



IN BRIEF

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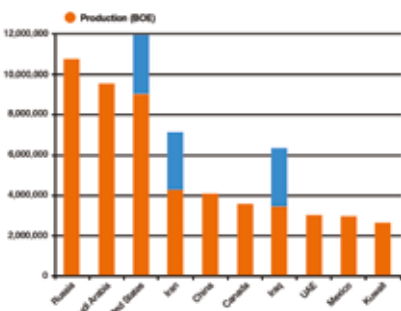
GAS PROCESSORS ASSOCIATION EUROPE

ARE WE LOSING OUR CORPORATE MEMORY?

Oil price falls by 50% in nine months, turmoil in the Middle East, political friction in Eastern Europe, poor political leadership. So surely it is not time for countercyclical investment in training and development?

You would have to have been in a concrete bunker on planet Mars not to know that change is afoot within the oil and gas industry.

We should have seen it coming really. In 2012 all of the players were in place: Shale oil production in the United States was soaring; Iraq was coming back onstream; negotiations with Iran were progressing well. All of these were going to lead to a surge in supply in a world where global economic growth was unusually low.



Top oil producers as of 2012

So why did we not notice that the party was over and just leave quietly?

Well, the answer is that we really should have. With the munificence of hindsight it was all so obvious. Iraq did indeed add 2 MMBPD of oil export, contrary to expectations, Libya continues to export 2 MMBPD despite its internal strife, and the United States did become the largest oil producer in the world once again. No surprises here. Demand for oil continued to roughly follow economic growth. There was very little of that and now China is faltering too.



Brent Crude Oil Price

The die was cast in June 2014 and prices started to fall.

There was just a chance that the fall would be temporary, but when in November OPEC voted not to reduce production quotas and instead to defend market share, we entered the long haul. The party will not be reconvened for some time, and when it is, many of our old friends will have left town.

Same old same old or is it different this time?

If there is one thing that is predictable about the oil price it is that it is unpredictable! It has been cycling longer than Chris Hoy and no doubt will continue to do so. There are one or two reasons for thinking that, this time, it may not be quite the same.

Saudi Arabia is no longer the world's only swing producer. The United States has now joined, at least for a short time, the elite. The ready availability of shale oil, as well as the ability to incrementally ramp it up and then down provides flexibility to their output. It means that when prices fall, the US will cut back on production and when they rise, they will quickly bring it back on stream again. The correlation between oil price and active drilling is very strong. This not only means

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3 VIEW FROM THE TOP
New GPA chairman Paul Openshaw on "fracking" and shale gas



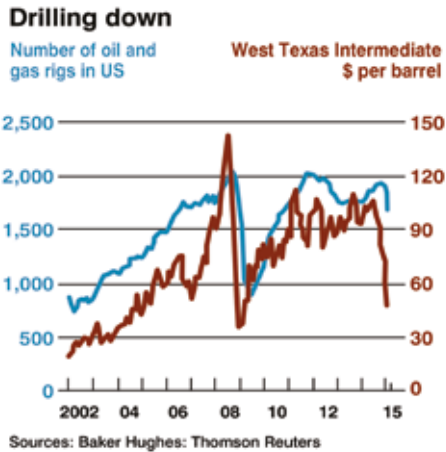
5-13 GPA EUROPE ANNUAL CONFERENCE 2014
Comprehensive coverage of the conference in Madrid



14-16 LONDON TECHNICAL CONFERENCE
A round-up of activities in the November 2014 event

that US will capture premium prices, but will also place a cap on future oil prices which OPEC will not be able to influence.

While oil and gas are very closely associated allies, they are not inextricably linked. They serve different markets. The high prices of gas in Europe and the Far East have so far not fallen. Neither has the low cost of gas in the Lower 48 risen, in fact it has fallen. As a result



opportunities for LNG export from the lower 48 are better than anywhere in the world.

There was one person at the party, standing quietly in the corner, to whom nobody spoke. It may be that soon we shall have to include Auntie Climate Change in our conversation. Above the loud music and clink of glasses we have barely been listening to the small voices



telling us that global temperatures continue to rise, the Arctic ice cap continues to melt and sea levels to rise. There is an increasingly large lobby advocating that carbon fuels be eliminated – yes eliminated – before 2050 to avoid catastrophic temperature rises. Very few at the oil and gas party have been listening to what is quite clearly the existential threat of which Lord John Browne has warned. After all, what could we possibly do?

Towards the end of next year the world's political leaders will meet in Paris to try to agree, for the umpteenth time, changes to the UN's Framework Convention on Climate Change (UNFCCC). This time they may just succeed. They probably won't, but if they do, then the next party will be held under far more restrictive licensing laws. We should probably spend the next few years getting ready.

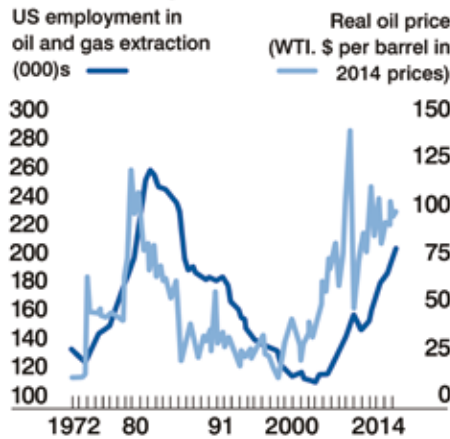
There are babies in that bathwater.

The (International) oil companies have little choice in the response that they make to the falling oil price. The depth of their pockets will dictate the speed with which they have to move. When revenues fall, sooner or later, budgets have to be cut. This is a survival issue and some will not survive.

Already, exploration and projects in the more adventurous frontiers are being abandoned or delayed, rates are being cut and headcounts reduced. The gearing between the oil companies and the service providers is high. Every job lost in an oil company will be lost tenfold or more in the supply chain. The historical correlation between oil price and number of employees is very strong.

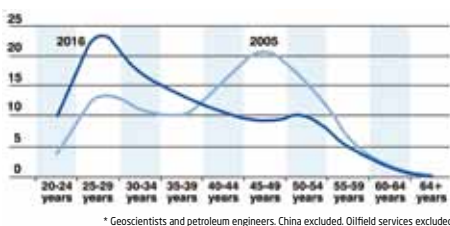
There will be a tendency, in this environment, to cut back on training and development budgets for of the remaining staff. **We believe strongly, that companies which engage in countercyclical investment training and development will come out of the current trough the stronger.**

Oil industry employment and the oil price



The oil industry was already facing a demographic time bomb. Its fuse may be about to shorten.

The baby boomers of the late 50s and 60s are now wealthy enough to retire and will be keen to take advantage of the opportunity to do so. **They should be prevented from doing so.** This will require flexible employment contracts and creative new roles. The nature of these roles is clear.



Oil industry professionals, by age
% of global petrotechnical professionals*

In only 10 years the workforce percentage occupied by people under 35 has increased threefold. The speed with which these individuals are trained and developed, such that they can fill autonomous and leadership roles, **has** to increase.

This is a strategic and differentiating issue. The most successful companies will be those who attract and retain the very best people. A key part of retention is going to be the structured investment in the training and development of these people. Training and development in the technology



Time to Autonomy
Estimated number of years for a fresh graduate to attain autonomy/leadership, by type of company

and technical skills that underpin our industry and in the project management and leadership skills necessary to define and deliver projects and to operate with high efficiency and availability. All of the above are underpinned by expertise in process safety, environmental consciousness and stakeholder engagement. It is in these areas that the GPA can help.

How can the GPA help you?

The GPA is not a unique organisation but it is special. It is your organisation. An organisation that exists at the behest of and to support the oil and gas industry. An organisation that brings together the experienced and knowledgeable 'baby boomers' – the old hands of the industry – with the extraordinarily smart but as yet inexperienced 'new shift'. We achieve this through our industry renowned GPA Data Books which capture the know-how of the gas processing world, and through our regional conferences where we share the stories of the day of our industry.

We urge you, in what are obviously trying economic times, to continue to support the GPA and its conferences. We believe most strongly that it is in the best interests of our industry that you do so.

Malcolm Harrison
Yateley, UK

FRACKING MARVELLOUS!

