



IN BRIEF

ISSUE 3 MARCH 2013

GAS PROCESSORS ASSOCIATION EUROPE

THE WORST OF TIMES AND THE BEST OF TIMES (WITH APOLOGIES TO CHARLES DICKENS)

VIEW FROM THE TOP

By Keith Thomas, Chairman, GPA Europe

One learns many things during the course of a professional career, however, probably the most useful advice I have picked up along the way came in the form of a very simple statement from a very enlightened older colleague.

Faced with my complaints about a particular project that, despite all our hard work, was not making progress, he told me quite simply: "In a difficult situation people do what they can and not what they should". In general an interesting insight, but what has that to do with gas processing?

The world post Fukushima is quite rightly asking the question: How can I ensure a power supply that is both low in carbon emissions and minimises potential risk posed by the use of nuclear energy? What an analytical thinking person would do is to weigh up the options, consider the restrictions imposed by implementing each one, and then try to select the optimum solution from a portfolio of alternatives which provides maximum security of supply at minimum environmental risk and the lowest possible cost for the end user. Unfortunately many politicians and the analysts that advise them seem to be either ignorant of,

or have forgotten this simple approach. The response across Europe to the tragic events in Japan has varied from near denial of a problem to a moratorium on nuclear power. This has led in various European countries to stagnation of investment due to market manipulation based on statutory requirements or subsidies and the inability to come to a sound policy. A coherent strategy on a European level that will deliver the premises outlined above in the long term still seems far off. Any engineer knows that if you move something from its equilibrium position it will eventually return to equilibrium, although not usually at the same point as it started. And indeed our entire industry is set up to use these changes to produce a marketable product. It can be of no surprise then, that the in some cases rapid response at the political level to public opinion has thrown the energy landscape, in which natural gas still plays a very significant role, into disorder.

At the latest you will by now be asking yourself, what has all this to do with gas processing? The answer is that whatever concept Europe adopts for its future energy policy, gas is certain to play a key role in providing the swing capability to match the weaknesses of relying on renewable



Keith Thomas

energy sources. These sources, by nature, are not always there when you need them or abundant when you do not. This may sound straight forward, but the challenge lies therein, that gas as a fuel for conversion to power in Europe is relatively expensive compared to

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A round-up of the Gastech event and the GPA Centre of Technical Excellence



9-12 GPA EUROPE AGM

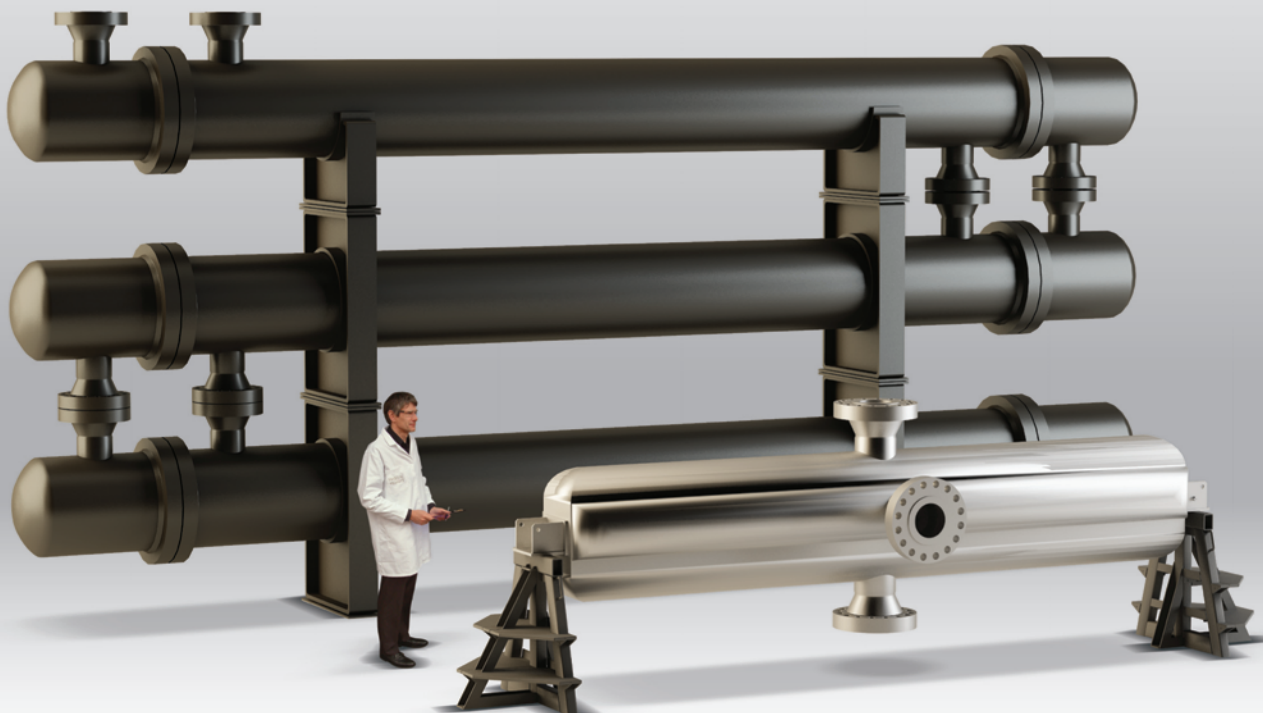
Full details from the 2012 AGM and Technical Meeting in London



13-14 CHAIRMAN'S REPORT

Chairman David Weeks reflects on an interesting year for GPA Europe

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available alternatives, Nevertheless, compared to Asia and South America, European gas import prices are at the moment relatively low, making Europe an unattractive trading partner. So the challenge lies therein to make gas available at a price that Europe can afford and in the quantity that it requires in the world market. Currently, excluding Russia, only three European countries export gas, namely Norway, the Netherlands and Denmark. All others are net importers. For the time being the traditional pipeline sources seem to be able to provide the bulk of demand. However LNG import capacity is already available and, at a critical price level which has yet to be achieved, the industry will push towards shale gas solutions for meeting any future demand. Considering the increasing liquidity of the European gas market, the extremely well developed gas networks in most of Europe and the unique opportunity for large scale energy conversion of power to gas, this puts the Gas industry at the forefront of any European energy strategy. But to do all this Europe needs a strong gas processing capability. The gas must come from somewhere, it has to get to where it is required, and the system has to be able to cope with variations in demand. Gas Processing is the technical field that makes this happen from the well head right through to the consumer.

