IN BRIEF

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GAS PROCESSORS ASSOCIATION EUROPE

OASE digilab: Efficiency gain in gas treatment

Fig 1: With the OASE digilab, customers can feed samples of the gas treatment agent from their gas treatment plant directly into the device and receive an analysis of the components within a few seconds.

By Dr. Torsten Katz, Head of Global Technology, Gas Treatment Solutions BASF and Kai Binder, Senior Global IT Manager, Gas Treatment Solutions BASF

BASF's OASE gas treatment team continues to innovate with the recently launched OASE® digilab, a novel process and device for continuous, near real-time monitoring of gas treatment. For customers, this means better quality control and higher efficiency in gas treatment. In combination with the digital platform OASE connect, the planning and engineering of new plants can be significantly improved and accelerated, and the operation of existing plants can be further optimised.

BASF is one of the world's leading suppliers in the field of industrial gas treatment, with more than 50 years of experience to date. The latest technical achievement is the OASE® digilab, developed through the collaboration of the OASE team with the BASF subsidiary trinamiX. OASE digilab facilitates quality control and improves gas treatment efficiency. Thus, the essential solvent components in a gas treatment plant can be continuously monitored. These are important prerequisites for ensuring the desired CO_2 absorption kinetics and CO_2 removal capacity in the plant. Possible corrosion damage can thus be avoided, and the plant can be operated with minimal thermal energy consumption or CO_2 footprint.

Innovation with near-infrared spectroscopy

OASE digilab is based on the analysis of liquids by near-infrared (NIR) transmission spectroscopy. The solution developed by trinamiX consists of a compact NIR spectrometer and chemometric data analysis, which qualitatively and quantitatively determines the composition of samples from the gas treatment plant.

Plant operators can inject the samples from their process directly into the digilab instrument and receive the analysis of the components within just a few seconds. In contrast, wet chemical methods take significantly longer and do not allow the activator content to be determined. In addition, the results are often not very precise.

In contrast, the alternative, more advanced analytical methods used by BASF's laboratories in Ludwigshafen (Germany) and Wyandotte (USA) take considerably more time simply because of the logistics involved. For example, samples first had to be taken from BASF's individual customers and sent to the two BASF laboratories from plants around the globe – so a lot of time passed before the results were available. The new digilab method combines the best of both worlds: It is easy to use, fast and very precise.

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In the past few years, trinamiX has succeeded in decisively miniaturising the NIR spectroscopy process. In addition to the transmission spectrometer, which forms the basis of the OASE digilab, trinamiX also offers a mobile spectroscopy solution for the analysis of solid samples. Thanks to its handy size of only about 15 cm, it became possible to provide customers from various industries around the world with a powerful "lab for your pocket".

Fig. 2: OASE digilab is connected to the digital platform OASE connect. With OASE connect, BASF customers from the gas treatment business field can design the operation of their plants more efficiently.

As with this "small laboratory", the digilab's mode of operation is simple and direct: Samples are taken from the customer's own equipment and injected into the digilab instrument immediately on site. Within just a few seconds, the analysis of the components is available. Customers who use this service can permanently measure the condition of their gas treatment and thus run with the optimum solvent composition.

Digital solutions work hand in hand

OASE digilab integrates with OASE connect, the globally unique digital platform that BASF has developed in recent years. Among other things, it serves to support customers in operating their plants as efficiently as possible. The heart of OASE connect is the planning and simulation tool, which is designed to be particularly simple and clear. Thus, the plant design works in both directions. On the one hand, planning and projecting of new plants can be significantly improved and accelerated, on the other hand, already existing plants can be further optimised in their operation.

In the future, OASE digilab will provide important data for this purpose. All results of the taken samples are stored in the analysis area of OASE connect. In this way, users can access their data at any time. On the other hand, BASF can process the data for the best possible solvent composition to further optimise the technology.

Comparison with reference analytics: OASE digilab provides reliable data

Against this background, diagrams 3 to 5 were generated from the global OASE connect analysis database. The OASE team regularly receives solvent samples from almost all customers worldwide, which are analysed in BASF's own laboratories. Several hundred samples accumulate here every year, originating from the gas treatment plants for natural gas, synthesis gas, from selective, biogas and flue gas treatment.

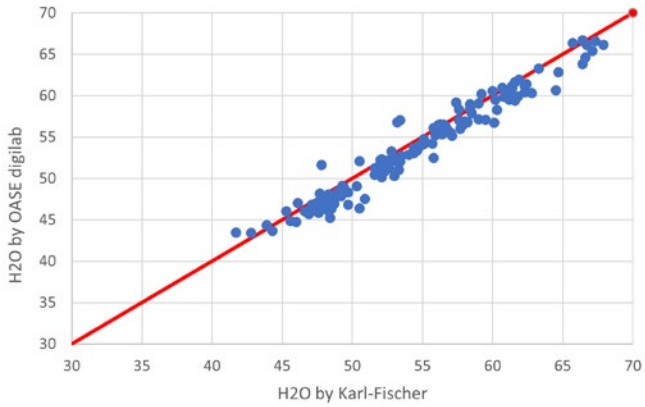

Fig. 3: Water content measurements with OASE digilab (y-axis) and reference analysis (x-axis).