VIEW FROM THE TOP

Newly appointed GPA Chairman Paul Openshaw presents his view on the opportunities for Shale Gas Development in Europe

Whoever shortened the term hydraulic fracturing to “fracking” delivered a gift to the world of journalism.

Fracking mess. Stop fracking about. Not in my fracking back yard. Frack off!

These are all genuine headlines, not just from the tabloids trying to stir up hysteria but from well-respected technical journals and quality newspapers who can't resist the temptation to latch on to the connotations of a dirty sounding word.

What's in a name?

George Bernard Shaw once said that America and the United Kingdom are two nations divided by a common language. Well, in the USA the term fracking is accepted with warmth and positive enthusiasm. The shale gas boom has transformed the US economy. Individual wealth, job creation and entrepreneurial spirit reminiscent of the gold rush have been embraced in a new dash for gas. For the first time in several generations the US has become a global leader in the export of hydrocarbons. The relief from dependence of Middle East oil and gas means that support for shale gas is now becoming a sign of patriotism. The falling price of gasoline is seen as a benefit from a crude vs shale gas price war with OPEC which the US appears to relish.

So why has public perception of the shale gas opportunity in Europe gone so badly wrong? Clearly those opposing the development have been winning the battle to convince the silent majority that the potential dangers of a new source of energy outweigh the benefits. Those in favour feel aggrieved by an unfair debate. The companies looking to deploy fracture drilling need absolute transparency and accuracy. Any slip up or inconsistencies in the data or

arguments presented are pounced upon and exploited in the press. On the other hand outrageous claims can be made by protestors and publicised. For example the completely groundless accusation that shale gas will poison our unborn children is often used as an opening gambit at public meetings. I was disappointed to read in The Independent, a UK newspaper known for its informed, sensible views, an article comparing the shale debate to the Thalidomide scandal, from the sixties!

Pub talk and informed scientific debate

Shale gas is a topic that often comes up in my local pub. I live on Teesside, the Industrial heartland of the North East of England. A group of friends, most of whom have more than thirty years of experience in petrochemicals, oil and gas or the steel industry, meet up once a week to put the world to rights over a pint. Shale gas is right up there, just behind politics and football as a discussion inspired by the headlines of the week. The overwhelming conclusion from our self-appointed think-tank is that the UK could easily solve most of its financial and social problems by embracing shale gas as the biggest opportunity of our current lifetimes.

To seek out a more informed view, last year I attended a Technical Meeting of the Institute Of Mechanical Engineers in London. A series of presentations from experts: Geologists, drillers and engineers built logical, compelling arguments for the development of the known UK shale gas reserves – eight times more gas than we have left in the North Sea. Importantly the evidence for the excellent safety health and environmental track record of the proven US shale gas industry was presented.

Could the tide be turning?

Last November, Ineos took the bold step of announcing a \$640 M investment in shale gas. The project will create an ethane import terminal in Grangemouth. Surplus ethane has become available as a shippable commodity because of the shale gas boom in the US. It is interesting to note that, rather than shying away from the link, Ineos chose to label this a shale gas initiative. Ineos Chairman, Jim Ratcliffe, has recently upped the stakes further by promising to share GBP 2.5 B shale gas profits with communities.

Shale gas has also been welcomed in Teesside, where Sabic has announced an investment plan to convert their ethylene cracker to ethane. Job security in Scotland and the North of England has been given a welcome boost by shale gas. Thirty miles south of Teesside, operators Third Energy



Paul Openshaw

have now been brave enough to use F word alongside their plans to develop existing wells in North Yorkshire.

Please let me have your views

Whilst this article represents my personal views rather than those of the GPAE, or the company I work for, I feel this is an issue that warrants further debate at future GPAE meetings. If you would support the promotion of a European shale gas industry please let me know. I would take a simple one line email entitled “Yes to shale” to popenshaw@enerflex.com as a sign of your support.

What's the worst that could happen?

Last May Russia decided to stop their gas exports to the Ukraine. Since then sanctions have increased the tension between Western Countries and Moscow. What if the Russia decided to cut their gas supplies to Europe? What if the anti-fracking campaign continued to halt the exploitation of our indigenous gas supplies, plunging Europe into cold darkness?

Now that would be a fracking nightmare!

ENGAGING WITH THE NEXT GENERATION

Here at the GPA, we also support a range of activities to inspire the next generation.

For the second consecutive year, GPA members from the Management Committee have participated in the programme offered by the Royal Society of Chemistry (RSC) and the Institution of Chemical Engineers (IChemE) to school students. This is an opportunity for the young students to engage with practising chemists and chemical engineers to learn about the application of chemical sciences in the real world.

The particular event attended by the GPA is the "Chemistry at Work Essex 2014". This year, about 140 students aged between 14–18 listened to Dr. Myrian Schenk talking about "Natural Gas Processing".

Students responded very well to the talk, engaged in discussions and asked many questions. The feedback we received from Colin Ward (event organizer), was:

"The feedback we got from the schools was very positive, apart from the large baggage hall being too cold! Not a lot we can do about that but it could have been worse!

"I hope you found it rewarding, some of you certainly made an impression and hopefully pushed a few more young people in the direction of a sciences career."

From the GPA we would like to thank the RSC and the IChemE for inviting us to such a special event in an iconic place such as the London Cruise Terminal in Tilbury. We will certainly endeavour to be there next year too!

Dr. Myrian Schenk

Process and Technology Group, Jacobs, U.K., member of the GPA ManCom and ProgCom.

The image shows two presentation slides. The left slide is titled "The Scientist in the High Street – Have You Thought About Pharmacy?" and features logos for "KING'S COLLEGE LONDON" and "HEALTH PARTNERS". It lists speakers "Dr Sian Howell, Mr Aamer Sajdar, Dr David Wood" and describes the role of a pharmacist in the NHS. The right slide is titled "Natural Gas Processing" and features the "ROYAL PHARMACEUTICAL SOCIETY" logo and the "GPA" logo. It lists the speaker "Myrian Schenk" and mentions "Jacobs UK Ltd for GPA Europe Ltd". Both slides include introductory text about the presentation's content.

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GPA EUROPE 31ST ANNUAL CONFERENCE MADRID, 17 SEPTEMBER 2014

YOUNG PROFESSIONAL TRAINING

**Moderated by Adam Jones
Costain Natural Resources**

The use of process simulation software to design and troubleshoot amine treatment units for acid gas removal.

On Wednesday 17th September 2014, over 20 of the GPAE's keenest Young Professionals gathered for an exclusive hands-on training session on the use of process simulation software to design and troubleshoot amine treatment units for acid gas removal. The session was delivered by Scott Alvis, Vice-President, Business Development at Optimized Gas Treating Inc.

Delegates were provided with a laptop with a copy of OGT's ProTreat software, which uses a rate-based approach to simulate the absorption of H₂S, CO₂, and mercaptans from high and low pressure gas streams in an absorption column. Through the use of ProTreat, delegates were first introduced to the concept of rate-based simulation, and the differences and advantages of this type of

modelling over the more commonly found "ideal stage" models.

Avoiding Pitfalls in Design & Operation of CO₂ Removal Units in LNG Production

The first major area of discussion was 'Avoiding Pitfalls in Design & Operation of CO₂ Removal Units in LNG Production'. After explaining some of the underlying mass transfer concepts governing the absorption process, Scott demonstrated how varying parameters such as amine loading and operating temperature can affect the unit performance. A key insight from this session was that in certain scenarios, a small change in operating temperature can lead to large changes in outlet CO₂ concentration (i.e. an operating instability) and that these instabilities may not be observed in ideal-stage models.

Maximising Selectivity with Tower Internals

Scott then went on to discuss 'Maximising Selectivity with Tower Internals'. Scott explained that the rate-limiting step for the

absorption of H₂S is gas-phase diffusion whereas for absorption of CO₂, the rate-limiting step is liquid phase diffusion. It was then shown that this principle can be used to affect selectivity by changing the hydraulic flow regime from spray to froth and the importance of internals in affecting this change.

The final area of discussion was the prediction of corrosion rates as an integrated part of the process simulation software. This area generated some lively debate amongst delegates, particularly around the validity of the model results. The key takeaway from this discussion was that corrosion prediction is still not very well understood within our industry.

