificial lift capability and increased processing capacity.
- **Production Efficiency** ('PE') - Both RO and PO potentially increase the ceiling of the Structural Maximum Production Potential ('SMPP') of an asset. Production Efficiency focuses on production loss reduction by optimising the daily operations of existing assets, both within individual departmental silos (wells, production, maintenance, drilling, HSSE, planning, etc.) and also cross-function optimisation through integrated activity planning.

Whilst RO and PO investments have both had a significant positive impact on daily production operations, if the platform is unavailable or operating sub optimally, those investments will also be either irrelevant or sub optimal. PE is a global problem that appears to be especially acute on the UKCS, where production losses continue to average 35% - 40% p.a. ¹.

Analysis

During our initial review of existing analysis of UK production efficiency and loss reporting, we established several interesting facts:

- Operators do not define SMPP or loss categories in the same way as each other, or the Regulator.
- Lack of common definition at a suitably granular level has resulted in different operators aggregating similar or the same data in different ways, for reporting to the Regulator.
- Currently, SMPP is defined by the individual Operator on a monthly basis, directly impacting PE%.
- Locked in potential is included in some Operator definitions, but not in others.
- Project delivery could increase SMPP; late delivery of a project could 'reward' Operators by measuring efficiency against existing SMPP.

Taking a sample of 3 operators' UK production efficiency and loss returns to the Regulator, analysis showed that the potential difference between Operators' reported PE was over 27%². Given the lack of basic common definition, Operators are understandably wary of publicly discussing of production efficiency and its drivers: PE as currently reported is not comparable cross company. Yet this measure is at the core of the MER UK strategy recommended by the Wood Report:

"Asset stewardship strategy – to ensure operators are held to account for the proper stewardship of their assets and infrastructure consistent with their obligations to maximise economic recovery from the fields under their licences and with consideration to adjacent resources. In particular, operators should be expected to develop, maintain and operate their assets and infrastructure at all times in an efficient and effective

manner and should share their asset stewardship strategy with the Regulator. The Regulator should set clear expectations on critical stewardship factor such as production efficiency and recovery efficiency and work with each joint venture partnership to ensure that they are met"¹. Achieving a common basis of measurement is therefore fundamental. Setting this firm foundation is the primary aim of the SPE's Production Efficiency SIG for 2015.

First Things First

A common basis for analysis and reporting is beneficial to all interested parties: Operators understand how they stack up against comparable fields operated by others, leading to examination and sharing of best practices to increase overall economic recovery. The Regulator is able to identify trends across the UKCS, analyse root causes, and – where appropriate – act as aggregator in the UK's common best interest.

Common baseline definition of SMPP requires definition of a common underlying choke model to a certain level. This is key to the output ('deliverables') that the SIG is aiming to produce in 2015 and beyond.

Deliverables

The SPE is a volunteer based organisation, and we recognise that planned deliverables for the SIG are ambitious both in scope and timing. Nevertheless, Deliverables planned for 2015 delivery include:

Develop a common Production Loss Reporting definition for the UKCS	Standard definitions of Structural Maximum Production Potential, including choke model definition. Capacity setting Loss areas – level 1, level 2 Level n Root cause categories Loss Event elimination action types Illustrative Worked Examples
Performance benchmarking	Based on new common definitions, rebase performance in to new performance 'league'
Best Practice 'Learn & Share' Workshops	Initiate series of quarterly 'Learn & Share' workshops on areas for potential performance improvement, as highlighted by PE performance
Draft global 'Standard'	Formally submit to SPE Houston for consideration as basis of global guidance

Progress to date

We held a successful Kick Off meeting in Aberdeen in January: I reiterate my personal thanks to the attendees from BP, Shell, Total, Nexen, Talisman Sinopec, Centrica, Wood Group PSN, Fairfield, Dana, OGUK and DECC.

It was agreed that the SIG will have three working groups: Subsurface/ Wells, Plant, and Export/ Market Potential. Each group is tasked with agreeing common definitions for 'their' section of the overall choke model, including both SMPP and loss definitions. There is also a Steering

[Continued on page 7](#)

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Nuffield Research Placements provide talented and highly motivated post-16 students with the opportunity to work with scientists, technologists, engineers and mathematicians over a 4-6 week period in the summer.

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www.nuffieldfoundation.org/nrp



2016 SPE President elect visits London

(continued from page 3)

In reality, the electricity that's available from a wall socket comes from nuclear, or coal, or oil and gas, or a fraction from wind or biomass or photovoltaic. Even with the most optimistic forecast for photovoltaic, biomass, wind and other renewables, none of that growth takes up even the increase in growth forecasts. Oil and gas production naturally decreases without new additions. If you look at projected growth in energy demand over the next five to six years – taking into account the decline of existing stock, and increased demand – it's not met by renewables, so we need new additions of oil and gas. Otherwise, prices are going to go through the roof, and people won't be able to afford to drive their cars and run their houses – the drivers of our standard of living.

How can we balance that need to supply the world's hydrocarbons with ways to improve energy efficiency?