To return to the starting point of this article:
From a European perspective what should

we do? Commercially Europe sits between the higher priced LNG based gas markets of Asia and South America, and the lower priced Shale Gas dominated market of North America. Recent LNG liquefaction activity in North America shows that this situation will not last for ever and that eventually US exports and global unconventional gas reserves are likely to even out the market price levels worldwide. And here one of the winners will be Europe because a balanced gas market will ensure that Europe will remain attractive for importers. But to achieve this, the gas sector needs not just a sound commercial basis, but also the infrastructure capabilities along the whole value chain to make it possible. And that is the key role of Gas Processors: to do what they can do and what they should.

Europe may be in a recession, gas consumption in Europe may be stagnating (all be it at a high level) and politically fossil fuels, of which natural gas is one, may not at present be in favour which would make it seem like it is the worst of times to be involved in the gas industry. However, there are structural problems that have to be addressed and in terms of flexibility and environmental impact there is no fuel as reliable, maturely developed and as acceptable as natural gas. Looking at it from this perspective the future of natural gas in Europe, whilst uncertain in its form, still looks bright. So it may be the best of times to be in gas processing after all.



Holford Gas Storage Processing Plant - Cheshire UK. Image supplied courtesy of EON and Costain Energy & Process.

GASTECH 2012

The GPA Europe's second Gastech was another opportunity for us to widen the exposure of the company to the wider gas processing community and we were not disappointed by the response. We had attended the Amsterdam Gastech in March 2011 and had been asked to, once again, organise a Centre of Technical Excellence (CoTE) at the London event, in return for a stand to advertise the benefits of GPA Europe. We had arranged with Gastech to have a stand on which to draw attention to the facilities available to members and there was never a better description. Although we did have some chairs I don't think we used them much and by the end of the Exhibition day you really do realise why it is called a "stand"!

The event was held at the ExCel Centre in London's Docklands from 8th to 10th October 2012 and Anne and I turned up on the afternoon of 7th October to find the hall a hive of activity with contractors and crews frantically working away to be finished ready for the opening on Monday morning. Our stand was simply a shell with some furniture all wrapped up and stacked on the space so we had to check everything ordered was there and then, of course, rushed around trying to find out where the missing equipment was – in this case a video screen. This was eventually set up and in working order on the Monday morning – an added

challenge to my already strained composure!!

By the time the exhibition itself actually opened we were all ready, spick and span, and ready to meet customers and potential members.

I am glad to say we had a steadyish stream of visitors during the days of the conference and we were able to interest a good number, many of whom have recently become members in the GPA Europe, so the event was generally a great success from that point of view. The real high point however was the CoTE event which we organised on the 9th of October, where we presented ten papers in a specially designed theatre in the Exhibition Hall. There were three such theatres offering a range of subject matter, but I am very pleased to report that our CoTE was once again probably the best attended with over 100 people gathering round to hear the presentations. The CoTE led to at least one company to join saying that they were really impressed by the quality of presentations and the information provided, and that alone has done a great deal to raise the profile of GPA Europe. More details on the CoTE content can be found in the following pages of this issue.

I also take this opportunity to thank all those members of the GPA Europe and the management committee who came along during the CoTE day to support Anne and me



Visitors at the stand

on the stand. With my rushing backwards and forward from the CoTE area, it was a huge help to me to have someone who was able to talk to visitors about the benefits of GPA Europe membership. Anne, who is not skilled in the industry, particularly appreciated the help.

The last day of the exhibition is generally quiet and although we are requested not to close up until the very end of the exhibition at 4 o'clock, we knew from experience at Amsterdam the year before that getting away when the hall is closed and the riggers come in to dismantle stands is difficult. Therefore, just before the event closed we had moved all our stuff out to the car and were able to slip away.

Gastech was a great success and when the event returns to Europe in the future I, for one, would be keen to revisit the event, but for now our attention is directed towards helping to make a success of the European Gas Production Forum and Exhibition which will be held with the Gastech organisers in Düsseldorf on 5th – 6th June 2013. There, our involvement will be much more significant and we will be managing a full day of papers in the conference, as well as a slate of very technical papers in a separate, but free, CoTE. Full details are available on the GPA Europe website. Space is still available for exhibition, and registration for GPA Europe members is available with very attractive rates which include accommodation at the Exhibition Hotel. Check out the details and join us in Düsseldorf in June 2013.

Sandy Dunlop
Executive Administrator, GPA Europe Ltd.



Keith and Sandy holding the fort

At the Berlin Annual GPA Conference in May 2012, you may remember that a draw was held for a complimentary ticket to attend GasTech 2012. The lucky recipient of the prize was Viviane do Santos of SBM Schiedam. Despite being in the late stages of pregnancy, Viviane somehow found the energy to take advantage of her ticket. GPA Europe wish Viviane many congratulations on the birth of her daughter, Nina, and we offer our gratitude that she has found the time to write to us at what we are sure is a very busy time to describe her experience of GasTech:

Claire Haycock, In Brief Editor

MY EXPERIENCE AT GASTECH

During the GPA Europe Annual Conference in Berlin in May 2012, I won a ticket to attend this conference as a delegate, which I promptly accepted.

