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THE INDUSTRY'S CASE FOR THE RENATIONALISATION OF CONSUMER ENERGY MARKETS

By David Simmonds

Nationalisation of utilities is considered political dogma. However, through this short thesis I would like to reason the case for nationalisation of our energy supplies from an industry perspective.

Of course, the GPA's primary interests are with gas supplies but, as much of today's power is still fuelled by natural gas, the rationale is extended to the power sector.

I will start with the original case for privatisation which in the UK commenced in the mid 1980s[1]. This happened after the major project to convert the gas network from coal gas to natural gas in the late 60s/early 70s, when gas supplies were operated under 12 Gas Boards, coordinated by the Gas Council. In 1972, British Gas was formed, bringing all the Boards under one entity.

The privatisation of British Gas in 1986 saw more change, much of which has brought significant benefit to the industry and the consumer. However, the business and regulation models which have evolved across Europe over subsequent years are now being severely tested by the sanctions levied against Russia. Supplier business models are breaking down, and indeed we have seen corporate failures.

However, we now need to look beyond today's troubles and consider the way ahead through the energy transition and, where appropriate, learn from experience.

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INSIDE

The original case for privatisation and its outcome

By the 1980s, the stature of British Gas had grown significantly to become a vertically integrated monopoly, operating from production, through transmission and distribution, to sales and service. Along with other utilities, Margaret Thatcher saw gas as ripe for privatisation, especially as British Gas's upstream position placed it in direct competition with other gas producers.

Privatisation would break down the market and, politically, it would reduce the bargaining power of the workforce and deliver short term cash to the Treasury. Through the 1986 Gas Act, Thatcher privatised British Gas into public ownership, BG Plc, as part of the 'Tell Sid' campaign.

A 1999 OECD report on privatisations[2] went on to remark *'As a sector of the economy, utilities are quite significant. Often their value-add accounts for a preponderant share of the GDP, and infrastructure investments account for an even larger portion of total investment. Their importance is, however, mostly due to their pervasive role as an input to all other industries.'* Yes, competition would help industry too!

Nonetheless it took many more years to restructure BG Plc to allow it to be fully broken up and, for privatisation to work fairly, it was necessary for the Government to develop a raft of compliance regulations. Indeed, it was not until 1997 that BG Plc's Gas Sales, Gas Trading, Services and Retail businesses were demerged as an entity under Centrica.

It took a further three years to split the remainder of BG Plc into two entities, BG Group and BG Transco, to create separate Upstream, Midstream and Downstream companies. There were two exceptions. Firstly, Centrica had been allowed to keep the Morecombe Bay production facilities as, interestingly, it was anticipated that it would not be sustainable just as a sales and service company. Secondly, BG Group retained all the international assets of BG Plc, be they production, distribution, or sales, as this provided continuity in the management of those assets[3].

For a number of years there was limited impact as Centrica continued to control the majority of the UK domestic market. Indeed, the Ofgem chart below[4] shows that, in terms of numbers of suppliers, competition in the market only took off ten years later. For the gas market this coincided with the increasing gas fungibility and, at least in the UK, the construction of LNG import terminals, and gas becoming a global commodity.