It's a good point. I'm concerned that in Germany, for example, they're shutting down nuclear power plants and adding coal plants. CO₂ emissions from coal plants are considerably higher than from natural gas. The USA has had a dramatic reduction in its total greenhouse gases (GHG) emissions, almost exclusively because of increased production of natural gas and decreased use of coal. Whereas the global increase in GHG remains high. That's just one example. In terms of environmentally acceptable things: one of the things we should be encouraging is greater use of natural gas. It burns relatively cleanly, and it's a perfect bridge fuel to a time when there is a lot more potentially cleaner sources of energy. It is not just a bridge fuel. I am convinced that natural gas is a long term key piece of our energy mix. Frankly, it is not certain that any of today's alternative energies – in their current form – are that much cleaner beginning to end. That is, if you look at it from the scale that would be necessary to displace oil and gas.

No one is going to look forward to the entire countryside from London to Aberdeen being covered in wind turbines. And while you can generate electricity with photovoltaics in Northern England, it's also possible to grow tomatoes in Alaska – neither one is very efficient. Even in places where there's a lot of sun all the time, like the desert, it's very difficult to do it efficiently because of the sand and the dust and the wind. And the total environmental impact of those is a little more significant than people may immediately realise. We like to think of those as being completely 'green', but they have a cost of installation and manufacturing – there's a lot of metals used in photovoltaics.

Balancing act between efficiency and environmental concerns?

There has to be a balance. The oil and gas industry has, for the most part, done a very good job from an environmental standpoint. There have been some notable exceptions to this, and we, as an industry, have to do a better job to maintain our social licence to operate. And there are multiple levels in a social licence to operate.

We have to be credible, be believable.

Ultimately, as we improve how we communicate, and how well we perform, we gain more community trust. We need to communicate effectively, so people understand what's going on; we need to make sure that people see that we actually do what we say; and, that we really do minimise environmental impact. Because if we fail to that, then we're going to lose the social licence elsewhere – in hydraulic fracturing, that social licence is already absent in several places. There are some places where you currently cannot operate.

In the public eye, hydraulic fracturing has somewhat functioned as a substitute for oil and gas activity in general. Every time the EPA, or any independent party does a study of hydraulic fracturing, everybody determines there's no way that any of these hydraulic fractures go out of the zone as much as others claim they do, and even the best studies now show there's no way earthquakes are driven by hydraulic fracturing.

In Oklahoma, for example, there's been a substantial increase in small earthquake activity, mostly below the level that can be felt. So



L-R: Miles Cudmore, Resource Appraisal Director in BP for tight gas; Nathan Meehan, 2016 SPE President Elect; and Carlos Chalbaud, SPE Regional Director for the North Sea.

people just assume, because there's a lot of hydraulic fracturing going on, that these fracs are causing the earthquakes. But if you do the careful analysis, you can really see that injected produced water from another type of field where there's big level of activity – and they went from injecting a billion barrels a year to two barrels a year in this formation – that's where all the seismic activity is, associated with the increase. So even if there were no frac jobs being pumped at all, the seismic levels would have gone up. There are some unique features in Oklahoma involved as well.

People in areas with a lot of gas and oil activity, are less concerned about some theoretical problems than they are about the number of trucks, and the wear and tear, on the roads, etc. These are realistic problems that we need to do a good job of addressing and communicating. In our company, we do full disclosure of the chemicals used in our hydraulic fracturing, and it's important to make sure that people know we're not pumping carcinogens in these very deep treatments, much less in their ground water. And, if you make all the measurements, and you look at all the studies, it's just not the case that fracturing is a cause of some of the problems people have claimed.

So, it comes back to communication, knowledge and trust?

Gaining trust is the highest level of social licence. It doesn't happen often enough. But where the community is willing to work with you and acknowledge and collaborate, then that's a good level of licence. I'm happy to work in an area where I still have to earn the company's trust every day.

What will happen with oil prices?

I get asked this question all the time and I really don't know. The more I study the matter, the more I'm convinced that I don't know.

I had an opportunity to sit (at a dinner) alongside the Secretary General of OPEC, and he said he didn't know if they were going up or down – he said he hoped they're going up – but no one knows.

The issues are complex.

Final comments?

New innovations frequently occur during times of low product prices – such as developing deep-water fields when we simply couldn't afford to build the structures we had previously, and thus dramatically take costs out of a given operation. Repetition drives innovation. When you drill a lot of wells, you dramatically lower costs. And as we get better, and faster and more efficient, we have fewer leaks, we have fewer spills, and we improve safety. Also, during low product prices, the IOCs, NOCs, the super majors, the service companies, and the super independents recognize the need to be vigilant about safety and performance. At SPE, we'll continue to increase programmes in health & safety, and the environment, and social responsibility.

During these challenging times, we can focus on new ideas and optimising profitability through innovation. When price goes back up, innovation has then become part of the collective DNA. ■

Unique Opportunities



SPE YP event at UKAS-accredited Expro Fluid Analysis Centre.