With this work, the OASE team follows a machine learning approach and correlates the obtained result spectra with the results of conventional chemical methods. In each case, the values measured with OASE digilab for water, base amine and activator system are compared with those of reference analytics. For water, the reference analysis is a Karl Fischer titration; for the base amine and the activator system, the methods are gas chromatography. In diagrams 3 to 5, a data point from the conventional analysis and the digilab determination was compared for each OASE white and purple sample available in the database.

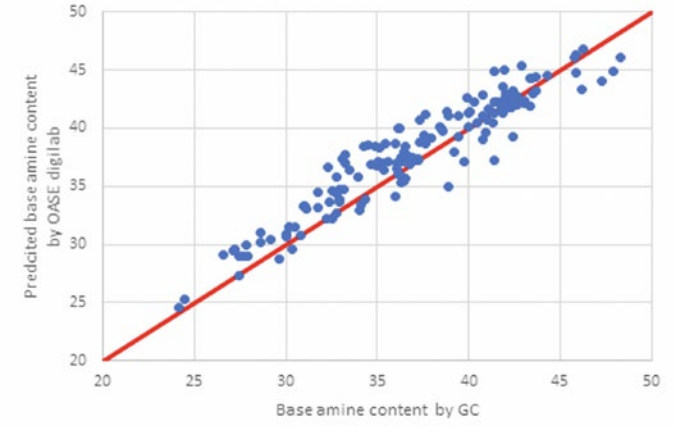

Fig. 4: Measurements of the base amine content with OASE digilab (y-axis) and reference analysis (x-axis).

The evaluation of the results obtained so far shows very impressively a good match between the values obtained conventionally and those obtained with OASE digilab, with all data points ideally lying on the angle bisector of the diagram. The scatter width of the angle bisector indicates the error range – it must be taken into account that both measurement methods have a certain deviation.

Corresponding results are also shown in the curves for the base amine and the activator system. The figures show the digilab values on the Y-axis and the values of the laboratory measurement with the reference method on the X-axis.

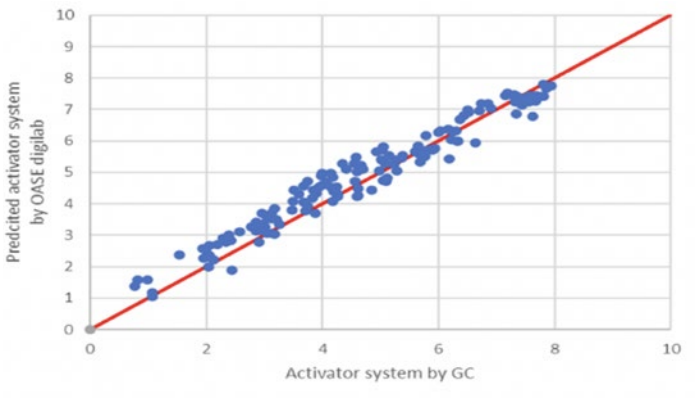

Fig. 5: Measurements of the activator system content with digilab (y-axis) and reference analysis (x-axis OASE).

Good agreement of the measured values also in BASF's own synthesis gas plant

Additional feedback on OASE digilab was collected at BASF's synthesis gas plant at the Ludwigshafen site with another gas treatment unit, where the novel measurement method was used in everyday operation between November 2021 and March 2022. During this time, dozens of samples were taken and analysed for each of the three components: water, base amine and activator system.

Also, in these tests there is a very good match between the values of the OASE digilab and the reference analysis (Fig. 6) – an additional proof of how well the new method for analysing the composition of gas treating agents in the near infrared works. In the future, it should also be possible to determine the CO_2 residual loading of the gas treatment agent via the OASE digilab.

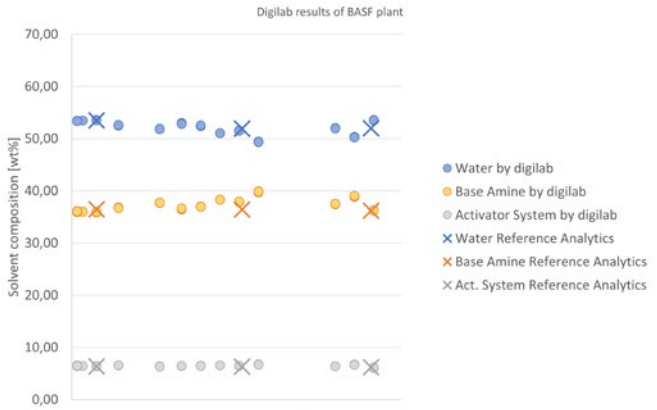

Fig. 6: Comparison of the values for water, base amine and activator content over time, measured with OASE digilab and reference analysis at the BASF synthesis gas plant in Ludwigshafen.