Prior to attending, I checked the program and news available at the website in order to guide my visit. Another very helpful tool was the smart phone App which was especially created for this event. I was able to make my own personal agenda and receive frequent news updates. From all subjects discussed during the conference, those related to FLNG and Gas-to-Liquids attracted my attention the most. As a Process Engineer working for SBM Offshore, I have been involved in FLNG (floating LNG production unit) projects and during my Chemical and Bio-Chemical Engineering education at the Delft University of Technology I was involved in several studies related to energy conversion. One of my preferred subjects was gas to liquids in micro-channel reactors. Also, SBM Offshore

has signed a Commercial Development Agreement with CompactGTL Ltd. to work exclusively together on floating GTL projects, which was presented at the conference.

There were a large number of activities at the Gastech including more than 100 prominent speakers and representatives from the industry and ministerial keynotes. Besides watching the presentations and panel debates, there were opportunities for asking questions. Presentations held at the Ignite! and the Energy Recruitment Show, were focused on the increasing shortage of professionals in the gas industry. The quality of the presentations given at the Centre of Technical Excellence (CoTE) seminar, which were free to attend, was remarkably high. It is no surprise that these presentations were well attended. Highlights included Gas Processing, Power Generation, Floating LNG, Gas-to- Liquids, Project Delivery and Unconventional Gas. More than 400



Viviane receiving her prize

exhibitors related to the global gas value chain were present at Gastech and I had the opportunity to contact many of them. Besides the opportunities for networking offered by the activities mentioned before, there were also special social activities held at the conference reception: the delegate lunch; the networking lounge; and the networking receptions after the CoTE seminar. In short, Gastech was a 'learningful' experience. Thanks, GPA Europe!

Viviane Do Santos
SBM Schiedam

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GPA EUROPE CoTE GasTech 2012

TUESDAY 9 OCTOBER • FIRST SESSION

GPA Europe took the opportunity to participate in this year's GasTech by presenting a full day's conference session in the Centre of Technical Excellence (CoTE), conference events presented in theatres set in the main exhibition hall. The conference was opened by John Sheffield who welcomed a full house and gave a brief synopsis of the purpose and functions of GPAE before introducing the first presentation.

Optimised Design for Tight Gas Gathering Systems

The presentation by Ahsan Iqbal, a senior process engineer from Worley Parsons, dealt with *Optimised Design for Tight Gas Gathering Systems*. Tight gas is released by fracturing



Ahsan Iqbal

and stimulating wells which are typically of low productivity, thereby requiring a large number of wells to be manifolded together. For a typical field, these wells may be spread over a vast area and the gas gathering network is large and complex. To ensure effective evacuation of the gas, detailed simulation of the flows is needed and Ahsan described his analytical procedure as applied on a recent project. He demonstrated how the tables developed helped with equipment and line sizing and led to optimum systems design. The presentation stimulated an active discussion of the selection of the best analytical approach.

Liquefaction Process Technology for Mid-Scale Plants

The second paper was presented by Will Schmidt of APCI, entitled *Liquefaction Process Technology for Mid-Scale Plants*. In an excellently clear presentation, Will noted the subtle differences between the mid-scale (0.5-2Mtpa) and large base load LNG facilities and highlighted the key technology selection criteria and the choices that need to be made.



Will Schmidt

He described the improvements that have been developed to improve the efficiency of the Single Mixed Refrigerant and also the Nitrogen cycle refrigeration processes. He noted that there are often more options than for base load plants with respect to driver selection, although specific project factors will determine the choice. The value of pre-cooling and importance of addressing trace component removal were clearly addressed. The paper stimulated an enthusiastic debate on process selection issues.

**Report by John Sheffield,
John M Campbell Co**

SECOND SESSION

Efficient Nitrogen Removal from LNG

Jorge Arizmendi-Sánchez of Costain Energy & Process presented *Efficient Nitrogen Removal from LNG*. The nitrogen content of LNG needs to be limited to 1 mol% to avoid possible "rollover" in storage and to meet quality specifications. Nitrogen removal is conventionally performed by flashing of LNG but, for high nitrogen levels in the feed gas, this can lead to high flash gas rates and nitrogen levels that are too high for the flash gas to be used as fuel gas. Fuel gas quality is very important in ensuring the performance and reliability of the gas turbines used for driving the refrigeration compressors, so high nitrogen levels are an operational concern.

Options for nitrogen removal were discussed and an integrated end flash / nitrogen removal system presented that is optimal for > c. 2 mol% nitrogen in the plant feed gas. A stripping column would produce flash gas containing over 20 mol% nitrogen for such a feed gas, whereas the proposed system includes a rectification section in the column so that it produces a high purity nitrogen stream for venting, LNG containing less than 1 mol% nitrogen and flash gas of low nitrogen content to use as fuel gas.

This simple and efficient process should ensure consistent quality of both LNG and fuel gas so as to provide stable performance of the gas turbines and overall plant refrigeration system.



Jorge Arizmendi-Sánchez

Design Capacity Assessment of the Norwegian Transport System for Natural Gas by Using a Novel HYSYS and Excel Analysis Tool

Craig Branch of Genesis Oil and Gas and Christian Aaserud of Gassco presented *Design Capacity Assessment of the Norwegian Transport System for Natural Gas by Using a Novel HYSYS and Excel Analysis Tool*. Gassco operates the natural gas transport system to supply Norwegian gas to Europe and supplies about 18% of Europe's gas consumption through 8000 km of pipelines, offshore platforms and onshore gas processing plants and terminals. To optimise the transport system, a novel integrated HYSYS and Excel analysis tool has been built to assess if there are opportunities to operate the system at

increased capacity. The tool can perform process simulations to determine pressure drop and velocity profiles to assess capacity constraints and thus lead to development of operating strategies (including flow trials) to allow increased production. The HYSYS model rigorously "captures" the main process equipment details to reconcile actual plant data with predictions. The Excel spreadsheet effectively drives the HYSYS model to obtain the data for analysis.

The tool has led to increased understanding of the Gassco receiving terminals and offshore platforms and several opportunities have been identified for ongoing performance testing of the transport system.