Overall, the delegates were treated to a very informative and useful training session. Scott did an excellent job of explaining some of the nuances of absorption process design in a clear and engaging style, and the use of simulation software provided concrete examples of the principles discussed, significantly enhancing delegate understanding.

Adam Jones

MADRID GOLF TOURNAMENT

Six golfers ably supported by Gerald Vorberg of BASF who had agreed to caddy for Joe Vara after Joe's award the night before, met up at Club de Golf Olivar de la Hinosa, courtesy of Softbits Consultants who had sponsored the golf match. We divided into two groups of three which as it turned out became a Rider

Cup with Europe represented by Sandy Dunlop, Brian Marshall and Franz Zisser and the USA team comprising Joe Vara, Barry Perlmutter and Jaime Nava, with a little help from Gerald. The European team completed the round and waited and waited for the Americans before returning to the hotel. The Americans turned



The winning team



Joe Vara picks up prize for Longest Drive from Brian Marshall of tournament sponsor Softbits Consultants



Barry Perlmutter was nearest the pin

up much later having taken a much more leisurely walk round the course – and a break in the middle which may have helped their game as the group comprehensively scored lower than the Europeans and Joe Vara again won the prize for the lowest score. A fun and relaxing game after conference was had by all, but the handicap committee is going to have to meet again before the next game!

GPA EUROPE 31ST ANNUAL CONFERENCE MADRID, 18 SEPTEMBER 2014

TECHNICAL CONFERENCE – MORNING SESSION

Moderated by Murtaza Khakoo,
BP Exploration

The conference was opened by GPA
Chairman, Keith Thomas, welcoming
around 100 delegates from 14 different
countries.

The Spanish Gas System. How it has developed and where it is going.

Spain has for many years been a major importer of natural Gas and LNG to supply the Iberian home market. Due to its geographical location and unique energy mix with a high level of Hydro Electric power generation, the Spanish gas industry has developed uniquely in Europe. Despite its previous isolation, Spain is now developing to become part of a European Gas System. The first paper of the Conference, by Mary Paz Adán, System Development and Studies, Enagás GTS SAU, looked at how the Spanish network developed and the drivers for development in the future.

The key note speech presented the drivers for the development of the Spanish Gas System which were fast growth, an open market system, security of supply issues and offering flexibility. The fast growth 1995–2005 was primarily driven by the introduction and expansion of combined cycle gas turbine (CCGT) power expansion which has plateaued in the last five years.

Deregulation of the European gas market opened new opportunities and infrastructure development. Isolation of the Iberian Peninsula stimulated multi-sourcing of gas supply from Algeria and France and LNG imports from Qatar, Nigeria, and Trinidad and Tobago.

Wind power generation expanded to 59% of the power mix by 2011 supported by gas for backup and peak shaving.

New challenges include: dealing with surplus capacity due to reduced growth (recession); energy policy pushing for renewables; European integration and developing Iberian hub (Spain, Portugal).

Sour Gas Treating using Controlled Freeze Zone™ Technology: Demonstrated Commercial Readiness

Next to speak was Scott Northrop, Exxon Mobil Upstream Research Company, (co-authors Ananda Krishna Nagavarapu and Jaime A. Valencia, also of Exxon Mobil), delivering a paper entitled “Sour Gas Treating using Controlled Freeze Zone™ Technology: Demonstrated Commercial Readiness.”

CO₂ in natural gas freezes at cryogenic temperatures. Rather than trying to avoid this, CFZ™ solidifies CO₂ in a controlled fashion in the



Scott Northrop

distillation tower. The resulting purified natural gas is sent to a pipeline or an LNG facility, while the impurities are removed as a high-pressure liquid stream that can be used for enhanced oil recovery or for acid gas injection (AGI).

With the aid of methane-CO₂ phase envelopes, Exxon's paper explained how their Controlled Freeze Zone (CFZ) cryogenic distillation process works by freezing CO₂ prior to separating solid CO₂ from methane product.

Building on their 1986 CFZ pilot plant tests, Exxon built and have operated for the last 2 years their 13.5mcsf/d commercial demonstration plant (CDP) in LaBarge, Wyoming that is claimed to have gathered all necessary data to confidently design and operate a large scale unit (upto 1bcfd).

With the aid of plant profiles at 600 and 550psig, the paper showed that CFZ CDP has successfully processed gases with 8–71% CO₂ attaining low CO₂ content product purities, less than 2% CO₂ and in the lower pressure case, CO₂ purity less than 60ppm – close to LNG quality – is achieved.

Tests on feed gas with up to 36% H₂S showed product gas with below 4ppm H₂S was produced with easy integration of the H₂S-CO₂ liquid bottoms mixture to site reinjection systems.

The moisture carrying capacity of CO₂ showed the CFZ process can operate with reduced dehydration requirements than originally envisaged substantiated by additional phase equilibria measurements.

The presentation spoke briefly about applications in high CO₂ gas commercialisation (their focus) and onshore EOR. Exxon was encouraged to produce a paper next time on life cycle comparison of their CFZ process with conventional processes including solvent wash, membrane and Ryan-Holmes.

Processing of Carbon Dioxide Rich Gas

The next paper entitled “Processing of Carbon Dioxide Rich Gas” was given by Adrian Finn of Costain Natural Resources (co-author John V O'Brian).

Efforts to commercialise high carbon dioxide content natural gas have traditionally been unsuccessful due to high processing costs. However, increased demand for natural gas can make development of marginal, high CO₂ gas fields attractive despite high CO₂ disposal costs, usually to underground storage to avoid atmospheric emissions. In processing high CO₂ natural gas, to inject the produced CO₂ into underground storage, having product CO₂ at high pressure and in the liquid phase is very important to reduce power consumption for CO₂ pressure boosting, reduce machinery cost and reduce both overall investment cost and operating cost.

Conventional process technologies for CO₂ removal, based on chemical or physical solvents and/or semi-permeable membranes, suffer due to the product carbon dioxide being gaseous at low pressure. In contrast, low temperature fractionation offers important advantages in upgrading natural gas whilst producing high purity carbon dioxide liquid at high pressure.



Adrian Finn

Giving an overview of conventional solvent wash (physical and chemical) and membrane separation system, Adrian's paper discussed the merits of cryogenic fractionation in achieving CO₂ product at high pressures with high purities and recoveries.

The cryogenic fractionation in the Ryan-Holmes patented process is supported by the addition of C5+ additive which functions to lower CO₂ freezing condition and breaking the CO₂-C₂ azeotrope to provide cost-effective CO₂ fractionation for high CO₂ content gases.

With applications focussing on Enhanced Oil Recovery (EOR), some of the challenges e.g. uncertainties in timing of breakthrough prediction and changes in CO₂ content with time require an adaptable processing scheme.

The 3–4 columns Ryan Holmes process that has been the basis of many US plants in the 1970's offers advantages over Exxon CFZ in that it is proven technology, can handle NGL in feed and uses conventional equipment.

The paper discussed a combination of the Ryan Holmes process with Exxon's CFZ column resulting in simplification and flexibility in overall processing system. In addition a process technology development to produce: pure CO₂ product; effect propane recovery; and supply gas to power generation was presented in outline.



Gerald Vorberg

CO₂ Capture from Fluegas, the Status Quo

The fourth paper of the morning entitled "CO₂ Capture from Fluegas, the Status Quo" was given by Gerald Vorberg of BASF SE (co-authors Gustavo Lozano also of BASF SE, Sandra Schmidt, and Peter Moser of RWE Power AG, and Torsten Stoffregen and Torsten Richter of Linde-Engineering Dresden GmbH).

In 2005 the Kyoto Protocol entered into force and set binding obligations on industrialized countries to reduce emissions of greenhouse gases. With the term Post-combustion Carbon Capture – "PCC" – a new decade in emissions reduction from fossil fuel power plants was triggered. In order to capture CO₂ from power plant flue gases, industry started a fascinating race to develop new, energy-efficient methods and improving traditional ones. One of the latter, CO₂ removals by a circulating solvent has led to the application of various design features, as well as the development of new, more sophisticated solvents. The impressive size of these CO₂ removal units, their impact on power plant efficiency, but also potentially unwanted side effects, has required very special solutions and stretched R&D budgets.

The paper discussed BASF OASE team in development of an effective solvent for CO₂ removal from flue gas from laboratory to pilot and full scale production testing.