With many years of experience into a new digital gas treatment era

Since the start of industrial gas treatment, which began at BASF more than 50 years ago to remove carbon dioxide from synthesis gas for the production of ammonia, the company can look back on more than 500 reference plants for gas treatment around the globe. According to a report by the New York-based market research company, Reports and Data, the global market for gas treatment is growing at an annual rate of 5.7 percent and is expected to reach a total volume of almost six billion US dollars by 2025.

With the new measurement method, trinamiX and BASF have created a compact solution that provides instant insights into the molecular composition of liquids. As a result, gas treatment, which is essential for the use of a wide variety of gases, is gaining significant momentum. The method is easy to use, fast and safe.

Without in-house NIR expertise, it is possible to perform and evaluate measurements with just three components: using a compact, high-performance transmission spectrometer, cloud-based analytics, and an app for immediate display of measurement results on Windows PCs or smartphones. BASF's digital solution takes gas treatment a good step forward. In the end, even energy and carbon dioxide emissions can be saved via optimal control of the detergent composition.

The BASF gas treatment portfolio includes technologies for the treatment of natural gas, syngas, refinery offgas, flue gas and biogas. Under the brand name OASE, BASF today offers a total of seven highly specific solutions for different gases. The services include, on the one hand, the provision of the various treatment agents required, and on the other hand, the licensing of highly developed plant technologies for gas treatment as well as a wide range of specific services.

Keep an eye out for our next issue when we will be revealing GPA Europe's new corporate identity!

A welcome return for major in-person events

I would like to start by saying how saddened I am by the tragic events in Ukraine, we all hope for a peaceful resolution as quickly as possible. I know many of our member companies have taken bold steps because of the situation, as well as working hard to provide support to staff and colleagues impacted. There are any number of charities offering support such as UNICEF and Mercy Corps; for those who can support then I would encourage you to do so.

The events on our Eastern boarder have given additional impetus to the Energy Transition, with renewable energies (including biogas) not only a way to lower CO_2 emissions but also be a way to provide energy security/independence. It is also encouraging governments to reconsider the use of existing domestic energy sources such as the North Sea and potentially shale gas reserves.

Our members will continue to play a vital role in this space, which I am sure will continue to bring technical challenges and solutions in equal measure. We look forward to hearing about these at the upcoming events.

Speaking of upcoming events, as we finally seem to be moving out of the COVID-19 pandemic, I am really pleased that we can look forward to getting back together face to face at the May Technical Conference in London. We have consciously started with a relatively small event as we recognise after two years away from such events some people may be a little overwhelmed by large gatherings.

Many of you may have seen similar concerns from colleagues as we all return to the office (many of us in some hybrid form), and we need to give each other time to readjust and to feel comfortable.

The May Technical Conference will focus on the "roadmap for the transition" with keynote speakers addressing two of the pillars of the Energy Transition, hydrogen transportation and CCS. There will also be a number of relevant technical papers presented, and the much anticipated to networking sessions.

Planning for our larger Annual Conference, which will be in Paris in November, is well underway, with more detail to be announced in due course.

However, as the various webinars have been such a great success, including the most recent one on hydrogen where we learned not only about producing hydrogen (blue and green) but also about transportation and storage, we will continue to run these webinars.

The next one will be focused on Biogas check out www.gpaeurope.com/events, and if you feel you have something to share on this, or any other topics, then do let us know via **admin@gpaeurope.com**.

As always do check out the monthly newsletter, connect with us on LinkedIn, follow us on Twitter or join us on Facebook. Stay safe have fun and see you soon.

Gary Bowerbank
Chairperson - GPA Europe

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GPA EUROPE BIOGAS WEBINAR

21 OCTOBER 2021

ONLINE SESSION

Moderated by Oliver Carter, Fluor Ltd

This was a session organised by our Biogas KSI Group. Biogas is a key interest area as governments are looking to reduce emissions and secure supplies, and industries are looking to decarbonise. The session focused on biomethane and biogas upgrading technologies.

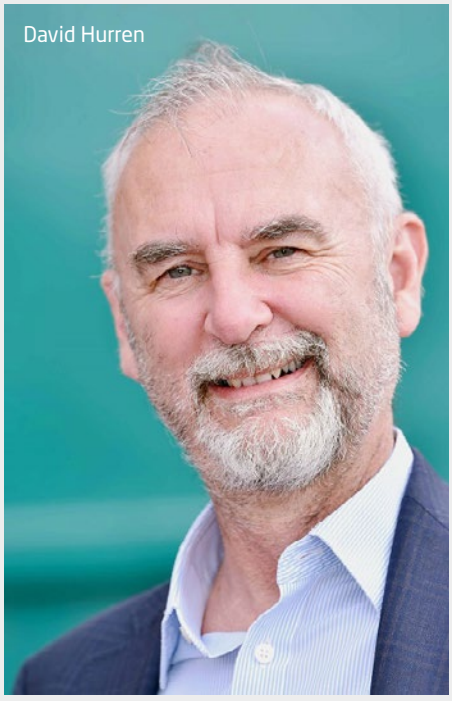
Biomethane has seen significant growth in recent years and particularly in Europe and includes Bio-CNG, LNG and grid supply. Gas from agricultural residues, sludges, waste land and food industry are part of the supply mix and we heard from key speakers from within the industry.