**Report by Adrian Finn,
Costain Energy and Process**



Christian Aaserud

THIRD SESSION



Vince Atma Row

Desulphurisation and Mercury Removal from Natural Gases

Next up, Vince Atma Row, Global Product Manager, Johnson Matthey presented *Desulphurisation and Mercury Removal from Natural Gases*.

Mercury and Hydrogen Sulphide are recognised as serious contaminants of hydrocarbon streams that must be removed to avoid corrosion of equipment, poisoning of catalysts and to comply with environmental regulations.

Vince provided an overview of sulphur and mercury removal technologies and options.

Selection of H₂S removal processes is dependent on quantity of H₂S to be removed i.e. on a combination of both concentration of H₂S in the feed gas and the feed gas flowrate, moving from fixed bed adsorption processes to amine/Claus units as the quantity of H₂S to be removed increases.

Processes for mercury removal use fixed bed adsorption technologies, whether regenerable or not, such as sulphur impregnated carbon, silver doped molecular sieve or using fixed bed mixed metal absorbent. One of the interesting aspects covered by Vince was identifying the distribution of mercury on a gas processing facility and hence identifying where one should locate the mercury removal process, i.e. as close as possible to the delivery point of the raw gas such that mercury is not distributed throughout the plant and the environment.

Factors Determining Full Stream Reclamation or Slipstream Reclamation for MEG Recovery

Simon Crawley-Boevey, Technology Manager – MEG Reclamation, Cameron's Process Systems gave a paper entitled *Factors Determining Full Stream Reclamation or Slipstream Reclamation for MEG Recovery*.

Mono Ethylene Glycol (MEG) injection is a well-established method of preventing the formation of hydrates in gas production pipelines. Simon provided a brief overview of hydrates, MEG and the need to remove salt from a MEG injection loop. The MEG Reclamation process recovers MEG by removing the water to achieve the required



Simon Crawley-Boevey

outlet glycol purity, and at the same time removing salts and other solids such as corrosion products and sand.

Simon described two case studies highlighting the differences between both the Full and Slipstream MEG Reclamation processes and the factors that influence the selection between the two.

Slipstream reclamation typically treats 10 to 50% of the Rich or Lean MEG, and is typically recommended for high rich MEG flowrates and low to medium salt loads. It is the preferred mode for onshore plants, whereas full stream reclamation is the preferred mode for offshore plants due to a lower footprint and weight than a slipstream design.



Standing room only

FOURTH SESSION

Selection of LNG Liquefaction Technology for FLNG Operations

The next presentation, *Selection of LNG Liquefaction Technology for FLNG Operations*, was by John Sheffield of John M. Campbell Co.

John outlined the long history of attempts to develop FLNG technology, the magnitude of the challenges, culminating in the final achievement of Shell announcing the huge Prelude project for NW Australia, and Petronas announcing two smaller projects in Malaysia.



John Sheffield

He showed the efficiency comparisons between the various liquefaction process cycles and highlighted how smaller production rates below 1MTPA favour nitrogen recycle systems and larger productions favour mixed refrigerant cycles. John also stressed how choice of process is strongly influenced by client preference, particularly with perception of safety issues between inert and mixed hydrocarbon recycle refrigeration systems.

John's long term enthusiasm for the concept of FLNG and his pleasure that it is finally happening shone through the presentation.

YAMAL LNG Project

To round up the day's papers, Martin Mayer of CB&I presented *YAMAL LNG Project*.

The gas from the South Tamara field needs to be brought to land to a site in the inhospitable Arctic Circle, where ambient temperatures range from +30°C to -52°C. Martin described the concept of a phased construction of three 5.5 MTPA C3MR trains.

Martin covered the key logistical problems caused by permafrost, weather access windows and the difficulties of construction in such an environment. Modular design concepts were described, in particular the sequence from process and piping design, structural design, transportation and

installation, along with the key factors of protecting process equipment from the elements.

During the last session, both John and Martin highlighted how far the LNG industry has travelled since the first base-load plants were built in the 1960s. Opportunities for remote gas field recovery previously considered as non feasible are now becoming realities.

**Report by David Healey,
Air Products & Chemicals**



Martin Mayer

GPA EUROPE AGM AND TECHNICAL MEETING KNOWLEDGE SESSION LONDON 2012

29TH NOVEMBER

Relevance of Law to Commercial Contracts and the Impact of Contracts on Design

Just a few minutes past 0900, more than 70 eager engineers of all ages were called to order in the meeting room at the London Hilton Metropole Hotel. David Weeks, GPA Europe Chairman, welcomed the audience to the 2012 AGM and Technical Conference outlining the events for the day. After the safety announcement, the chair of the technical sessions of the day, Sigbjørn Svenes of Statoil, introduced the first event, the traditional Knowledge Session. For the first time a non-technical topic, "*Relevance of Law to Commercial Contracts and the Impact of Contracts on Design*", was the subject of the knowledge session. Still this is an area which embraces us all in our everyday work – operator, E&C company, vendor and consultant alike.

Edward Davies of Hill Dickinson LLP, a UK based international law firm, had themed his

lecture notes *Relevance of Law to Commercial Contracts and the Impact of Contracts on Design* for the morning session. Mr Davies took the audience through a broad overview of legal terms and issues flavoured with examples and also opened up for the audience to share and discuss their experiences. He started by outlining the hierarchy of legal rights with the applicable law always superseding any contractual wording. For example late payment interest rates are common in UK law as well as in many other countries, but are non-existent in countries practicing sharia-law and will have no formal legal status if the contract is subject to such laws. Likewise laws intended to protect individuals (employees and consumers alike) and the environment will take effect above any contractual arrangements, exemplified by BP being temporarily banned from new contracts in the US Gulf of Mexico. Furthermore, a contract cannot free anyone from liability for deliberate or



Edward Davies

malicious acts. In this way the contract becomes a legally binding commercial arrangement within the framework of applicable law.