With RWE responsible for onsite integration and Linde in engineering and construction, a pilot plant

for CO₂ removal from a 1000MW power plant was built to benchmark performance using MEA chemical wash and test new solvents.

The BASF paper described how some 250 compounds and formulations were screened, and kinetics, specific energy, oxygen stability and other parameters tested to select best performing solvents.

Phase 1 of the study in 2009 benchmarked MEA solvent performance and two new solvent formulations identified as OASE *Blue Solvents*.

Phase 2 of the study in 2011–2013 tested effects of: process variables; long term specific energy requirement; emissions reduction; material selection; equipment and heat integration optimisation, and investigated scale-up effects and design tool validation. Results from comprehensive testing were provided in the paper and accompanied slides.

Rich-end, Lean-end, and Bulge Pinches in Amine

Ralph Weiland of Optimised Gas Treating Inc then presented his paper "Rich-end, Lean-end, and Bulge Pinches in Amine", co-authored by Nate Hatcher and Scott Alvis also of Optimised Gas Treating Inc.

Bulk carbon dioxide removal applications, typified by carbon capture but also encompassing removal from sweet high CO₂ gases to meet pipeline specifications, are often carried out by limiting the solvent flow to control the extent of removal. Absorber performance is set by keeping the rich solvent fully saturated and using the solvent flow rate to limit removal. Such an absorber is called rich end pinched. On the other hand, when CO₂ is to be removed to ppm residual levels such as in LNG



Ralph Weiland

production, the final gas purity is usually set by the lean solvent acid gas loading. If a column is incorrectly designed, however, or a gas stream is to be treated to some intermediate CO₂ level, operating conditions can result in a column showing a bulge pinch. Failure to recognise bulge pinching in the design phase may well result in failure of the plant to treat properly.

Optimised Gas Treating's paper discussed three types of mass transfer rate limiting pinches prevalent in amine treating. Whilst lean and rich end pinches due to high and low circulation rates respectively are easily understood, bulge pinch can occur before rich end pinch sets in.

The capacity of a given solvent is affected by many parameters e.g. acid gas content; temperature; solvent strength; kinetics; trays or packing etc. To provide optimal design and to troubleshoot defective operations, rate based models are required to identify where pinches are prevalent. Where bulge pinch occurs, increasing trays or packing will not solve bottlenecks.

The paper gave examples and drew conclusions from results presented for different lean, rich and bulge pinches obtained from 5 different gas treating scenarios: with MEA; with promoted MDEA (CO₂ and deep CO₂ removal); H₂S removal with MDEA and carbon capture.

Energy recovery in amine gas sweetening using a liquid phase turbocharger

The last paper of the morning was presented by Joan Galtés of Energy Recovery Inc (co-authors Prem Krish, Jeremy Martin and John Sienciewicz).

In the gas sweetening process, the contactor typically operates at high pressures and the regenerator operates at pressures near atmospheric. Energy is consumed in pumping the lean amine from the regenerator up to contactor pressure and energy is wasted in depressurizing the rich amine. Processors can recover the energy dissipated in depressurizing the rich amine and return it to the process by partially pressurizing the lean amine.

The Energy Recovery paper discussed the application of equipment liquid phase energy turbo-recovery system from a parallel industry to an established application in amine circulation.

Energy Recovery discussed their IsoBoost Technology – a compact, high speed, self-lubricated, integral unit of liquid expander and pump offering up to 80% efficiency. The paper provided some mechanical details, the process control methodology and a combination of multiple nozzles with throttle and bypass valves to enable a wide flow operating range.

Options for incorporating in amine flowsheets as 2 x 100% or 3 x 50% lean amine pump flow design were discussed, and energy and CO₂ gas emission savings compared.

Brief start-up procedure, and operational data and experience from the Jackalope amine unit operating in Texas since 2008 were also included in the paper.



Joan Galtés

GPA EUROPE 31ST ANNUAL CONFERENCE MADRID, 18 SEPTEMBER 2014

TECHNICAL CONFERENCE – AFTERNOON SESSION

Moderated by Justin Hearn, BASF SE

Risk Based Inspection - an Opportunity for Improvement

Kevin Walls of ABB Consulting was first up after lunch with his paper "Risk Based Inspection – an Opportunity for Improvement."



Kevin Walls

The paper first described the history of the concept of inspection, and the basis of early regulation and inspection practice prior to Risk Based Inspection. Kevin then enlarged on how UK legislation in the early 1990s had moved from a prescriptive to a goal setting regime, with this new flexibility allowing ABB to develop focussed schemes of examination: the forerunner to RBI.

Kevin then discussed the five step analysis needed to determine an optimum risk-based inspection (RBI) plan for plant equipment and the quantitative and qualitative approaches necessary for determining risk profiles.

For each of the five steps, namely: data gathering and validation; identification of deterioration mechanisms and failure scenarios; risk analysis for Health and Safety and business risk; determination of optimum inspection plan, and the inspection execution

and review, he discussed some opportunities for improvement to increase efficiency and the consistency of decision making.

Focusing on review of RBI, or revalidation, the ABB approach considers a number of factors in the revalidation to derive optimised inspection, continuous risk reduction and increased confidence.

Further, through use of non-invasive inspection (NII) as described in DNV-RP-G103, significant increase in vessel inspection intervals, reduction of hazards, and reduction of cost has been possible.

Case studies of examples of savings made possible due to the RBI revalidation process and incorporating NII were also given in Kevin's paper.

Treating Innovations for High CO₂ Gas

Fluor Energy's published abstract and paper on Gas Terminal Revamp by Michiel Baerends unfortunately did not receive the necessary client approval for presentation as the plant was still under-going commissioning and start-up. The audience did not suffer however, as Nick Amott of Fluor Energy (co-authors John Y Mak and Curth Graham) delivered an excellent paper on the subject "Treating Innovations for High CO₂ Gas".



Nick Amott

Nick briefly discussed the conventional CO₂ removal processes (MDEA, membrane) and how Fluor's physical solvent process, using Propylene Carbonate, is one of two

well-proven physical solvents for CO₂ removal.

Some innovations of the process were discussed, which included use of refrigeration produced by flash regeneration; a hydraulic turbine for cold extraction; and solvent regeneration using vacuum flash or inert gas.

Two offshore evaluation studies were discussed, with 24% and 32 mol% CO₂, and Nick presented heat and material balances and utilities and chemical consumptions for each.

The paper also provided a description of integration with a nitrogen rejection unit (NRU) in an LNG plant, and debottlenecking of an onshore MDEA CO₂ removal unit (also in the 2009 paper).

Better Compressor Designs Through Advances in Process Modelling

Michael Brodkorb of Honeywell Process Solutions (co-authors Rafael Coronel, Martin Ross and Grant Stephenson) presented an industry update on how process modelling can help to develop better compressor designs. The concept of Dynamic Compressor Simulation Study was introduced, before a variety of recent examples of dynamic compressor modeling studies from different process consulting companies was presented. This illustrated that there is plentiful experience in the industry to support operating companies with their compressor problems. He also presented two new developments integrating the general process simulation tool (Honeywell's UniSim Design) with tools for conceptual compressor selection (MSE's Pro-M) or with software for detailed separator design (Kranji's MySep) to better understand carry-over amount and quality.

In the second part of the presentation, a compressor-specific development inside UniSim Design, the so-called "Reduced curves", was presented. With this functionality it is possible to overcome the issue that the compressor manufacturer's performance maps only apply for the suction conditions and for the rotational speeds at which they are constructed. Using these performance maps for modeling the compressor away from these suction conditions / rotational speeds can give

significant errors. An example was shown where the standard modeling approach showed no surge with a surge margin of 3%, while the "reduced curves" approach showed a more realistic 100ms surge.

Michael concluded by stating that current best practice (Dynamic) Process Simulation is very common in compressor design and troubleshooting, and that Dynamic Simulation Study results help communication between the different project parties, in addition to giving better designs.

Thermal Stresses Avoidance in Cold Box

The final paper of the afternoon was presented by Nady Mabrouk and Ahmed Adel of United Gas Derivatives Company (UGDC)

The UGDC paper described the leaning-out of feed gas (C3 1.72% instead of 1.91%mol) currently being processed by the NGL straddle plant, which resulted in difficulty in maintaining design operating temperatures. In this joint presentation, both Nady and Ahmed showed that this also gives difficulty in: a) maintaining a delta T of 30°C between adjacent streams during operation, and b) limiting 1°C/min increase during unplanned shutdown.