Biomethane Briefing

Our first presentation was by John Baldwin of cng services.

cng services provides design and build for injection of biomethane into gas distribution networks, development of Bio-CNG filling stations and supply to off grid national industrial customers. John provided a Biomethane Briefing and gave an overview of the technical environment and experience from UK with a view on how that might differ from other gas production from biogas in other markets. He also covered how the biogas can be used and packaged into downstream markets.

John Baldwin



David Hurren

Air Liquide, Biogas & Technologies

Our second presentation was by David Hurren of Air Liquide Biogas Solutions Europe.

David provided insights into Air Liquide as a world player in biogas, as well as separation technology, CO_2 recovery and liquefaction. His presentation covered Air Liquide's biogas solutions within Europe. Technology has been proven for upgrading of biogas from Anaerobic digestion. In addition to base upgrading modules, options exist for CO_2 recovery and liquefaction of the produced biomethane to create Bio-LNG. It is essential to understand the biogas purity and desired product purities and then the expected loading rates/variations of demand on the plant.

Walid ElMoudir

Application of Delta Technology in Treating Biogas Stream & Coal Bed Methane Gases

Our final presentation was by Walid ElMoudir of Delta CleanTech Inc.

Delta CleanTech has developed an acid gas removal system under name of Low-Cost Design (LCDesign®) technology, which can be designed to remove CO_2 and H2S from biogas streams or the post-combustion flue gases streams. Two design exercises have been conducted based on treating a biogas stream in Canada and coal bed methane gas stream in China.

A rate-based modelling approach was implemented in the design using commercially available solvents, enhanced process configurations, and optimum operating parameters to achieve the production capacity at minimum capital/operating expenditures. The presentation highlighted how the clean-up targets and the production capacity are met in both projects' targets.

A modular design approach had been adopted that provides several advantages: Fabrication in a controlled environment, a cost-effective way to transport, a small footprint, flexible equipment arrangement, easy site installation and commissioning, and an accessible layout for operation and maintenance.

GPA EUROPE VIRTUAL TECHNICAL CONFERENCE

18 NOVEMBER 2021

ONLINE SESSION

Moderated by Samantha Nicholson, Flour Ltd

The session had fascinating insights into cutting image work. From carbon dioxide capture from hydrogen manufacturing unit looking at cost benefits of pre and post combustion capture; next generation of fixed bed gas purification; brazed aluminium heat exchangers and Cryogenic Carbon Capture™ which captures and liquefies carbon dioxide to use in industrial exhaust gases; and finally to the phenomenon known as reflux or retro-condensation and how they are trying to counter this.

Gary Bowerbank

Carbon dioxide capture options for steam methane reforming based hydrogen manufacturing units

Our first presentation was by Gary Bowerbank of Shell Global Solutions.

Does your refinery or chemical plant have a Steam Methane Reforming (SMR) based Hydrogen Manufacturing Unit (HMU)? Are you under pressure to meet your carbon dioxide emissions mandate?

Growing numbers of national governments and energy companies, including Shell, are announcing net-zero emission ambitions. To help fulfil their responsibilities under the 2015 Paris Agreement on climate change, governments around the world are increasingly likely to penalise CO_2 emissions.

Consequently, refiners and chemical plants have mandates to reduce their CO_2 emissions substantially. For this, carbon capture, utilisation and storage is widely regarded as one of the most effective decarbonisation solutions.

An SMR-based HMU provides a major opportunity because it creates significant CO_2 emissions that can be captured in two main ways:

1. From the high-pressure, pre-combustion stream after the shift reactor before pressure swing adsorption line-up. This recovers less CO_2 but has a lower capture cost per tonne of CO_2.
2. From the low-pressure, post-combustion flue gas. This maximises the amount of CO_2captured but requires a more expensive unit needing more space.

This presentation examined the key elements of a typical HMU and explain the options for CO_2 capture; conducted a cost–benefit comparison of installing pre- and post-combustion technologies at a typical HMU; and provided a real-world example from the Athabasca oil sands project in Canada, where Shell is capturing more than 1 Mt/y of CO_2 from SMR streams and generating valuable lessons for future projects.

Natural gas fuels the energy transition

Our second presentation was by Dr. Paul Hudson of Johnson Matthey.