The session also focused on the fact that laws change over time caused by political changes, general development of society or maybe as an iterative improvement – all issues which may impact contractual arrangements. Also the risk of foreign law in international projects were highlighted with issues like conflict between laws in countries where the project is executed and countries where services and supplies are conducted or manufactured, and how contractual terms may be interpreted or arbitrated in various societies. How contractual formats influence participants' behavior and managing the contract were also covered as topics before Professor Davies ended a highly interesting morning with testing his students on interpretation and decision making. The final discussions took us up to lunch and the room was prepared for the Annual General Meeting covered in another article in this magazine.



The legal complexities of contracts

GPA EUROPE AGM AND TECHNICAL MEETING

TECHNICAL CONFERENCE LONDON 2012

29TH NOVEMBER

Gas Monetisation from Marginal Fields

After the AGM and with the new GPA Europe Chairman Keith Thomas duly elected, the Technical Conference topic of the afternoon, *Gas Monetisation from Marginal Fields* was introduced. As energy demand is increasing worldwide, natural gas is a fuel of choice in most of the world and is seen as available, competitive and with a low carbon footprint. Natural gas is brought to markets from conventional gas reservoirs, as associated gas from tight gas or shale gas, and biogas,



Brian Songhurst

as well as several other sources. Still many gas reserves have by nature difficult access to markets due to location, size or quality. Another push to get some of these volumes to market may now come from international focus to reduce worldwide gas flaring. The conference papers focused on various technologies to make such reserves available to the market.

Floating Liquefaction Update

The first paper of the afternoon, *Floating Liquefaction Update*, was given by Brian Songhurst of Energy and Power Consulting. Brian began by saying that new generation floating storage and regasification units are now competitive to corresponding onshore installations and maybe liquefaction is next. He then went on to highlight some of the current projects ongoing and the solution providers most active. He referred to at least 15 current FLNG developments worldwide, with 3 projects including Shell's Prelude project already being sanctioned. Projects are still shown to be concentrated in the relatively benign waters of Asia-Pacific. However, activity is seen off South America and in the Mediterranean/Middle East areas as well, with project sizes generally ranging from 1.5 to around 3.5 MTPA of LNG. As near shore concepts are also being looked at, Brian mentioned as a curiosity that the first commercial LNG shipment to Canvey Island in the UK in 1959 came from a jetty moored barge in Louisiana, US.

Currently predicted capital expenditure for large scale FLNG (3+ MTPA) is similar to the cost level seen for onshore LNG projects in Australia. With all costs included from field production through to regasification, the total cost is around breakeven point for the European gas grid for a 2.0 MTPA FLNG project, and with a subsequent margin compared to current prices in the Japanese market. Yard capacity for vessels does exist worldwide and for smaller scale FLNG projects (< 2MTPA typically), vessel size is within the same range as world class oil producing FPSOs. Even for the larger Prelude size vessel type, at least 3 shipyards outside China may handle such large vessels. Still, financing of FLNG projects is a challenge much related to financial investors being nervous about new technology risks associated with FLNG concepts. These technical risks are mainly connected to LNG Transfer (side by side or tandem offloading, wave heights) and safety

issues (layout/explosion risks, cryogenic spills, choice of cooling medium –N₂-cycle versus Mixed Refrigerant). Process performance with regards to robustness towards tilt and movement is also an issue, as is marine engineering such as turret design and location. Still FLNG is finally coming to realization with Petronas and Shell having sanctioned their first projects.

Natural Gas Liquefaction Using Nitrogen Expander Cycle - An Efficient and Attractive Alternative to the Onshore Base Load Plant

The microphone and laser pointer were then handed over to Stine Faugstad of KANFA Aragon AS in Bergen, Norway. Following the theme of FLNG she presented the paper "*Natural Gas Liquefaction using Nitrogen Expander Cycle - An efficient and attractive alternative to the onshore base load plant*". The paper was co-authored by Inge L. Nilsen also from KANFA. Ms Faugstad started off by describing the liquefaction technologies used in the comparison - Gas expansion cycle



Stine Faugstad



An enjoyable lunch

(Nitrogen) and Vapour compression cycle (precooled mixed refrigerant). She then went on to describe the various efficiency definitions used for comparing various liquefaction technologies: specific power consumption (kWh/tonLNG); thermodynamic efficiency; and thermal efficiency, concluding that overall plant thermal efficiency gives the most accurate basis for comparison of cycles. The paper compared a theoretical study of the two cycles based on gas turbine drives (aero-derivative and industrial gas turbines) with equal ambient conditions, product specifications and feed composition, but with different capacities. The study concluded that even though the nitrogen expansion cycle has significantly lower thermodynamic efficiency than the precooled mixed refrigerant cycle, the overall thermal efficiencies of the two processes are similar. Finally the effect of thermodynamic efficiency on project economy where studied for equal sized plants. The study concluded that availability was the predominant factor for overall project lifetime, giving less than 0.5 % increase in present value for the precooled mixed refrigerant cycle compared to the less efficient nitrogen expansion cycle. Similarly for fixed feed plants, approximately 2% difference was seen. This led Ms Faugstad to conclude that there will be opportunities for nitrogen cycles with safe,

simple, reliable and low cost design, to compare favorably with current state of the art base load technology, especially for offshore applications.