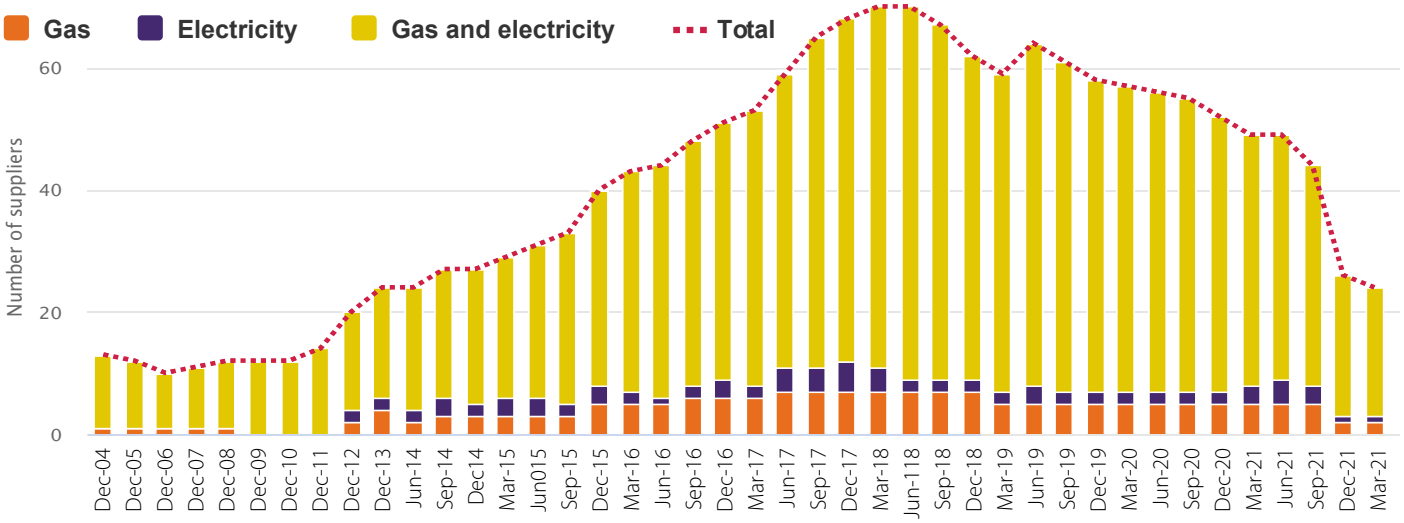
Margaret Thatcher

New domestic energy supply businesses were established on the back of the free market, looser regulation, and ability to raise cheap finance. In Europe this coincided with the expansion of gas supplies from Russia which appeared to be without limit.

As with all markets though there is a limit to the number of potential players, and 2018 saw the number of UK suppliers peak at almost 90! Another feature over the same period was the push for gas to drive power generation, as it provided a cleaner alternative to coal and, in Germany, an alternative to nuclear.

Number of active domestic suppliers by fuel type (GB)

Source: Ofgem analysis of distribution network operator (DNO) and Xoserve reports



[1] https://en.wikipedia.org/wiki/British_Gas [2] https://www.oecd.org/daf/ca/corporategovernanceofstate-ownedenterprises/1929700.pdf

[3] https://www.theguardian.com/commentisfree/2012/mar/29/short-history-of-privatisation [4] https://www.ofgem.gov.uk/energy-data-and-research/data-portal/retail-market-indicators

Having joined BG Group at the time of the final demerger I witnessed first-hand the relative success of BG Plc's devolved businesses; this can be assessed through considering their respective share growth. Inheriting the upstream/overseas assets from BG Plc, BG Group's stock grew almost four-fold over the ten years to 2010, while Centrica's stock grew just 50% over the same period.

The midstream company, BG Transco, saw little stock growth and merged with National Grid in 2002. BG Group, the upstream asset, realised the greater potential; even its own international downstream assets were slowly sold off over the years. During the period of enhanced competition post 2010, Centrica has seen its share price drop to well below its 2000 valuation. Downstream assets have consistently delivered low rates of return.

Over the last ten years the real winner has been the consumer for, with the increased number of suppliers, customers have been able to pick and choose. Consumer prices remained low especially once global gas prices retreated from their peak in 2014/5. The UK market saw a small shake-out of suppliers post that 2018 peak, but it took the threats of cuts to Russian supplies and the price hikes in 2021 to commence an avalanche of failures, so that today the UK is left with only around 20 providers.

Other European countries encouraged similar competition but did not see the same growth in number of providers. State entities have retained market share in many countries and some of the more successful UK energy providers are owned by European entities, including EDF (France), Scottish Power (Iberdrola, Spain) and E.ON (Germany).

Indeed, France is still dominated by its state gas and electricity suppliers, enabling it to better manage prices. EDF is already 84% state owned, while in Germany the state is looking to take a controlling interest in Uniper[5].

Looking wider, particularly to the US where the GPA is very active, each US State has its own rules and levels of regulation/competition vary[6] , but there is nowhere near the free-for-all we have seen in the UK. Yes, there are over 450 local gas distribution companies, but these own/operate their local gas pipeline network for the purpose of delivering gas to customers behind its system; they have more 'skin in the game'.

Today, if you ask gas producers as to their confidence in their downstream assets, the wholesale market to consumers, I am sure the majority will say that they are only in there to support their upstream assets. Yes, the real value is upstream, and that is why Governments are looking to these for windfall taxes.