One option considered during normal operation (issue A) was to recycle C3 to bring feed gas composition closer to the design. However, the licensor proposed an alternative modification on the feed gas-demethaniser bottom / expander suction liquid exchanger.



Ahmed Adel

This was however not implemented as it required extensive mechanical changes, including cutting and welding three valves, six tie-ins and other changes. An alternative solution to by-pass around 33% of the absorber bottom liquid to expander suction liquid was much simpler and was implemented by UGDC.

For issue B), the proposed solution was to by-pass all cold box cores during unplanned shutdowns to avoid any unexpected flow inside one of the cores during the time other cores have no flows. A new by-pass SDV was introduced on Core B to achieve this.

As a result of these changes, the propane recovery of 99.6% was achieved, even though feed gas has further leaned-out to only 1.1% mol C3 in June 2014.



Nady Mabrouk

Low Acid Gas Processing Retrofit Options -

Nasser Al-Qahtani et al, Haradh Gas Plant , Saudi Aramco

Due to difficulty in transferring the presenter's Powerpoint slides from his USB drive to the GPAE Conference computer, the presentation unfortunately had to be abandoned. The author has, however, provided a written paper which is included in the Conference pack.

The session chairman was extremely grateful to the other speakers for allowing the schedule to be changed at very short notice.

GPA Europe would like to offer their grateful thanks to Fluor for sponsoring the Drinks Reception on 17th September and to ABB Consulting for sponsoring the Conference Dinner.



Madrid speakers and moderators

MADRID COMPANION'S TOUR

Twenty ladies and two brave men met in the lobby of the hotel for the Companion's Tour. Our day started with a 70 km drive south of Madrid to Toledo which was declared a UNESCO World Heritage site in 1986 for its extensive cultural and monumental heritage and historical co-existence.

The local tour guide Susana Vedugo spoke very knowledgeably to us during our ride giving us much of the history of the area and explaining why today Toledo is known as the "Imperial City" for having been the main venue for the court of Charles I. In addition, it is also called the "City of Three Cultures"



Mosque of Cristo de la Luz

having been influenced by a historical co-existence of Christians, Muslims and Jews.

Once we arrived in Toledo we stopped at a scenic photo spot for a group photograph and then continued on into the city where we stopped for coffee in a lovely square. A walk through the streets brought us to the Mosque of Cristo de la Luz. In hind sight we

probably spent a little too much time here as the guide was telling us all its history. This former mosque, built in 999 is a rarity in that it is in much the same state as it was when it was originally built. In 1186 Alfonso VIII gave the building to the Knights of the Order of St. John, who established it as the Chapel of the Holy Cross.

Time restraints meant that this was really the only place we visited although on our walking tour we saw the Old San Vincente Church, the University, Cathedral Square, San Tome, San Juan de los Reyes and the San Martin Bridge. Walking the streets and over the Alcantara Bridge and seeing the Cathedral, many of us wished we had spent less time at our first stop to allow us to go into the Cathedral.

Back on the coach it was time to rest those tired legs and chat and catch up with those we only see once a year, as we travelled back to Madrid for lunch. Lunch was taken at the Tablao Villa Rosa, one of Madrid's oldest



Flamenco lesson

flamenco venues founded in 1911. On the outside there are numerous ceramic tiles which line the façade with typical Spanish scenes. Inside, the Tablao has coffered ceilings and decorative arches. After we had finished eating, I sprung the surprise we had planned for the Companions.



San Martin Bridge



The Companions



View of Toledo

Elena Santorja was introduced to our group as our Flamenco teacher for the afternoon. Everyone had a great time during this dance experience and laughed a great deal both at themselves and each other! I must say a big thank you to our two male companions who joined in the dance lesson with great gusto and made it an even better experience for all.

We were back at the hotel in time to get ready for the dinner at the Bernabéu Stadium with a small tour of the stadium, albeit in pouring rain, and then a wonderful dinner in the Players Family Room.

I do hope everyone else enjoyed themselves on the tour and plan to come again next year to the Florence meeting.

Anne Dunlop



A taste of glory at the Bernabéu



Dinner at the Bernabéu Stadium - with thanks to sponsors ABB Consulting

MADRID AWARDS

We were very pleased that Dawn Hartnell, daughter of Bob Aungier who, with his wife, was tragically killed in a car crash and in whose name the Award was created, was able to join the Conference in Madrid with her husband, Chris. She presented the Aungier Award for the best paper presented by a Young Engineer in 2014 to



Dawn Hartnell presents the Aungier Award to Adam Jones

Adam Jones of Costain. Dawn had actually adjusted her own holiday in Greece to ensure she was able to join us in Madrid and was very grateful for the opportunity. The presentation was made after the dinner at Real Madrid's Bernabéu Stadium.

The opportunity of the event was also taken to present Joe Vara of Rotor-Tech a personalised photograph of the Golf Trophy he won in Edinburgh in 2013



Last year's golf tournament victor

GPA EUROPE 31ST ANNUAL CONFERENCE MADRID, 19 SEPTEMBER 2014

TECHNICAL CONFERENCE – MORNING SESSION

Moderated by Sigbjørn Svenes,
Statoil

The breaking news this September morning was that the United Kingdom was still kind of united after the Scottish referendum last night.

For the eager pan-European and international GPA-crowd more pressing issues on the mysteries of trace components and how to deal with them were on the agenda for this final session of the 31st GPA Europe Annual Conference. Entering the stage, after enjoying a short stay in the leather chairs at the Santiago Bernabéu stadium, as a substitute session chair was Sigbjørn Svenes of Statoil. He introduced the morning topics on Mercury (Hg) and MonoEtylenGlycol (MEG) handling as increasing areas of focus within the industry: one as part of the growth within LNG production; the other as multiphase flowlines and pipelines has come into more common use.

Mercury traces removal from natural gas: Optimization of guard bed adsorption

The first paper of the morning was titled "Mercury traces removal from natural gas: Optimization of guard bed adsorption properties", and authored by Karin Barthelet, Jean-Marc Schweitzer, Antoine Hugon, and Arnaud Baudot from IFP Energies nouvelles. The IFP paper was presented by Ms Karin Barthelet and she discussed the optimisation of CuS impregnated alumina as an absorbent for mercury.

After a brief introduction of other Hg removal technologies such as silver impregnated mol sieve or sulphur impregnated carbon and their disadvantages, she focussed on two types of metal sulphide (CuS) based sorbents. Ms Barthelet stated that a bulk absorbent, made of active CuS phase shaped



Karin Barthelet

with binders, provided large active absorbent sites and has high potential for mercury removal. However, incomplete sulphidation, mercury diffusion to bulk sites and cementing in presence of water were reasons to be excluded from IFP selection.

IFP mercury absorbents are therefore prepared by dispersing CuS within the porosity of alumina carrier supports. Three different alumina types with different relative properties, surface areas and pore volumes were selected as carriers. Preparation was made by impregnation of CuO followed by sulphidation. The presentation showed characteristics and behaviour under electron microscopy of the three sorbents and performance testing.

The performance testing described in the paper led IFP to selection of the CuS/C sorbent with shorter mass transfer zone; high Hg capacity; better mechanical properties and resistance to capillary condensation. The work has also generated a model for design and performance prediction.

Simulation of Mercury Distribution in a Middle East Natural Gas Plant using Multiflash™ in Petro-SIM™

Next on stage was Behnam Salimi of KBC Process Technology. He presented the paper "Simulation of Mercury Distribution in a Middle East Natural Gas Plant using Multiflash™ in Petro-SIM™" co-authored by his colleagues, Antonio Queimada and Rasool Barouni. KBC recently acquired Infochem with their Multiflash package able to simulate multi-phase systems including liquid-liquid and liquid-solid equilibria amongst others, and also with special description for point prediction of mercury distribution. This has been integrated into their Cape-open PetroSim simulator (a Hysys offshoot) and enabled to track partition of Hg in a flowsheet.