Climate change, the COVID-19 pandemic, and the global drive to be greener have accelerated the move away from using fossil fuels to fulfil energy demands. Achieving this transition as a step change to net zero poses huge difficulties, however, transitioning from coal and oil to natural gas is widely seen as a logical step on the path to lower carbon energy.

Increased utilisation of natural gas over coal and oil will reduce CO2 emissions but must be done safely and without increases of other pollutants including H2S and mercury. Fixed bed gas purification has been enhanced and developed over many years but what is achievable with the next generation of fixed bed absorbents? Can existing plants be upgraded without capex? Can new plants be designed for increased efficiency of mercury and sulphur removal with lower capex and opex? And can waste be reduced and handled in an environmentally conscientious manner?

Paul Hudson

GPA EUROPE VIRTUAL TECHNICAL CONFERENCE
18 NOVEMBER 2021

ONLINE SESSION

How the unique characteristics and application of brazed aluminium heat exchangers are driving us towards a lower carbon energy future

Oliver Knight

Our third presentation of the session was by Oliver Knight of Chart Industries.

Brazed aluminium heat exchangers (BAHX) were adapted for industrial use from the aerospace industry shortly after World War 2. Today tens of thousands are at the heart of the cryogenic processes separating air, liquefying and processing natural gas and in propane dehydrogenation and ethylene cracking. They are highly prized as they represent the most compact and efficient heat transfer solution for gas/gas and gas/liquid duties.

As the world moves rapidly towards a lower carbon energy future, BAHX are already taking centre stage in many of the processes driving this change. They are fundamental to many of the liquefaction processes enabling small- and mid-scale LNG, including bio-gas liquefaction, and they're proven offshore in FLNG and on-board boil-off gas recovery systems.

BAHX have been used in hydrogen liquefaction for years and are a crucial part in the development of larger capacity liquefaction plants. Liquid air storage utilises air separation technology so it's natural that BAHX are central to LAES plants and Cryogenic Carbon Capture™ is an extremely exciting process that captures and liquefies carbon dioxide for use from industrial exhaust gases.

Understanding and identifying reflux in Ng dehydrators through CFD

Our final presentation was by François-Xavier Chiron of Axens and Alessandro Checchi of Resolvent.

Drying natural gas is a mandatory step in a natural gas process unit, aiming at producing LNG. Strict specifications on water prior entering the cold box (typically 0.5 to 0.1 ppm volume) impose the use of a dual bed composed by optimised alumina followed by molecular sieves. The desiccant is loaded in fixed beds that alternate between adsorption (drying downflow) and regeneration (heating upflow). That process is known as Temperature Swing Adsorption or TSA.

Drying is conveniently carried out at ambient temperature where water molecules are physisorbed (Van der Waals bonds) onto the molecular sieve. After a pre-determined duration, the water-saturated dryer is put into regeneration mode where the aim is to remove water from the desiccant by elevating the temperature with a hot gas stream.

Alessandro Checchi

When the adsorbent temperature reaches some 110-130 °C, water desorbs from the desiccant and is entrained along the vessel together with the regeneration gas flow. The regeneration conditions have to be carefully looked at since this transient operation brings the adsorbent material from ambient temperature to 280-290°C within a few hours.

A well-known operational issue linked to the regeneration, is the condensation of water during the first moments of regeneration, on colder parts of the vessel. This phenomenon is known as reflux or retro-condensation. Liquid water can run along the vessel walls, fall onto the molesieve bed and destructure the binder that holds the zeolite crystals together, resulting in lump formation, pressure drop and premature molecular sieve change-out.

In that frame, Axens and Resolvent worked together on setting-up a CFD model that predicts the risks of condensation during the regeneration of such dehydrators. The model is developed using COMSOL™ and it is based on both industrial data and laboratory kinetic studies related to desorption of water on Axens' 4A molecular sieve.

The model solves heat and mass transport coupled to the desorption reaction across the whole geometry and detects the risk of condensation. The whole regeneration cycle has been simulated where the hot gas is entering the system and heat up gradually the bed. In the first moment of the regeneration, the bottom is hot while the top of the bed is still cold.

The risk of condensation is therefore greater at the top of the vessel and depends on the vessel insulation as well as on the distribution of the water along the bed during the adsorption phase. Several cases were investigated with a focus on the impact of the bed ageing on the risk of reflux and demonstrated as part of this presentation.

GPA Europe Chairperson's Annual Report 2021

By Gary Bowerbank, Chairperson, GPA Europe

Ladies and Gentlemen, friends and colleagues, welcome to the 2021 Annual General Meeting of GPA Europe Ltd.

Our event year started with another six 90-minute virtual events offered free to our GPA Europe members.

The topic of our first two-day virtual conference, Future of Gas, could not have been more relevant with announcements at the time involving many of the major IOCs that clearly show a desire and need to embrace the Energy Transition and lower society's Net CO_2 Footprint. In the conference we touched on some of the main leavers at our disposal; hydrogen (blue, green and a few new colours), CCSU (the need to lower costs and demonstrate it is sustainable) and biogas (a perhaps under-utilised resource).