A case for nationalisation of gas suppliers

Firstly, it useful to understand what suppliers offer: they sell a commodity which is produced and delivered by others; they do not modify or alter the commodity. Their *raison d'être* has been underpinned by a business model which enables them to buy gas cheaply on the wholesale market and sell it on to consumers under term contracts.

Yes, most of us bought our energy on one- or two-year fixed contracts, and suppliers hedged their supplies to match. Their business model is purely financial, and relied on an oversupply in the marketplace.

A few years ago, the UK Government introduced a price cap to protect consumers, so term offerings were designed to competitively beat the cap. Recently this model has been tested, for while multiple suppliers are good for consumers, those same suppliers must compete in the wholesale market. I would go further and suggest that the excess of suppliers has exacerbated recent pressure on wholesale prices.

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[5] https://www.thetimes.co.uk/article/uniper-to-seek-state-takeover-cqm8z5qhc

[6] https://www.epa.gov/green-power-markets/us-electricity-grid-markets#retail

With today's high global gas prices this model has collapsed further, and the UK and other Governments have been forced to protect domestic and business consumers by setting an artificially low cap. There is no differentiation between suppliers' offerings, and comparison websites have stopped operating in this area[7]. The UK Government's recent announcement to reimburse suppliers above the price cap means that they must now negotiate with each supplier. As a consequence there is no incentive for suppliers to seek long term deals in the marketplace, especially as their customers are no longer on term contracts.

Practically, the onus has turned to Government to secure supplies to minimise exposure to the market. This breaks down the modus operandi of the market model and provides a let out for financially strapped suppliers, with even more cost to the State! [8]

The next question which needs to be asked is, for how long will the current situation last? If it is for just a few months, then we can soon revert to the original business model/regulation framework. However, it is very likely that sanctions against Russia will extend for a significant period, if not indefinitely. As they are now funding the cap, Governments are urgently looking for alternative supplies. But, as we in the sector are aware, new production cannot be turned on like a tap.

An extended breakdown of the consumer market and Governments' exposure to wholesale gas prices leads me to recommend nationalisation of both gas and power supplier markets. The rationale is as follows…

- The two markets are intimately linked; gas is still the balance provider for power generation, and most suppliers offer both services.
- There is no consumer choice when prices are capped.
- Wrapping up all consumer demand into one bundle would allow Governments to seek improved longer-term deals in the wholesale market, and indeed can leverage the threat of further windfall taxes.
- Governments can avoid further complex supplier compensation and bailouts; especially as more smaller suppliers are likely to fold.
- Opportunity for consumer billing and supplier management team cost savings.
- Industry resources can be focused on alternative energy supplies and the energy transition.

There will be costs, but, given historic low returns in the downstream market, these should be relatively low. Nationalisation could also include networks, but I see no reason to advocate this, for they are already managed and recompensed through effective regulation.

Of course, this is an issue for today's politics, and I don't want to be supporting one or other side of the political divide. I believe the benefits are clear cut from industry, consumer and government perspectives. However, let me finally extend the rationale by also looking at the 10- to 20-year time frame for our energy supplies, as energy transition plans will see significant changes to the two markets.

Power markets will change as more renewables are brought online, usually under fixed price 'contract by difference' agreements. Further there is active discussion around the need to price power regionally to reflect installation of local wind turbines, solar farms or even hydro-storage. Many are looking to local supply/demand pricing models, such as is prevalent in the US, and these will be challenging to implement with the multiple nation-wide supplier model.

For gas networks we can anticipate a transition from natural gas to clean hydrogen over the next 20 years. This will take as much if not more planning than that for the 1960s coal gas to natural gas transition. Again, the current model will act as a barrier, as suppliers compete for what initially at least will be a scarce resource. If we want a future for hydrogen, we need to be cognisant of the barriers, and learn from the success of the previous transition.

The GPA supports all players in the gas sector, but the current challenges drives through its heart; there are difficult decisions to be taken. While privatisation has delivered much for the industry, today's and tomorrow's challenging energy market can be successfully tackled through a strategic reset.