The KBC paper described two phases of study completed for a Middle East gas project providing details of methodology, characterisation and simulations. Phase 1 was based on predicting Hg partition at 3 locations – slugcatcher, MP Separator and Condensate Stabiliser. This was followed by



Behnam Salimi

Phase II aimed at finding the optimum location of MRU in the gas phase and in the condensate separation flowsheet. The paper provided block flows of simulation and results and also showed some of the PetroSim features, e.g. time based modelling.



Clotilde Jubin

Operation of Mercury Removal Units on Wet Gas

Ms Clotilde Jubin, Ph.D of Axens, mesmerized the audience all the way up to the coffee break with her paper "Operation of Mercury Removal Units on Wet Gas" co-authored by her colleagues Yann Lepine, Olivier Ducreux and Christophe Nedez. The Axens paper also discussed the technology options for mercury removal covered in the IFP above, and Axens claims to be a pioneer in the development of alumina-based adsorbents for Hg removal. This is different from the "bulk metal sulphide" alternative with drawbacks as mentioned by Ms Barthelet in the IFP paper presented earlier in the morning.

Ms Jubin explained that the benefit of alumina carriers is their robustness, giving high and stable mechanical resistance which does not generate dust even under drastic operating conditions of high pressure and water saturated stream. With an example case study, they described an application which had been troubled using "bulk metal

sulphide" which was replaced by Axens Axtrap 271 with significant improvement.

Explaining the mechanism of Hg absorption by diffusion through fluid film, then intra particle diffusion prior to reaction, the Axens paper discussed the dependence on particle size and porosity on performance which enabled them to optimise on the AxTrap 273 adsorbent with 1.4-2.8mm particle size.

How to Select Best MEG Recovery Units Configuration

J r mie Esquier, Business Development Manager with Prosernat, took the stage after the only and final coffee break of the day. His paper was called "How to Select Best MEG Recovery Units Configuration"

Prosernat explained their recent exclusive license agreement with CCR, Canada to offer the CCR MEG Recovery Unit (MRU) - note, this acronym confuses with another established one for mercury removal unit. Prosernat quoted that their largest unit with 4 trains and 66m³/h of MEG regeneration / reclamation is currently under construction in Middle East.

The paper discussed salient features of the process involving gas-condensate-MEG separation followed by the reclaiming flash drum and MEG still column operating under vacuum. Salt is extracted from the flash drum and is separated using a centrifuge. A decision tree for configuring an MEG recovery unit was proposed which determines if a



Barry Perlmutter

pre-treatment unit is required and whether full, integrated stream or slip stream treatment is necessary. Furthermore, the paper also discussed optimisation of the process: targeting MEG recovery and process availability; taking account of heat recovery; effect of corrosion inhibitors etc.

Efficiently Removing Divalent Salts from MEG Reclamation Units - Developing a Tailor Made Solution

The final presentation of the conference, "Efficiently Removing Divalent Salts from MEG Reclamation Units - Developing a Tailor Made Solution" was given by Barry Perlmutter of BHS-Sonthofen Inc. Co-authors were Detlef Steidl and Christian Gassen. BHS - Sonthofen introduced themselves as providers of backwash filter solutions for amines or other services. Their paper was based on extending their filter solution to removal of divalent salts down to 1micron particles from MEG reclamation and recovery units instead of using centrifuges.

The paper discussed two solutions - single stage pre-coat filtration and two stage filtration and washing. The single stage pre-coat allows a greater accumulation of salts in vertical candles without the cake collapsing. Systems with integral filter aid storage and pre-coat preparation are offered. The two stage filtration and washing does not make use of pre-coat but instead homogenises salt recovered on candles

before pressure plate filtering and recovery of salts. The double stage filtration washing decreases operating and maintenance costs, and cost comparisons including investment and operational cost breakdowns were provided in the paper.

Again the excellent discipline shown by the speakers made the Annual Conference 2014 finish within time allowing participants to continue networking, rushing off to airports or simply going on to enjoy the sights of Madrid, despite the rain!

Sigbj rn Svenes

GPA EUROPE TECHNICAL CONFERENCE

LONDON, 27 NOVEMBER 2014

KNOWLEDGE SESSION

EDITOR'S NOTE:

The absence of Sandy and Anne Dunlop at the Technical Meeting brought home to the other members of the Management Committee just how much they both do, largely in the background, to make everything run smoothly. Lorraine Fitzwater, David Weeks, Adrian Finn, Keith Thomas *et al* stepped in bravely to manage operations at the event, which seemed to run without too many hiccups in the end. However, we are all heartily glad that Sandy is now fighting fit again, and back in charge!

Moderated by Adrian Finn, Costain Natural Resources

Subsurface Technology for Non-Subsurface Professionals

Alex Chwetzoff of Petroskills presented a remarkably comprehensive but highly detailed Knowledge Session that provided an appropriate introduction of subsurface



Alex Chwetzoff

technology for gas processors more usually focussed on surface facilities. Alex has 40 years of experience in exploration, business development, strategic planning, training development and management of multi-disciplinary conceptual project teams and was able to bring this great wealth of experience to provide a highly illuminating presentation.



Alex explains

The presentation covered many points of which a selection were:

- The role of geoscience in identifying sedimentary rock formations (that could thus be hydrocarbon bearing) and their structure, in identifying the best fields and locations for drilling and in understanding the properties of reservoir rock types for oil and gas production appraisal/evaluation of reserves. Discussion of rock characterisation included the key parameters of porosity (emptiness %), relative hydrocarbon saturation and permeability. The probability of success in obtaining a viable "petroleum system" was discussed in terms of hydrocarbon "trap presence", "trap efficiency", reservoir presence, source rock maturity and fluid migration with all of these factors being critical
- Reservoir engineering – so as to estimate the volume of hydrocarbon deposits, the volume of recoverable reserves, the difficulty of recovery, the development of reservoir management and to perform simulations to forecast field potential. This discussion covered fluid flow through porous media, reservoir drive mechanisms (fluid expansion, solution gas, water influx, gas cap expansion and compaction) and secondary and tertiary recovery methods
- Well construction and drilling – drilling for exploration and production, drilling rig types, directional drilling, casing design, blowout prevention, performance and cost
- Downhole production and well completion – bases for design, specific equipment, how safety is achieved, how reservoir production is maintained by artificial lift, methods of reservoir stimulation and hydraulic fracturing
- Conventional oilfield practices, discussion of technical advances and the applicability of these techniques to exploitation of unconventional reserves, essentially tight gas, shale gas and shale oil
- The importance of close working relationship between all subsurface disciplines

In the course of nearly three hours Alex kept a rapt audience enthused by his deep knowledge of all aspects of his subject and he provided a most interesting introduction to the topics covered later in the day in the Technical Session. GPA Europe is much obliged to Alex.

Adrian Finn

GPA EUROPE TECHNICAL CONFERENCE LONDON, 27 NOVEMBER 2014

TECHNICAL CONFERENCE AFTERNOON SESSION

Moderated by Sigbjørn Svenes, Statoil

After the Association business conducted in the 2014 AGM was closed, Sigbjørn Svenes of Statoil welcomed the audience to the Technical Conference. The topic of the afternoon "The Development of Reservoirs and Wells" was building nicely on our learnings from the morning Knowledge Session on Subsurface Technology. Four papers describing various aspects of production technology made up the mix for the rest of the day.

An Outline on Offshore Hydrocarbon Drilling & Production.

To set the scene, the first paper of the afternoon given by Richard Emptage of One Subsea and Hans P Hopper of Cameron was titled "An Outline on Offshore Hydrocarbon



Richard Emptage and Hans P Hopper

Drilling & Production". The focus of the paper was on current direction of the industry accessing more difficult resources to recover such as deeper waters, deeper reservoirs and rougher climate. Enhancing oil recovery from fields in the depletion phase was also covered.

After giving a short overview of overall production concepts from the traditional jacket through to floating units and subsea tie-backs, the theme shifted to drilling technology where the use of mechanical means and drilling fluids to control the

wellbore were discussed and it was explained how learnings from the Macondo incident in the Gulf of Mexico had been incorporated into Blow-Out Preventer design (BOP). The increasing challenge of balancing ever deeper wells with variable drilling fluid formulations to avoid loss of mud into reservoir fractures and prevent unwanted inflow of reservoir fluids were explained, giving understanding to the increased drilling cost worldwide. The differences in production drilling technologies from exploratory drilling were also discussed showing examples of vertical, deviating, horizontal and multilateral wells.