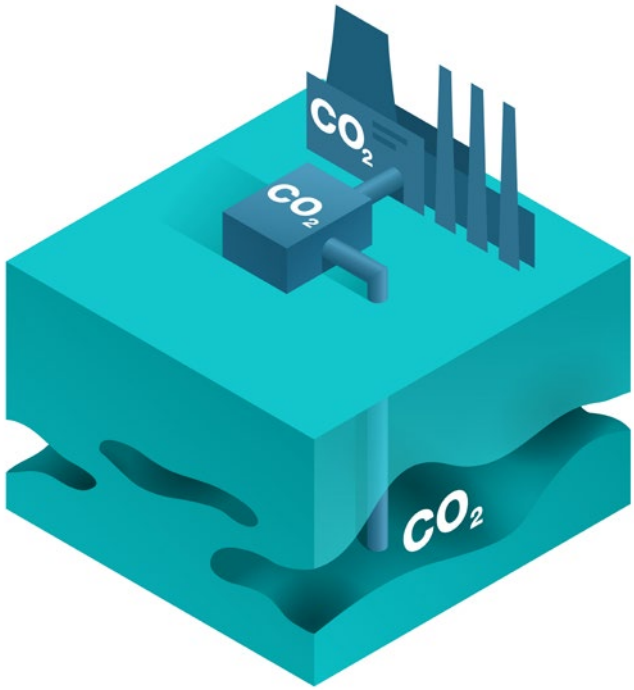
We kicked off both days of the conference with a keynote address.

David Simmonds, former GPA Europe Chairperson opened day one of our conference and presented on Future Energy - Challenges for the Regulator.

Jean-Francois Cam, Integration and Stakeholder Manager from Equinor kick-started day two and gave a talk on Northern Lights – developing the world's first open-source CO2 transport and storage infrastructure.

Our workshop opened with grounding presentations on an overview of the European gas industry by Adrienne Blume from Gulf Energy Information and a look at the Shell Energy Transition Scenario by Ren Xianfang from Shell.

There was a clear takeaway from these presentations that we all understand there is a need to reduce CO2 emissions. How quickly we get there and what level we get to be up for debate and all these scenarios and projections will take us in different directions. For our industry, it is clear that in the short to medium term there is a strong demand for natural gas.



The workshop threw up more questions than answers...

Some common themes from all teams transpired:

- Collaboration across sectors, suppliers/contractors, regulators etc.
- Public perceptions/awareness (CCS, H2, CO_2, neutral LNG).
- Recognise we have gaps in our own knowledge.

The future of gas is quite a challenge, the world's population is continuing to grow, and we are already seeing a rise in energy demands. Companies within the gas processing industry are having to adapt to this, their business models, products, and services.

This conference gave us insight into interesting areas which are not the traditional gas processing focus.

We have seen how Europe is leading the way in hydrogen – cutting edge of the energy transition. Something we can hopefully take back to our GPA Chapters. We also saw big learning curves within the biogas session with technical challenges in terms of scale up, processing sections which needs to be required and treating. An area we can really develop going forward.

In recent months we have seen the importance of our industry being highlighted in both the escalating costs of wholesale gas prices as well as the impact we can have on the Net Zero targets. By working together, learning from each other, and investing in the right areas I am confident we can meet the energy demands of the future without compromising the present. At GPA Europe we continue to enable this by connecting the tradition gas processing sectors with the emerging future energy businesses.

October saw the first of our new energy webinars which we will continue throughout 2022. This was a half-day webinar organised by our KSI Biogas New Energy Groups. Interesting sessions on biomethane, setting the scene for next year where we aim to inform and educate our members.

A look ahead to next year. We will continue the virtual webinars and we see those linked to the future energy themes and they will continue throughout the year. Next year we will then aim to have two in-person events. Industry staple events are starting to happen around the world, so we remain optimistic that these can go ahead.

Our Key Strategic Initiative Groups continue to be extremely active; we aim to bring you more virtual webinars in 2022; we have the new Specialist Directory (to help our members connect to each other), as we continue to work through our targets developed within our Roadmap.

So do keep checking the website and follow GPA Europe on LinkedIn to keep up to date with all the events and activities.

I would like to thank you all for your continued support of our organisation. Without your membership and attendance at our conferences, the organisation would not exist, and the industry and our world would be worse off for this.

My final thanks goes to the Management Committee of GPA Europe. All of these people are volunteers and willingly give up their time so that the organisation exists. It's not easy to fit all of the work required to do this in with a day job, family time and personal time – the industry is not slowing down and everyone is extremely busy. Thank you ManComm.