[7] https://www.comparethemarket.com/energy/gas/?_gl=1*3q99dr* up*MQ..&gclid=CjwKCAjwm8WZBhBUEiwA178UnPyjuwSFRkIvnD2hIK8XMQMGruapLd39AlUiryG0rtAM0duJpSxGVRoCSMkQAvD_BwE&gclsrc=aw.ds

[8] https://www.thetimes.co.uk/article/energy-support-plan-took-ovo-off-danger-list-l2lql5mnt

GETTING BACK TO 'NORMAL'

By Gary Bowerbank, Chairman, GPA Europe

Many of us have spent most of 2022 getting back to 'normal', if anyone can say what normal is these days.

Gary Bowerbank

It has meant that most of us have returned to the office, even if in a hybrid fashion and we have been able to come together at seminars, conferences and various other business engagements. As well as of course, being able to interact socially away from work and finally go on those long-planned vacations that were postponed in the last few years.

Throughout the year I have been reflecting hope we can take many of the forced learnings that COVID-19 thrust upon us. Personally, from a day-to-day point of view, those days I work from home are far more productive than those spend running from meeting to meeting in the office.

Although I do also see the value in being in the office, having those connections to those outside of your routine network and most importantly coaching junior staff. The other new normal, seems to be the ever accelerating pace of change. This is not only with the Energy Transition themes, but also the Energy Security for our countries. I see all our member companies playing a key role both of these areas. Here at GPA Europe, we continued to engage the community on these topics by continuing the well-received webinars covering Hydrogen, CCUS and Renewable Gas.
Do remember, that these presentations remain free to watch for our members.
https://gpaeurope.com/category/presentations

These topics will also be front and centre in the Annual Conference, which is back to being a face to face gathering this year, which is being kindly hosted at Technip Energies' offices in Paris in November 2022. For those who won't be able to make it, much of the material will be available to our members via **https://gpaeurope.com/library** and there will be a full round up in the next *In Brief*.

Speaking of the next *In Brief*, it is worth mentioning that in the next issue this section will be written my successor Myrian Schenk – who takes over as Chairperson in November 2022. It has been an honour to be chairperson for the last two years, and I am very proud of how the whole of the GPA Europe community came together and adapted to the challenges we have faced. This includes the Technical and Management committees, the members of the various Key Strategic Initiatives groups and last but not least our excellent Executive Administrator Helen (the glue that really holds this together). I will continue to be active in GPA Europe, I really feel it has a role to support the industry now and well into the future and look forward to seeing many of you at future events.

Stay safe and have fun!

GPA EUROPE HYDROGEN WEBINAR

A session organised by our Hydrogen KSI Group.

The webinar covered the four different aspects of hydrogen economy: blue and green hydrogen processing, transportation and storage. The event was moderated by Adriano Gentilucci, DOW.

First presentation – Nitesh Bansal, Haldor Topsoe

Blue hydrogen: The decarbonised hydrogen

Nitesh Bansal

According to IEA, the annual hydrogen production accounts for 3% of global CO2 emissions. As such, there is a need to decarbonise hydrogen production. However, the potential role that hydrogen can play in the net zero carbon economy is much higher as it can decarbonise other sectors as well by becoming a preferred energy carrier, either in pure form or by being converted into other energy carriers. Hydrogen Council estimates that H2 production will increase 8-10 times by 2050, emphasising the need for decarbonising H2 production.

Hydrogen is traditionally produced by steam methane reforming using fossil-based feedstocks such as natural gas, LPG or naphtha. Hydrogen production from fossil sources without CO2 capture is termed 'grey hydrogen'.

To unlock the full potential of hydrogen in the energy transition aimed at reducing CO2 emissions, it is therefore necessary to supplement green hydrogen with other clean hydrogen sources with a low carbon footprint (known as 'blue hydrogen'). Such hydrogen can be formed by combining traditional production methods with clean technology innovations. Blue hydrogen can thus be produced either by revamping an existing grey hydrogen plant or by constructing a grassroot blue hydrogen plant.

The definition of blue hydrogen is not yet completely agreed, but many key industry stakeholders correlate blue hydrogen with >90-95% CO2 recovery. In this presentation, different methods of producing blue hydrogen were discussed together with their comparison on the basis of different technical and economical basis.