Further description of the pros and cons of various types of subsea trees (horizontal, vertical) and how seabed wells could be configured to achieve the most suitable subsea architecture for a given reservoir was given. The presenters then moved closer to the process engineers' hearts dominating the audience by showing how technologies like artificial lift, subsea multiphase pumping and subsea separation can be deployed to increase reservoir recovery. The final conclusion emphasized the technology challenges to be met by the hydrocarbon industry to recover evermore difficult resources in an economical way.

Flow Assurance and Field Development Challenges and Solutions in Offshore Oil and Gas

Next on stage was Liam J. Finch of Petrofac. He presented the paper "Flow Assurance and Field Development Challenges and Solutions in Offshore Oil and Gas". The prime focus of the



Liam Finch

paper was towards Field Development Planning, Process Engineering and Flow Assurance design as well as Field operations support. The aspects addressed were demonstrated by extensive use of field studies.

After the initial overview, Liam went on to define the key process engineering and flow assurance challenges to be addressed both with respect to absolutes and along the field production timeline to ensure a successful field development scheme. Key issues addressed were: two-phase flow conditions; downstream wellhead chokes; potential for solids depositions (wax/hydrates) in production systems; and potential HP/HT (high pressure/high temperature issues in subsea flowlines, pipelines and topside facilities. Most relevant features with regards to field development planning discussed included plateau rates, well shut-in and flowing pressures along the timeline and water cut development over time.

Field examples were used to demonstrate how the above challenges had been addressed to optimize solutions for field compression (on-/offshore), subsea cooling solutions, flowline rating (full rating versus HIPPS) and fully Subsea Architectural solutions for extensive fields. In his conclusion Liam emphasised the importance of the Process Engineering and Flow Assurance role in achieving economically viable and standardised design solutions to minimize investment risks in a highly capital intensive industry like ours.

What! You took your feed stream from a Petroleum Engineer AND you believed it?

After the coffee break the crowd was just eager to learn what they should have done from Brian Moffat from Petrophase who gave us the paper "What! You took your feed stream from a Petroleum Engineer AND you believed it?" Brian started with reminding the audience of the different modelling perspectives the reservoir engineers need for data, compared to the detailed needs for compositional data of the process engineer designing the gas

Continued overleaf



Brian Moffatt

processing plant or the similar needs for properties of the flow assurance engineer.

Mr. Moffatt went on to describe common sampling techniques for bottomhole flowing samples and surface sampling, illustrating the pitfalls in obtaining accurate data both downhole and topside. He emphasized the importance of Quality Control (QC) to maximize value of samples for the intended purpose. By adding the modelling aspect to the traditional QC process assumed with controlling the sampling conditions, the sample quality and lab procedures, the knowledge gained from the sample can be put into context.

After giving some coarse examples of applied fluid knowledge in the field, Brian concluded

his presentation by going more into depth on a study on how to depict Mercaptans concentrations in a field lifetime. A key factor here was to understand how reservoir depth, lateral variations in the source rock, and retrograde condensation in the reservoir influences the development of Mercaptan concentrations. As a result CAPEX could be reduced as metallurgy for processing facilities was selected with confidence.

The Use of a Compositional Thermal Hydraulic Integrated Production Model in the Investigation of Subsea Processing

The final paper of the day was given by Martin Watson of KBC, who gave the presentation "The Use of a Compositional Thermal Hydraulic Integrated Production Model in the Investigation of Subsea Processing". In his paper, Mike focussed on how simple Integrated Production Models (IPM) can be enhanced to optimize field hardware to minimize cost. The typical IPM models the system from reservoir to a given location in the value chain, such as point with constant arrival pressure, point of sales or similar. Subsystems are described by a set of resistances based on fixed parameters, giving lift curves for the fluid with inherent potential for unintended variations in forecast of fluid flow and hence field income. The paper argued that by introducing more rigorous models using dynamic multiphase flow simulators like OLGA or LedaPM, more parameters can be accurately modelled to better predict actual flow conditions, hence optimizing the system design.



Martin Watson

The effect of the addition of compositional thermal hydraulics to the precision of the IPM was demonstrated in two flow assurance case studies to better picture the feasibility of the subsea system. The first case described the optimization of a two phase subsea separator system and the second case the accurate modelling of a subsea compression system also outlining the need date for the subsea compression. The presenter rounded off with the message that, with the increased focus on subsea processing, it is likely that more will be expected from liquid/liquid hydraulic models in the future to aid the proper sizing of subsea processing systems.

The day was rounded off by newly elected GPA Europe Chairman Paul Openshaw, who upon his closing remarks, invited the audience for a networking session sponsored by GPA in the Steam Bar downstairs.

Sigbjørn Svenes



Networking time

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CHAIRMAN'S ANNUAL REPORT 2014

Ladies and Gentlemen, Friends and Colleagues, Welcome to the 2014 Annual General Meeting of the GPA Europe Ltd.

2014 has been a year of further consolidation of the new course that the association is taking. We set ourselves the target of continuing to move the association forward to offer attractive events for younger engineers whilst at the same time maintaining a balanced budget. Broadly this year we have achieved what we set out to do although this work is still ongoing and we as an association are still very much in a transition stage.

Contrary to 2013 GPA Europe Ltd moved back to an annual programme based on three high quality Conferences and Knowledge Sessions spread across Europe together with the AGM which you are now attending. The GASTECH

exhibition has now moved to Asia for its next events and hence our link with this event has been severed for the foreseeable future.

Our initial Conference for 2014, following up on the success of last year, was in Paris and was themed around Gas Processing Offshore. Additional to this was a knowledge session by the two Johns, Sheffield and Morgan, of John M. Campbell / Petroskills, on Gas Processing and LNG. Contrary to last year where the cold weather proved a travel problem for many delegates, this year Ozone was the issue. The conference was attended by over 90 delegates confirming the attractiveness of the venue and in particular of the date later in the spring to our more traditional February timing.

Returning to our previous mode of three main conferences plus the AGM, a second spring conference was organised for the end of May in Leiden on the subject of Gas Exploitation to Markets with a knowledge session on engineering Design Management by Herve Baron of Le Gaz Integral. This conference was attended by more than 50 delegates, many of whom were taking advantage of the young

professionals scheme. The conference was considered a success by the attendees and financially made a small surplus. However, in terms of the effort required it was decided to review whether this format of three



The AGM in full swing

conferences should be the one we adopt moving forward. More on this later.

In September the GPA Europe held its Annual Conference in Madrid. On the first day, the Young Professionals received training on the use of process simulation software to design and troubleshoot amine treatment units for acid gas removal. The session was delivered by Scott Alvis, Vice-President, Business Development at Optimized Gas Treating Inc. The main conference was, as is traditionally the case, an open-themed conference with a lead paper from ENAGAS on the Spanish gas industry, and 3 sessions of high quality technical papers, with this year's evening of entertainment at the Bernabéu Stadium. Following up on last year's dynamic entertainment in Scotland was always going to be a problem but I think Mr Dunlop as always did us proud. Unfortunately the event was somewhat marred by the theft of several mobile phones and iPads from the conference room. The consequences of this we still need to discuss, however we hope this was a one off event and I am sure if there are lessons to

be learned and that we will draw the appropriate consequences.

In 2014 two issues of In Brief were published, edited by Claire Haycock of ABB Consulting. Although we had a larger range of content due to the third conference this year, Claire still

struggled to get good quality lead articles. So once again my thanks at this point to her for sticking with it and in the end being successful. Again at this point I would like to point out that the quality of the magazine depends on the members' input. The opportunity is there for anyone to contribute and several members have indeed taken the opportunity this year, which was pleasing, so if you think you have anything to offer, contact Claire.

Contact with the Gulf Chapter continues and has been of a more formal nature this year. It is the intention of GPA Europe LTD to organise a joint conference, if possible in 2016 and probably in Turkey to reflect the interface between the two chapters. Based on our previous, less than positive experience of allowing others to take the lead in organising a conference, only to discover at the last minute that it is not functioning and having to cancel, we have decided to take the lead on this occasion. The plans are not yet fixed but I am confident at the 2015 AGM that we will be able to announce where and when this event will take place. This is once again a step out from our traditional approach, but one that we intend this time to carefully control.