Gary Bowerbank Chairperson - GPA Europe

GPA EUROPE CARBON CAPTURE, UTILISATION & STORAGE WEBINAR
17 FEBRUARY 2022

ONLINE SESSION

Moderated by Hamish Blackwood, Fluor Ltd

A session organised by our CCUS KSI Group. The webinar discussed experiences and developments in carbon capture, utilisation and storage. Our presentations covered topics including operational experience from existing CO2 capture facilities; CCUS technology developments; and updates from European CCUS hubs

Richa Bhusan

Zero steam carbon capture designs?

Our first presentation was by Richa Bhusan of Shell Technology Centre Bangalore.

Along with companies, cities, and financial institutions, more than 130 countries have now set or are considering a target of reducing emissions to net zero by mid-century. Hence, adopting waste heat gas recovery, cogeneration technologies or low carbon electricity is needed to transition to industrial energy productivity breakthroughs. Projects need to optimise the power to steam demand ratio depending on project specific OPEX metrics.

There are decades of experience of successfully operating and designing amine treating units in the industry and the objective of this presentation is to discuss pathways to reach absolute minimum steam demand for pre-combustion carbon capture (ADIP-ULTRA) units. These pathways leverage concepts on smart integration of amine flows with heat and power recovery options. The tipping point for projects may vary, however Richa's presentation showcased tools and handles to achieve the optimisations of power and steam.

Risk mitigation in carbon capture technology design with the ACC™ Mobile Test Unit

Our second presentation was by Dr Ricardo Wanderley of Aker Carbon Capture.

Ricardo Wanderley

In order to reduce risks in full-scale carbon capture facility development, pilot testing on specific flue gases has proven to be a key enabler to mature Aker Carbon Capture's ACC™ technology. Flue gas characteristics, such as CO_2 concentration and specific impurities, are unique to each specific industrial plant, even within the same industrial sector. It is important to understand how these characteristics influence the process design of a carbon capture plant in terms of solvent degradation and emissions for example, in order to build efficient, low cost, and low risk full-scale carbon capture plants.

ACC's Mobile Test Unit (MTU) has been applied at various industrial sites for the purpose of qualifying flue gases for carbon capture.

The MTU proved to be a valuable asset for competence development, process optimisation, and risk mitigation. Results from MTU campaigns were a key input to technology development, both for small, standardised designs (Just Catch™) and for larger bespoke designs.

These campaigns enabled ACC to experiment with novel solvents, refine our technology, and better define process parameters. This presentation focused on the design of the MTU, some of its remarkable deliverables, and how the MTU helped shape the ACC™ process and our confidence in our technology.

Deploying hot potassium carbonate process for post combustion CO2 capture

Our final presentation was by Chet Biliyok of Petrofac Facilities Management Ltd

Stockholm Exergi (SE) is developing a full-scale bio-CCS plant to annually capture >800,000 tonnes of emitted CO_2 from the 375MW biomass fired KVV8 combined heat and power (CHP) plant at Värtaverket in Stockholm. The extracted CO2 is subsequently shipped out under cryogenic conditions for permanent storage to create a carbon sink. To deploy a process at KVV8 that captures a minimum of 90% of the CO_2 emissions, several factors are considered, such as operational cost and efficiency; integration requirements; health, safety & environment (HSE); layout/space and construction requirements; CO_2 offtake approach, among others.

Subsequently, Stockholm Exergi selected a hot potassium carbonate (HPC) solvent-based CO_2 removal process as the preferred post-combustion CO_2 capture technology to be implemented and retrofitted onto KVV8. HPC-based CO_2 removal processes have been successfully deployed for decades in various industries, such as in gas sweetening and steam methane reformers, but has not been applied to flue gas streams at large scale.

In Q2 2021, Petrofac was awarded a front-end engineering design (FEED) study for a large scale HPC CO_2 capture integrated to the CHP plant, along with CO_2 compression, dehydration, liquefaction, storage and offloading. The design of the CO_2capture unit has an innovative heat recuperation to maximise the efficiency of the CO_2 absorption and desorption from flue gas while using a safe, readily available and non-hazardous solvent that does not degrade or produce harmful emissions.

In completing the FEED study, Petrofac encountered and addressed several challenges related to equipment scale-up, heat integration and plant layout, and we are able to demonstrate that such a HP CCO_2 capture can be deployed at scale and retrofitted without significant disruption to the host plant operations and mechanical integrity, while also satisfying crucial project requirements such as efficiency and HSE.

GPA Europe Key Strategic Initiative Groups

Our Key Strategic Initiative Groups are working hard behind the scenes to support with actioning out our Key Strategic Initiatives:

1. Develop a value proposition tool adaptable to all members
2. Develop targeted marketing strategy and support with relevant tools
3. Develop a plan to address future energy/gas markets
4. Develop a training strategy to address members' development needs

Meet the Teams
Future Energy

David Simmonds
(retired)

Fluor
Hamish Blackwood

BP
Boris Ertl

Advisian Group
Stephen Lamport

Amine Experts
Philip Le Grange

Fluor
Samantha Nicholson

McDermott
Philip Walsh

Meet the Teams
Marketing

Kelvion UK
Paul Hopkinson
Team Lead

Shell Global Solutions
Gary Bowerbank

Dow Europe GmbH
Adriano Gentilucci

Petrogenium
Alex Woldhuis

Meet the Teams
Training

Worley
Fiona George

Kelvion UK
Paul Hopkinson,
Team Lead

Amine Experts
Philip Le Grange

Equinor
Sigbjørn Svenes

In each future edition of InBrief we will provide you with an update from one KSI team. For regular updates please see our website where we will be creating a new area for all details on the KSI teams' work. We will post details on LinkedIn and our newsletter over the coming months.