Mark Baker

Second presentation – Mark Baker, Petrofac

Decarbonisation of a manufacturing plant using green hydrogen

As the global decarbonisation drive accelerates, emissions from industrial and manufacturing facilities, which account for more than 20% of global emissions, is receiving a lot of focus. Many of these manufacturing plants, particularly those that produce consumer goods, are in dispersed locations and cannot pool resources as those co-located in clusters are currently doing to reduce their individual cost of decarbonisation. Therefore, such facilities require an alternative and cost-effective way to decarbonise and minimise exposure to the rising costs of emission allowances.

A large proportion of the carbon emissions at manufacturing facilities can be attributed to high-temperature heat generation for onsite usage, mostly due to burning fuels like natural gas and distillates to generate the steam required in their production processes. Another significant source of emissions is the fuel used in the supply chain and fleet to move raw materials and produced goods to, from and around the facility, typically in trucks and on forklifts.

A brewery is used as a case to show how green hydrogen can be strategically deployed at a manufacturing facility to reduce carbon emissions, by first as a substitute to the hydrocarbons used to generate steam for process heat, and then expanded to provide the fuel for the supply chain fleet of the facility. Such an approach can be applied to all manufacturing sites requiring high temperature in their processes such as distilleries, glass manufacturing and other fast moving consumer groups, providing a cost-effective option for decarbonisation of dispersed manufacturing facilities.

Third presentation – Gianluca Mannucci, RINA

Challenges in H2 readiness assessment of existing pipeline networks

Gianluca Mannucci

In the context of the energy transition, conversion of existing pipelines networks to convey gaseous hydrogen either pure or blended with natural gas is a great opportunity to reduce costs and time to market.

Therefore, there is increasing interest in the market in the assessment of H2 readiness of existing natural gas pipelines.

Evaluation of the suitability of pipeline components from a material perspective is one of the main challenges of such exercises and requires specific experience and expertise, especially in relation to the typical issues associated to interaction of materials with hydrogen and steel alloys.

Correct understanding of the material requirements from the available codes and technical documentation (e.g. ASME B31.12, EIGA, IGEM, etc.) is fundamental to keep under control issues such as hydrogen embrittlement and ductile fracture propagation control and arrest, and eventually determine whether an existing pipeline can be considered suitable for hydrogen transportation.

A desk verification of the material properties that allows to rely on a minimal susceptibility of the materials to hydrogen embrittlement is the first recommended approach. Nevertheless, in case such an approach is not easily applicable or produces too conservative results, a dedicated laboratory testing campaign can be performed to determine actual material performance in presence of hydrogen.

In particular, the resistance to hydrogen embrittlement can be quantified in terms of residual material fracture toughness and resistance to fatigue crack growth in the specific conditions of gaseous hydrogen exposure. Additionally, slow strain rate tensile testing can be also considered to allow a quantification of the material susceptibility to hydrogen embrittlement and easily point out the loops that deserve major attention about their suitability for hydrogen service.

Also, current integrity conditions are to be considered in the assessment exercise through dedicated fitness for service assessment appropriately adjusted to incorporate hydrogen specific requirements.

Fourth presentation
– Karin de Borst, Shell Global Solutions

Large-scale geological hydrogen storage: challenges and opportunities

Hydrogen is considered a key enabler of a net-zero emission energy system. It provides a balance between energy supply and demand over possibly long distances and periods of time and, thus, allows introduction of a higher share of renewable energy sources in the overall energy mix. Offering a balancing mechanism to the energy system will require large-scale storage of hydrogen, which can be most cost-effectively realised in the subsurface using mined salt caverns, depleted reservoirs, or aquifers.

The presentation provided an overview of the main technical challenges associated with subsurface hydrogen storage. Special emphasis was placed on the potential contamination of the hydrogen during storage, creating a need for purification after back-production of the hydrogen before its further utilisation.

Geochemical and microbial reactions in the subsurface storage sites can result in formation of methane and the toxic hydrogen sulfide. Moreover, storage in depleted reservoirs will inevitably result in some mixing of hydrogen with the in-situ methane and higher hydrocarbons.

The costs for purification and for disposal of the reject stream will be crucial for the economic feasibility of subsurface hydrogen storage and determine which markets can be supplied after storage, depending on their purity requirements.

Karin de Borst

GPA EUROPE TECHNICAL CONFERENCE

Gary Bowerbank

Morning Session

Moderated by Gary Bowerbank, Shell Global Solutions

Our May Technical Conference, with the theme of 'Roadmap for the Transition', was our first chance to get to gather face to face in more than two years. The opportunity to network, making new connections and reacquainting with some old faces was really appreciated by everyone.