FPSO System with Integrated GTL Solution for Associated Gas

Shravan Joshi of CompactGTL in the UK started the final session after the coffee break presenting the paper *FPSO System with Integrated GTL solution for Associated Gas*. Also contributing to the paper were Iain Baxter, Subby Bains and Mike Bowe, all with CompactGTL, and Mike Wyllie with SBM Offshore. Mr Joshi first gave an overview of the commercial framework for current development. This now has a push from increased political and environmental pressure to mitigate continuous flaring of associated gas during oil field development and also extended well tests (EWT), typically in remote/deep water areas. A key to the concept described is to downscale the GTL (Gas To Liquid) plant to fit within the constraints of a typical FPSO and rather produce a waxy syncrude which can be mixed with the field produced crude oil. In this way cargo storage is removed and complicated product upgrading facilities to



Shravan Joshi

high value synthetic fuels are also eliminated. Comparing to world scale GTL plants this compact scheme will be in the 15% or less capacity range and is not competing with other gas utilization schemes such as CNG, FLNG or Gas to Wire, requiring larger gas reserves. To accomplish a compact design fit

for an FPSO also containing crude oil, a modular approach has been used. Reliability and maintainability with regards to module change-out has been focused along with layout considerations to meet safety requirements. Feed gas pre-treatment is based on commercially available units while internal competence has focused on syngas production and Fischer-Tropsch conversion.

Syngas production is based on a two stage endothermic Steam Methane Reforming (SMR) process including a high temperature reactor based on brazed plate-fin heat exchanger manufacturing techniques and a proprietary reforming catalyst. Membrane separation technology controls the H_2/CO ratio to the Fischer-Tropsch reactor modules using similar manufacturing techniques as for the SMR process. These mini-channel reactors are key elements to the technology, enabling the concept to meet size and weight constraints critical to FPSO design. CompactGTL and SBM have based their study on a typical SuezMax tanker size. Since late 2010 a modularized demonstration plant has been operated by Petrobras in Aracaju in Brazil and a successful test period was concluded in early 2012.



Gas to Propylene - Methanol to Propylene (MTP®) Option to Meeting Future Propylene Demand

The final paper of the day, Gas to Propylene – Methanol to Propylene (MTP®) Option to Meeting Future Propylene Demand, was given by Dr. Sven Pohl of Air Liquid in Germany and co-authored by Pietro Di Zanno and Matthias Stein, also of Air Liquid. He introduced his topic by giving an overview of trends and projections in natural gas and crude oil relative pricing. The seemingly widening gap of crude prices above gas prices may create an opportunity to use natural gas as feedstock to fulfill an increasing worldwide demand for propylene via methanol production. A proposed route would be a gas to propylene complex with a world scale air separation unit and syngas plant, followed by methanol production. Methanol is then fed to the MTP® reactors using a proprietary Zeolite catalyst to



Sven Pohl

achieve high methanol conversion and maximize propylene production. Valuable co-products will be gasoline, LPG and water. Typically, a polypropylene plant will also be included in this complex. The MTP process is proven in operation in China since late 2010, with coal as feedstock (coal gasification).

The excellent discipline shown by the afternoon speakers, including closing remarks from the new GPA Europe Chairman, Keith Thomas, led to the on time completion of the day's events, allowing the participants to rush off for further discussions and refreshments in the free bar provided by GPA Europe!

Report by Sigbjørn Svenes, Statoil



The speakers and moderators

CHAIRMAN'S ANNUAL REPORT - 2012

Ladies, Gentlemen, Fellow Directors, Friends and Colleagues, welcome to the 2012, and indeed the first, Annual General Meeting of the GPA Europe Ltd.

2012 has been a year of exciting changes for .

For those of you who attended our last Annual General Meeting on 24th November 2011, you may recall that the attendant membership voted in favour of a motion for GPA Europe to incorporate under the UK Companies Act (2006), as a limited company by guarantee.

You may also remember that there was heated and lengthy debate about the proposed articles of association under which the new limited company would operate and conduct its business.

Time constraints prevented resolution of this contentious issue at the 2011 AGM and the Management Committee was instructed by the members to further review the articles, agree necessary changes and reach majority consensus on their composition before proceeding with incorporation.

I am pleased to report that the final version of the articles of association was agreed at the January 2012 Management Committee meeting and that the Gas Processors Association Europe was legally incorporated as a limited company by guarantee on 1st April, 2012. If you are at all curious, copies of the articles of association are available for download from the GPA Europe website. Henceforth, we are GPA Europe Ltd.

Once again, GPA Europe Ltd has organised for its corporate and individual members, its traditional annual program of three technical conferences in 2012 plus today's AGM, Knowledge Session and technical program.

As a departure from our usual tri-city rotation of London, Paris & Amsterdam, our first conference of 2012 was held in Antwerp, Belgium at the Scandic Antwerpen Hotel between February 22nd and 24th. Themed around the subject of 'Moving Fluids - the latest developments in Machinery', 40 delegates registered to be enlightened. A total of nine papers were presented on Thursday 23rd February. On Friday the 24th, Dr Najam Beg of Caltec presented a knowledge session on Surface Jet Pumps. Although ejector / eductor devices are well known within our industry, extension of their use into the area of enhancing field production life certainly represents a novel application offering very attractive economic paybacks.

Declining attendance numbers at recent GPAE February meetings has been a cause for concern amongst the Management Committee and is regularly discussed at our quarterly meetings. It is unreasonable, and indeed unfair, to expect speakers to commit their own precious time and their employer's money to present before low audience numbers. With this in mind, the Management Committee has initiated an action plan in an effort to boost delegate numbers. Alternative timings and locations for the first GPAE conference of the year will be tested in turn to determine their influence, if any, on registrant numbers. As a consequence, next year's conference will be held slightly later in the year, in March, and will return to Paris. The success, or otherwise, of the planned actions will go a long way towards determining the long-term future of this first-quarter conference.

In April, I attended my first USGPA Annual Convention, held this year at the Hilton Riverside hotel in New Orleans. The 'price' of my attendance was an invitation from International Breakfast Chairman, Colin Woodward, to make the opening address at the International Breakfast on Monday 16th April. The subject of my presentation was Carbon Capture and Storage – a Worldwide Overview, a subject much discussed by power generators but still only practiced on an industrial scale by the hydrocarbon processing industries and, in particular, gas processors.