KSI Team Update: Marketing

We are delighted to announce that we are live with our Company Specialist Directory, https://gpaeurope.com/specialist-directory

The purpose of this area is for our GPA Europe Corporate Member Companies to list themselves and key specialist areas. All GPA Europe Members can access this area and search/filter on specialist areas and be able to contact the relevant company representative via email or phone.

If you are interested in being listed within this directory, please contact us at admin@gpaeurope.com or on +44 (0) 1252 625 542.

Be part of the discussion

We will be continuing the work started by our Key Strategic Initiatives Groups. If you are interested in being part of a group, or would like more information, please let us know at admin@gpaeurope.com.

FORTHCOMING EVENTS

GPA Europe in 2022

Be part of our conferences promoting a new energy future and the transition of our industry towards that future. We are looking for stories about the development of technology and best practices affecting natural gas processing. As well as a look at Hydrogen, Biogas, Ammonia, Carbon Capture and Storage, and LNG amongst others, to inspire the gas processing community.

Virtual Webinar – "Biogas"

22 September 2022

Annual Conference, Young Professional Training Day & AGM

14-16 November 2022
Paris, France

A conference and networking event organised by GPA Europe.

What's on?

- Free Young Professional Training Day
- Technical Conference
- Workshop
- Keynote Address
- Executive Panel
- Social Activities
- Our company's AGM

Call for Papers

Our Call for Papers is now open.

Do you have a story to tell?

All we need is a 100-200-word abstract. Tell us what your idea is and why you think it is special. Send your abstract - Title, Author to admin@gpaeurope.com

It will be reviewed by our Technical Committee and, if accepted, we can help you to develop it into a technical paper and presentation.

All speakers have the chance of winning our Best Paper Award.

FOLLOW US ON SOCIAL MEDIA FOR ALL THE LATEST NEWS

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@GPAEurope

@gpa-europe-ltd

CORPORATE MEMBERS

This listing of current Corporate Members represents the status at 1 May 2022.

Level 1 Members

Air Liquide Global E&C Solutions Germany GmbH
Aker Solutions Ltd
Amines & Plasticizers Ltd
Atlas Copco Energas GmbH
Axens
BASF SE
Bechtel Ltd.
BP Exploration Operating Co. Ltd.
Cameron Flow Control Technology (UK) Limited
CB&I Ltd
Celdes s.r.l. fob Saipem
Costain
Dow Chemical Co. Ltd
ENGIE - CRIGEN
Equinor
Fives Cryo
Fjords Processing France SAS
Fluor Ltd.
Gassco AS
GL Industrial Services UK Ltd
Grace GmbH
Iron Mountain Slovakia s.r.o
Johnson Matthey
Kellogg Brown & Root
Oil & Gas Corrosion
Pall Europe
Parker Hannifin - PECO
Petrofac Facilities Management Ltd.
Schlumberger Purification Solutions
Shell Global Solutions International BV
SIME
Spirax Sarco
Technip France SAS
Tecnimont S.p.A
TOTAL SE
Uniper Technologies GmbH
William Blythe Limited
Wintershall Dea GmbH
Wood Group UK Limited
Worley

Level 2 Members

Aragon AS
Axiom Angewandte Prozesstechnik GmbH
BASF Catalysts Germany GmbH
Chart Energy
Hatch
Iv-Oil and Gas
KBC Process Technology Ltd.
Kelvion Ltd.
Liquid Gas Equipment Ltd
MySep Pte Ltd
Oil & Gas Systems Limited
Orbital Gas Systems Ltd
Paqell B.V.
PetroSkills|John M Campbell
Process Vision Ltd.
Rotor-Tech, Inc.
SBM Schiedam
Sulzer Chemtech Ltd.
Technip E & C Ltd
Teesside Gas & Liquids
TGE Gas Engineering GmbH UK Branch
Tranter
Vahterus Oy
VTU Engineering GmbH
Zeochem AG

Level 3 Members

Abbey Industrial Sales Co Ltd
Gas Liquids Engineering Ltd
Gasconsult Ltd
Kirk Process Solutions
MPR Services
Optimized Gas Treating
Petrogenium
Phillip Townsend Associates Ltd.
SDS Separation Technology B.V.
Sulphur Experts
Thermasep
Upstream Concept Engineering

Academic Members

Hydrocarbon Processing
University of Bradford
University of Surrey

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