First presentation – Dr. Navdeep Kahlon, Progressive Energy

HyNet North West project: Why, what and how?

Navdeep set the scene by bringing us up to speed on a number of UK government policies that set ambitious targets for production of H2 (blue and green) for use in domestic and industrial applications. And while starting to use H2 as part of the natural gas grid is not a net zero solution, it is still far better to make what reductions we can do now while renewable and other technologies solutions are developed.

"Better to start with an imperfect solution, than to wait for the silver bullet," Naveed said. He then went on to give a good overview of the HyNet North West project which covers production, storage and transportation of H2, as well as the capture, transportation and storage of CO2. As with all the such projects, it requires collaboration cross a wider range of sectors and partners, but represents an opportunity to provide jobs to the region. (See: **www.Vimeo.com/560384154**)

Dr. Navdeep Kahlon

Tim Harwood

Second presentation – Tim Harwood, Northern Gas Networks

Gas networks journey towards a hydrogen conversion

Within GPA Europe we are often focused on the production and processing of gas, and less on the distribution and use. So it was very insightful to hear from one of the companies which manages the distribution of gas within the UK. Northern Gas Networks delivering gas to 2.7 million residents and businesses across the North East, Northern Cumbria and most of Yorkshire.

The focus of Tim's presentation was an update on the H21 program, which seeks to demonstrate the suitability to use the existing network for 100% hydrogen. This includes a number of elements including trials with 20% H2 injected into the grid in Winlaton, Gateshead and upcoming 1100% hydrogen demonstration in the Redcar Hydrogen Community (planned for 2024/25).

This all gears towards the BEIS (UK Government Department for Business, Energy & Industrial Strategy) Policy design on hydrogen, expected in 2026.

As well as demonstrating the safety of hydrogen, via qualitative risk assessments to be published later this year, Northern Gas Networks do a lot of work educating the community on the use of hydrogen in their homes with the Hydrogen Home and Customer Energy Village at their research site, Low Thornley. (see **https://redcarhydrogencommunity.co.uk/**)

London speakers and moderators

Third presentation – Justine Roure, Oil & Gas Climate Initiative

OGCI leadership on the oil & gas industry decarbonisation

Justine Roure

Justine introduced the Oil & Gas Climate Initiative, how and why it was formed, as well as how it has grown to where it currently has with 12 member companies covering the entire globe and being a mixture of national and international energy companies. The most recent OGCI strategy (September 2021) is built on three pillars – focusing on reducing their own direct emissions; encouraging others in industry to lower emissions; and accelerating decarbonisation in the wider community. She then went on discuss two focus areas – methane emissions and the development of carbon capture and utilisation/storage (CCUS).

With respect to methane emissions much of the focus is on accurate measurement and reporting to increase transparency. Various programmes have been able to detect and then address large scale methane emissions by the use of satellite imagery and/or drones. With improved monitoring, then it becomes credible for the OGCI to announce the Zero Methane Emissions Initiative to treat methane emissions with the same focus as safety.

The latter part of Justine's presentation focuses on how OGCI has kickstarted CCUS hubs across the globe including a significant number in Europe. This has been done by matching CO2 emitters with CO2 sinks, and helping to build consortia to develop the opportunities. To further support industry in this area the CCUS Hub has been set up to openly share the gathered information to match produces with consumers. (see **https://ccushub.ogci.com/**)


David Knight

Afternoon Session
Moderated by David Knight, Schlumberger

First presentation – Adam Jones, Costain

Enabling drastic emissions reduction in Wales through integrated industrial decarbonisation deployment

On 17 March 2021, the UK Government announced the allocation of £171m funding under UKRI's Industrial Decarbonisation Challenge for nine industrial decarbonisation projects across five industrial clusters.


Adam Jones

The South Wales Industrial Cluster (SWIC) deployment project, led by Costain, has been granted Phase 2 matched funding of nearly £20m following successful completion of a Phase 1 assessment of the decarbonisation schemes and infrastructure required to deliver decarbonisation in South Wales – the second largest cluster in the UK when measured by industrial emissions only.