As many of you may know, the USGPA event is orders-of-magnitude larger than our own European conferences with parallel technical sessions and extensive corporate hospitality. It was very interesting to compare presentation content and styles and experience again at first hand the quality of the papers presented by our European members to an American audience, including the 2010 GPAE paper of the year 'Development of Technologies for CO₂ Capture from Flue Gases' jointly authored by Prosernat and IFP and presented by Laurent Normand on behalf of Christian Streicher. All of our member company presentations magnificently showcased the innovative vibrancy of the gas processing industry in Europe.

In May of this year, the first issue of our re-styled magazine, In Brief, was published. Graphic Design house and new publishers, TenAlps, were tasked by GPA Europe Ltd with modernising both the presentation and format of In Brief to create a stylish magazine which could grace corporate coffee tables anywhere.



David Weeks

While the content of the magazine remains focussed on GPA events past, present and future, for the first time, limited advertising space has been introduced. The amount of allowable advertising is limited by contract and is available for purchase by any interested parties. Of course, discounted rates apply for GPAE members.

The re-launch of In Brief coincided with the appointment of a new editor, Claire Haycock. In January this year, Claire volunteered to succeed Nick Amott, who after nine years of loyal and largely unheralded editorial service decided to 'hang up his quill'. It is not an understatement to say that Claire underwent a 'baptism of fire' having to learn the responsibilities of her new role as editor, while liaising with a new publishing house to meet tight copy deadlines while still performing her day job. I extend my thanks, and the thanks of our membership, to Nick for his years of dedication and to Claire for accepting this new challenge and for her sterling efforts throughout 2012.

To avoid a clash with the GasTech conference in October, GPA Europe's Annual Conference was brought forward four months and was held at the Hotel Palace in Berlin from 23rd to 25th May. The conference was opened with a keynote speech by Keith Thomas, VP of Project

Development and Technical Support - Gas with Eon-Ruhrgas and GPA Europe's Chairman-elect. Keith speculated in his presentation about future opportunities in the German gas market following the Bundestag's decision to decommission its fleet of nuclear power generators.

The traditional 'open' theme of the annual conference was retained and over the one-and-a-half days between Thursday morning and Friday lunchtime, a total of 17 papers were presented on subjects ranging from floating LNG to HAZOP and LOPA. A total of 144 attendees registered for this event, 18 of whom were accompanied by their partners, once again reinforcing the popularity of this event in our gas processing annual calendar.

I mentioned at the start of my report that 2012 had been a year of exciting change for GPA Europe. The introduction and success of our first Young Professionals session on the eve of the annual conference in Berlin was without doubt the most significant event of this year.

Forty-four young, plus a few not-so-young, engineers registered to be educated on the subject of Acid Gas Treatment. This new YP initiative has been championed by Soufyane Teffahi of BP who not only organised the presenters, selected the theme and program but also networked tirelessly to enthuse attendance amongst young, professional engineers. My thanks to six giants of the gas processing industries, John Morgan (J.M.Campbell), Justin Hearn and Volker Giesen (BASF), Tom Cnop (UOP), Luke Addington (BR&E) and Jan Lambrichts (Dow) for their willingness to give of their time and expertise and for their lecturing skills and contributions to the success of this first YP venture.

Young Professionals are the future of our industry and of the GPA Europe organisation, so it is intended to reprise the YP event at next year's 30th Anniversary conference in Edinburgh in September 2013. The plans for this event are already in place and the theme will be Gas Terminals.

Our third event of 2012 was the organisation of a Centre of Technical Excellence at the GasTech Conference and Exhibition held at the ExCel Centre in London's docklands on Tuesday, 9th October. Following the success of GPAE's participation at GasTech 2010 in Amsterdam, we were again invited by the organisers, dmgevents, to select eight, open-themed papers for presentation throughout the day.

average, approximately 100 attendees listened to each of the papers presented at our CoTE throughout the day.

The Centres of Technical Excellence at GasTech are always located in the Exhibition Hall and are free to enter. GPAE's participation at GasTech is designed to offer our members an opportunity to meet and reach a wider audience than attends our traditional quarterly conferences and which also provides an ideal venue for GPAE to showcase the organisation, the quality of our papers and to recruit new members. Based on the interest expressed by visitors to our stand at GasTech, we are optimistic about welcoming

Forum event in 2013. This conference and exhibition is envisaged to be similar in style and concept to GasTech, although Europe-centric and therefore smaller in scale, and is intended to fill the void left by GasTech which will not now return to Europe for a number of years.

Additionally, GPAE is also holding preliminary discussions with the Gulf Chapter of GPA about the feasibility of holding a joint conference with them, perhaps in Istanbul in 2014. There is much enthusiasm within both organisations to make this event happen so I encourage you all to watch In Brief and the GPA Europe website for news.

If these initiatives can be brought to fruition, they should both provide further opportunities for our members to make new friends and contacts, to increase their business potential through greater exposure to a larger audience in wider geographical areas and, at the same time, help to grow the GPAE organisation without, we hope, losing the essential warm and friendly ethos of GPA Europe's traditional conferences.

Sandy has asked me to remind you all that the 13th edition of the GPSA Engineering Databook, including a portable CD version, was published in mid 2012 and so far, no less than 50 copies have 'flown off the shelves'. If any of you have an eye for a bargain, there are also copies of the 12th edition available from Sandy at reduced prices!

It only remains for me to offer my thanks to you, the membership for your support of GPA Europe throughout the year, to all of our speakers and session Chairs without whom there would be no conferences and to all the willing volunteers who sit on the Board of Directors, the Management and Program Committees and who have given, and continue to freely give of their time, ideas and enthusiasm to navigate and steer GPA Europe Ltd forward into the future.

Finally, I must thank Sandy and Anne Dunlop, our 'Batman and Robin dynamic duo', without whom, GPA Europe could not function as a well oiled machine and a flourishing organisation.

As my two-year tenure as your Chairman draws to a close, I would like to wish Keith the very best of luck during his period in office and I sincerely hope that you will all offer him the same support which I have enjoyed throughout my time at the helm of the Gas Processors Association Europe Ltd.