In 2014 we were again able to present the Aungier Award for the best paper by a young professional. This was won by Adam Jones of Costain for his paper on A New Process for Increasing LNG Production Efficiency. This was the second year in succession that we were able to make the award which was very encouraging.

Looking ahead to 2015 we have decided to change our format of conferences to consolidate our effort and at the same time trying to re-slant our activity to appeal even more to young professionals. Consequently we will only have two main conferences plus the AGM conference, but additionally we will have a young professionals event which is open to everyone but will be co-organised by the young professionals group specifically tailored to their wishes. The driver here has been to balance the need to maintain technical quality against the income generated by the conferences. It was decided that the issue of quality was paramount, and that stretching to provide over 30 quality technical papers plus three knowledge sessions a year was in fact becoming too much of an effort. Additionally as at least one of the three conferences generally struggled to break even, the impact on finances would be negligible and would in fact reduce risk of us making a loss. On the basis of this we will offer two main conferences next year in

Hamburg in April and Florence in September together with our AGM, and the Young Professionals event which will be in Manchester at the University conference centre in February. The format of this is to a certain extent experimental and we may, based on the feedback we get, have to adjust it in following years. However it represents another step forward in respect of bringing in new young professionals to the organisation and is as such a significant step in the implementation of our strategy. Interest already seems to be good and I would ask you and your companies to support this event if at all possible.

As always my final act as Chairman is to thank the Directors, Management Committee and the Programme Committee of the GPA Europe Ltd who give their time generously and



The Bernabéu Stadium

actually make everything work and their associated companies that allow them to give the support. Finally in last position, but by no means reflecting their importance my thanks to Sandy and Anne Dunlop who are effectively the power house that turns what we aim for into reality.

Thank you for your involvement and support in 2014.

AWARDS

Whilst it had been hoped that the award for Best Paper for 2013 was to have been presented to David Futter of E.On Technology in Madrid, he was subsequently unable to attend and thus Keith Thomas, retiring Chairman presented the award at the Annual General Meeting to David. David's paper, "Condition Monitoring to Support Production in the Power Industry" was greeted warmly by the delegates at the previous November's AGM & Technical Meeting, providing Gas processing companies with a useful insight into maintenance in the Power Generation industry that may be applicable in Gas Processing.



David Futter receives his award for Best Paper 2013



Paul Openshaw thanks Keith Thomas on behalf of GPA Europe

Having completed his two year stint as Chairman of the GPA Europe, Keith Thomas was awarded with a commemorative plaque recognising his sterling work by incoming Chairman Paul Openshaw. Paul commented: "I have admired Keith's style of leadership. He has always taken on board the views of the membership. He has provided guidance and encouragement to make things happen. Keith and the Management Committee have a great deal to be proud of."

BEST PAPER 2014

The Programme Committee has analysed the Feedback scores from all conferences from November 2013 to September 2014 and concluded that the Best paper in the views of

those submitted feedback was Adrian Finn's paper, "Processing of Carbon Dioxide Rich Gas" which he presented at the Annual Conference in Madrid. Simon Crawley-Boeveys's paper, "Offshore MEG Regeneration and Reclamation Units" presented in Paris, was a close runner-up.

Unfortunately, the Programme Committee was unable to select a winner of the Aungier Award from the very few presentations made by Young Engineers and so this award will not be presented for 2014. This is a reminder to all Younger Engineers and Students that a well prepared and presented paper given at a GPA Europe Conference will be seriously considered for the award which consists of the kudos of winning - very useful for the CV, plus a prize of £1000.



London Speakers and Moderators

FORTHCOMING EVENTS

2015 CONFERENCES

Offers of presentations are welcomed for all meetings. Contact Administration Office for further details.

SPRING CONFERENCE

22-24 April, 2015 -
Le Meridien Hotel,
Hamburg

Theme - "Gas Treatment and Liquefaction Processes for Natural Gas."

- Knowledge Session
- 11 high quality papers
- Offsite Conference Dinner

ANNUAL CONFERENCE

16 - 18 September, -
Hilton Metropole Hotel,
Florence

Unthemed Conference

- Knowledge Session
- 15 Technical Papers
- Offsite Conference Dinner
- Site Visit
- Companion's Tour
- Now open for booking

AGM & TECHNICAL MEETING

November 2015,
Hilton Paddington,
London

Theme - "i-Design and i-Control"

- Call for Papers open - closes early August 2015
- One day conference
- Knowledge Session

SPRING CONFERENCE 2016

Dates, Theme and Locations to be decided in March 2015

ANNUAL CONFERENCE - JOINT MEETING WITH GPA GCC CHAPTER

September 2016,
Istanbul

Unthemed Conference - Papers on any subject welcomed at any time

CORPORATE MEMBERS

This listing of current Corporate Members represents the status as at 30 January 2015.

Premier Member Companies

Air Liquide Global E&C Solutions Germany GmbH
AMEC Foster Wheeler
Amines & Plasticizers Ltd
Atlas Copco Energas GmbH
BASF SE
Bechtel Ltd.
BG Group
BP Exploration Operating Co.
Compressor Controls Corporation
Costain Energy & Process
DNV GL
Dow Oil and Gas Europe
E.ON Technologies GmbH
Fjords Processing
Fluor Ltd.
Gassco AS
GDF Suez
GE Oil and Gas
Invensys Systems France
Kellogg Brown & Root
M-I Swaco Production Technologies
National Grid
OMV E&P GmbH
Pall Europe
PECOFacet
Perenco
Petrofac Engineering Ltd
Petrotechnics Ltd.
Saipem SpA
Shell Global Solutions International BV
Siemens AG Power Generation Industrial Applications
SIME
Statoil ASA
Technip France
Total
Vitol
WorleyParsons

Level 1 Member Companies

ABB Consulting
Air Products Plc
Alfa Laval
Burckhardt Compression AG
Cabot Norit Nederland BV
Cameron Ltd
CB&I Ltd
CB&I Nederland B.V.

CECA SA
ENI Div E&P
Evonik Industries
Fives Cryo
Genesis Oil & Gas Consultants Ltd.
Geostock
Grace GmbH
Huntsman Belgium BVBA
Jacobs UK Ltd
Johnson Matthey
Kinetics Technology SpA
Koch-Glitsch
MOL Hungarian Oil and Gas Co.
Offshore Design Engineering Ltd
Siirtec-Nigi S.p.A.
Sulzer Chemtech Ltd.
Taminco
Techint Sp.A.
Technip E&C Ltd.
Wintershall Holding GmbH
Xodus Group
Zettachem International

Level 2 Member Companies

Axiom Angewandte Prozesstechnik GmbH
BASF Catalysts Germany GmbH
BHS-Sonthofen GmbH
Bryan Research And Engineering
Chart Energy and Chemicals Inc
Corac CET
Criterion Catalysts & Technologies LP
E.I.C. Cryodynamics Division
Enerflex (UK) Ltd
Energy and Power Consultants
Energy Recovery Inc.
Escher Process Modules BV
Frames Process Systems BV
G.I. Dynamics
g3
GDF Suez E&P Deutschland GmbH
GEA Heat Exchangers Ltd.
Granherne Ltd.
Heatric
IMA Ltd.
ISG
Iv-Oil and Gas
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Kanfa Aragon AS
LGE Process
M.S.E. (Consultants) Ltd.
Maloney Metalcraft Ltd

Maxoil Business Solutions
Oil & Gas Systems Limited
OLT Offshore LNG Toscana
Orlen Upstream
OSL
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SBM Schiedam
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TGE Gas Engineering GmbH UK Branch
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Vahterus Oy
VTU Engineering GmbH
Wartsila Oil and Gas Systems
WinSim Inc
Zechstein Energy Storage
Zeochem AG

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Gasconsult Ltd
Infochem Computer Services Ltd
Juran Europe Ltd
Kirk Process Solutions
Matrix Chemicals BV
McMurtrie Limited
MPR Services
O&GBISS BVBA
OAG Ventures Ltd
Optimized Gas Treating
Rowan House Ltd
Softbits Consultants Ltd
Sulphur Experts

Academic Member Companies

Eindhoven University of Technology
University of Surrey

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