Aligned with the Government's ten-point plan for a green industrial revolution, Phase 2 of the project involves engineering studies to explore the routes to decarbonisation including fuel switching with hydrogen and emissions capture with CCS as well as reducing the carbon intensity of the local electricity system.

With around 90% of all of Wales' GHG emissions being produced in the South Wales region, the decarbonisation infrastructure developed as a result of implementing industrial projects in South Wales has the potential to not only reduce the industrial emissions in the region but also provide a strong foundation which enables progression to achieving net zero emissions in Wales as a whole.

Now one year into the project, Adam provided an update of the deployment project decarbonisation solutions proposed by the SWIC partners, including how Costain's team is managing and co-ordinating the project from a system integrator perspective. This not only involves balancing supply and demand for novel hydrogen and CO2 related projects but also exploring 'the art of the possible' in terms of matching the development of enabling decarbonisation infrastructure with specific industrial decarbonisation projects.

Second presentation – Dr Peter Clough, Senior Lecturer in Energy Engineering, Cranfield University

Blue hydrogen production by Sorption Enhanced Reforming (The HyPER Project)

Low carbon hydrogen could play an important role for decarbonising industry, power, heat and transport. The Royal Society concluded that natural gas reforming with CCUS was one of the most likely technologies to be deployed at scale in the near to mid-term.

The HyPER project, funded by the UK Government Department for Business, Energy and Industrial Strategy, proposes to answer the call for technology development leading to a low carbon, cost effective, bulk H2 supply through pilot scale demonstration of the sorption enhanced steam reforming process, based on existing GTI technology. With our existing expertise of the process and collaborative industrial support we are aiming to demonstrate the process as an integrated system.


Dr Peter Clough

This project is designing, constructing and operating a 1 MWth sorption enhanced steam reforming pilot plant reactor capable of producing a pressurised H2 stream and demonstrate the ability to achieve CO_2 capture rates of >96%. The technology demonstrated in this project is expected to show the potential for reducing capex by 50% relative to SMR/ATR+CCS.

Candice Carrington

Third presentation – Candice Carrington, Petrofac

Gas networks journey towards a hydrogen conversion

Gas-to-liquids offers a pathway for decarbonising aviation fuels. In a conventional gas-to-liquids process, syngas derived from natural gas or coal is converted to synthetic crude (syncrude) via thermal or catalytic routes, which can then be distilled and separated into a variety of fuel blends or cuts similar to a typical crude oil refinery. When the syngas is derived from a biomass or waste source, its conversion to liquid fuels results in a sustainable fuel source with significant emission reduction potential.

The Protos Biofuel Project is being executed by Petrofac for Protos Biofuels Ltd, one of the competition winners of the DfT's Green Fuels, Green Skies (GFGS) competition, and employs gas-to-liquids technology for sustainable aviation fuel (SAF) production.

Waste in the form of refuse derived fuel (RDF) is put through a gasification process to generate syngas, which is then cleaned up before being put through a Fischer-Tropsch process to produce a distillate-rich syncrude. This stabilised syncrude would be readily processed in a conventional petroleum refinery for production of SAF, thereby achieving an eligible SAF pathway with reduced greenhouse gas reductions compared to a fossil fuel-derived aviation fuel.

In this presentation, Candice explained how the project employs a synergy of proven and novel technologies, from both the waste management and the petrochemical industry, as well as combining different design practices, to come up with a robust technical solution.

She explored some of the challenges encountered in delivering the design, which include variation in feedstock quality, managing contaminant levels, maximising energy integration, and handling effluent and waste from the process.

The key requirement of the GFGS competition is to demonstrate a First-Of-A-Kind (FOAK) commercial pathway for SAF. As a result, there are some technology assessments and selections that were undertaken, perhaps more so than in projects for more proven processes. Candice also demonstrated how technology selection was a key factor in the viability of this new energy transition project.

Fourth presentation – Myrian Schenk, TechnipEnergies

Myrian Schenk

Carbon capture and utilisation in ethylene plants

Carbon capture and utilisation are a fundamental step to reach net-zero targets, as suggested by governments around the world. At TechnipEnergies, energy transition is our business, we apply our core capabilities to ensure that today's and tomorrow's energy challenges can be solved.