Thank you.

Report by David Weeks



New chairman Keith Thomas thanks David Weeks for his outstanding service to GPA Europe

seven new Corporate and seven new individual members to the ranks of our organisation in 2013.

We have also re-launched the Outreach initiative to UK universities this year. Sandy Dunlop, our Executive Administrator, and Colin Woodward, a former GPAE Chairman and long-standing member have visited both Durham and Manchester Universities in 2012 to introduce GPA Europe to their respective student bodies. For the first time in many years, we can claim six student members amongst our numbers. GPAE would like to extend this initiative to other universities both in the UK and in mainland Europe. If any of the membership here today has contacts at their old alma maters or who might be interested in volunteering to participate in this scheme, please contact Sandy or any member of the Management Committee to make your interest known.

The Board of Directors and the Management Committee are also actively considering a number of other exciting, future initiatives for the benefit of our members. We are currently in discussion with dmgevents about partnering with them to introduce a new European Gas

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Former Acting Director
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Ali Arif Akturk
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NATURGAZ A.S.



Dr. Tatiana Mitrova
Director of Global Energy
Skolokovo Energy Centre



Ismail Nawaz
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European Centre for
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FORTHCOMING EVENTS

2013

March 13-15

Marriott Rive-Gauche Hotel, Paris

SPRING CONFERENCE

- One Day technical Papers on a range of gas processing topics
- Morning Knowledge Session - Subsea Gas Processing

Sponsored by CECA, Prosernat and Cameron
Registration open and full details available on GPA Europe website

June 4-6

Hilton Hotel Düsseldorf

EUROPEAN GAS PRODUCTION FORUM & EXHIBITION - A GASTECH REGIONAL EVENT

- Two days of presentations and discussions
- Free High quality Centres of technical Excellence
- Free John M Campbell Training Courses
- Free Exhibition
- Special rates including accommodation for GPA Europe members

Registration Open and full details available on GPA Europe website

September 18-20

Roxburghe Hotel, Edinburgh, Scotland

30TH ANNUAL CONFERENCE

- Keynote Speech from Fergus Ewing, Minister of Energy for Scotland and discussion on gas in the era of renewables
- Full Day of Technical Papers
- Young Professional Training Programme
- Special Gala Dinner
- Companion's Tour

Registration Open - May 2013 - pre-register on the GPA Europe website now

Sponsorship from ABB Consulting and BASF.
Further sponsorship welcome - contact GPA Europe Administration Office for details.

November

AGM AND TECHNICAL MEETING, LONDON INCLUDING KNOWLEDGE SESSION

2014

Dates and events to be announced - watch the GPA Europe website and monthly newsletters for details

CORPORATE MEMBERS

This listing of current Corporate Members represents the status as at the end of 2012. In addition there were 280 active individual members

Corporate Level 1 - Premier

Aker Process Systems
Amines & Plasticizers Ltd
Atlas Copco Energas GmbH
BASF SE
Bechtel Ltd.
BG Group
BP Exploration Operating Co.
Compressor Controls Corporation
Costain Energy & Process
Dow Oil and Gas Europe
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GE Oil and Gas ESP Ltd
GL Noble Denton
Kellogg Brown & Root
Lurgi GmbH
M-I Swaco Production Technologies
National Grid
Offshore Design Engineering Ltd
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Pall Europe
PECOFacet
Perenco UK
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SIME
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Technip France
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Corporate Level 1

ABB Consulting
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Burckhardt Compression AG
Cameron Ltd
CB&I Ltd
CB&I Nederland B.V.
CECA SA
ENI Div E&P
Evonik Industries
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Grace GmbH & Co. KG
GS Engineering & Construction Ltd
Huntsman (Belgium) BVBA
Johnson Matthey
Koch-Glitsch
MOL Hungarian Oil and Gas Co.
NORIT Nederland BV
Siirtec - Nigi S.p.A.
Sulzer Chemtech Ltd.
Taminco
Techint S.p.A.
Technip E&C Ltd
Tecnimont KT
TNO - Energy
Wintershall Holding GmbH
Xodus Group

Corporate Level 2

BASF Catalysts Germany
Bryan Research and Engineering
Chart Energy and Chemicals Inc
Criterion Catalysts & Technologies LP
Danfoss A/S Oil and Gas
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Enerflex (UK) Ltd
Energy Recovery Inc.
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Exterran (UK) Ltd
FEESA Ltd
Fives Cryogenie
Frames Process Systems BV
G.I. Dynamics
G3
GDF Suez E&P Deutschland GmbH
GEA Heat Exchangers Ltd.
Granherne Ltd.
Hamworthy Gas Systems
Heatric
IMA Ltd.
Inprocess Technology & Consulting Group, S.L.
ISG
Iv-Oil & Gas
John M. Campbell & Co.
Kanfá Aragón AS
M.S.E. (Consultants) Ltd.
Maxoil Business Solutions
Mott MacDonald
Oil & Gas Systems Limited
Optimus Services Ltd
P S Analytical
Peerless Europe Ltd.
Penspen Ltd.
PGNiG SA
Pietro Fiorentini
Procede Group BV
Process Systems Enterprise Ltd
Prosernat
Refrigeration Engineering
SBM Schiedam
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SPT Group
Teesside Gas & Liquids
TGE Gas Engineering GmbH UK Branch
Tracero
Tranter International AB
Twister BV
University of Surrey
UOP N.V.
Vahterus Oy
VTU Engineering GmbH
Weir LGE Process
WinSim Inc
Zeochem AG
Zeta-pdm Ltd
Compact GTL

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Kirk Process Solutions
Matrix Chemicals BV
McMurtrie Limited
MPR Services
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OAG Ventures Ltd
Optimized Gas Treating
Rowan House Ltd
Softbits Consultants Ltd
Zeta Technologies (UK) Ltd.