A PVT Knowledge day was arranged by SPE YP London Committee on 25 February 2015 at Expro Fluid Analysis Centre (FAC) in Reading. The event was followed by a presentation of Reservoir Fluid and PVT analysis by Brian Moffatt of Petrophase in RPS Energy Henley office. The day was an opportunity for young Petroleum Engineers and students to visit Expro PVT Laboratory to engage in reservoir fluid PVT analysis in a real time environment. The visit consists of presentations, discussions, facility tour, and question and answer session in the end.

The event at UKAS-accredited Expro Fluid Analysis Centre provided opportunity to understand the processes involved in fluid characterisation and inspect firsthand the customised apparatus to be applied for different experiments. The Lab tour was followed by brief presentation by Neil Winkworth of Expro on importance on PVT sampling for correct design of facilities and economics of field development. Attendees actively participated in Q&A session following the presentation.

Brian Moffatt hosted the afternoon session. Brian's logical problem solving skills and breakdown of complex problems to first principle theories encourages young professionals to look at PVT analysis in different way. He emphasised the importance of Quality Check (QC) of sampling data and to identify the most representative of reservoir fluid. He demonstrated on how to use real time production data in QC methods using two case studies.

Attendee Xiahong Zhang of KBC said: 'Having been working on theoretical model development of PVT, physical property and phase behaviour of reservoir fluids for years, visiting Expro PVT Lab gave me an unique opportunity to learn how PVT experiments are carried out, and accuracy of all the PVT data.'

The day was fun, a platform for young engineers to integrate with industry professionals yet very informative and practical.

Expert industry insights

In keeping with tradition, the London SPE YP Committee held the Ambassador Lecture Program South on 26th February 2015.

The ALP is one of the events organised by the SPE specifically aimed at students. It is an evening where they have the opportunity to find out more about the oil and gas business first hand, from fellow young people, and it has always been popular. The 2015 edition was no different, and while the majority of attendees were based in London (and at LSBU in particular) others came as far as Birmingham.

The SPE was lucky enough to have three excellent speakers from different backgrounds and companies to represent small-mid cap E&P companies and consultancies. After three very good presentations by Mo Farrag (Igas), Mark Beleski (ex-RDS now Circle Oil) and Maxim Kotenev (Sasol), questions on all aspect of the oil and gas business were asked; from how do you stand out, is a Masters in Petroleum Engineering worth it, to which jobs should you apply for. The Q&A session went on beyond the presentations and into the networking session, which went on until 9pm, at which point it was adjourned to the student union bar.

Overall, the event was a success and the SPE YP committee would like to thank the SPE LSBU student chapter for its excellent organisation, LSBU for hosting us, the students that attended and the speakers, for volunteering their time and without whom this event would not have been possible. ■

Production (continued from page 4)

Committee made up of the work group leads (all from Operators), the Regulator, OGUK, and the Chair: the Steering Committee is responsible for overall coordination, integration, and approval of individual work group outputs.

Other operators have since joined the working groups, including RWE Dea, MOL, Wintershall and GdF. The London Kick Off will be held on Friday 6th March – so watch this space for further updates.

Conclusion

This initiative embodies 3 of the SPE's 4 strategic objectives – capability development, knowledge transfer, and promoting professionalism. The SIG has already had expressions of interest from other jurisdictions in re-using what we develop here in the UK. As we work hard to build on our solid start, we look forward to updating the wider SPE community as we make progress through 2015 and beyond.

Footnote:

Alex Spring is Chair of the Production Efficiency SIG, and a Partner at Bridge Business Consulting. Alex can be contacted on:

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London upcoming events – 2015

23 April 2015

Unconventional Energy Seminar - The Future for Heavy Oil and Shale Gas in the UK The Royal Institution of Great Britain, 21 Albemarle Street, London, W1S 4BS

28 April 2015

Next-Generation of Energy Efficient, Low Water Usage - Heavy Oil Recovery Methods. Professor Jalal Abedi, SPE Distinguished Lecturer and Professor of Chemical and Petroleum Engineering, Univ. Calgary.

'Fluid Profiling - A Modern Technique for Reservoir Characterization'. Michael O'Keefe, Principal Reservoir Engineer, Schlumberger and SPE Distinguished Lecturer Geological Society address.

5 June 2015

SPE-YP spring/summer party and 2nd year bowling competition at Bloomsbury lanes.

9-10 June 2015

SPEi/London Section Conference One Great George Street, Westminster, London, UK

For more information, or to book any of these events, visit: www.spe-uk.org or www.katemcmillan.co.uk

Unconventionals Seminar

As conventional hydrocarbon resources in the UK decline, future production of oil and gas will increasingly rely on Unconventional Resources, including heavy oil and shale.

A one-day seminar on Thursday April 23rd aims to provide an educational resource to the Petroleum Engineering community, where we provide technical presentations by those who are actively involved in these areas, either within or outside the UK. Half the day will be devoted to Heavy Oil and half to Shale.

The venue is the Royal Institution, 21 Albemarle Street, London W1S 4BS, and fees (with limited student spaces) include lunch and refreshments plus delegate material.

Anybody who is involved in the Petroleum Industry at a technical level will benefit from this Seminar.

Bookings: www.katemcmillan.co.uk or email katespe@aol.com

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