We believe that it is essential to have strategic flexibility, being able to integrate complex technologies and have a proven execution to take the journey towards a carbon neutral future. The key points for success in the energy transition world are:

1. Increase the affordability of carbon capture and utilisation
2. Technologies breakthrough and scale up/industrialisation of mature technologies
3. Strong policy action (government support, CO2 taxes, regulations)
4. Increased focus and support from green finance

Carbon capture itself, is a known process. Low pressure gas scrubbing process using amine solvents can be leveraged from natural gas scrubbing processes (MEA has been used since 1930s). In addition, amine scrubbing is the single source process for proven capacities greater than 1 MTPA on flue gas from the examples of Boundary Dam in Canada and Petranova in USA.

Other alternative processes are under development: cryogenic separation, adsorption on solid beds, new solvents. These technologies might soon show a breakthrough.

Utilisation of the captured CO_2 is less developed. Due to the large amount that can be captured, sequestration in new or depleted reservoirs is mostly the solution, however, other utilisation techniques are emerging from traditional ones such as urea production and food industry utilisation. The emerging technologies to utilise CO_2 include carbon to chemicals, carbon to methane, carbon to alcohols, etc.

In this presentation, Myrian gave an example of an ethylene plant emissions to show the possibility of capturing CO_2 and converting it to ethylene by a two-step process, first to ethanol and then by ethanol dehydration (Hummingbird) to ethylene. One way to monetise the emitted carbon and reduce emissions. Myrian proposed an integrated solution to aid the affordability of carbon capture and utilisation.

GPA EUROPE RENEWABLE GAS WEBINAR

Samantha Nichson

A session organised by our Renewable Gas KSI Group. Moderated by Samantha Nicholson, Fluor Ltd

The webinar discussed two types of waste and one type of product being created. Waste to fuel is in an interesting development phase and in particular the most recent agricultural uses to produce methane – one of the highest producers of greenhouse gases.

First presentation – Andy Cornell, ABSL

Future use of refuse derived fuel as a feedstock in the production of low carbon fuels

Andy presented on a technology which Advanced Biofuel Solutions (ABSL) has developed, RadGas, that converts household waste or biomass residues into biofuels while capturing carbon dioxide. RadGas can convert a range of feedstocks such as refuse derived fuel (RDF), straw or wood chips into a range of biofuels such as biohydrogen, biomethane or SAF.

Moreover, in the production of biomethane or biohydrogen, the majority (if not all) of the carbon can be captured, paving the way towards carbon negative fuels, a key component of the energy mix towards net zero.

RDF is the preferred feedstock for the RadGas process in markets where there is sufficient availability and local regulations mean that it attracts a gate fee. In most parts of the world there is good waste availability, meaningful gate fees and a desire from policymakers to encourage environmentally friendly pathways for waste treatment, such as ABSL's offering.

Andy Cornell

Second presentation – Paul Hudson, Transform Materials

Green acetylene production – using biogas to achieve a step change in supply chain CO2 and waste production

Paul presented on the production of acetylene via the widely used calcium carbide route produces solid and liquid waste in the supply chain as well as CO2. Use of biogas in the Transform Materials (TM) novel, non-thermal microwave plasma process prevents the need to generate solid and liquid waste and can cut CO2 emissions associated with the acetylene hugely.

Andy Cornell

The process not only protects the environment but it produces green hydrogen as a by-product. Use of the TM process is a great way to valorise methane from all sources, especially biogas and can unlock the potential of green products made from acetylene such as PVC, acrylic polymers, synthetic rubbers, acetylene black, graphene, vitamins and pharma applications amongst others.

Marine Juge

Third presentation
– Marine Juge, ENGIE Lab CRIGEN

Biomethane sector in France and technical levers to reduce the production costs of biomethane from anaerobic digestion

The biomethane production in France is largely growing since the last years and several pathways are available or under development, for example anaerobic digestion or, pyrogasification. Due to actual context and new European objectives the sector is booming.

European Commission announced to increase to 35 bcm the biomethane production in 2030 which doubles the initial objective and represents 15% of the current European gas consumption. To achieve this ambitious target we will need to drastically increase the number of units, diversify the pathways and so optimise the production costs to improve the profitability and guarantee the quick development of the pathways.

Marine presented the current biomethane sector in France: the different pathways, the number of units, the regulation and incentives evolutions, etc. Moreover, Marine covered ENGIE's ambitions in terms of cost reduction thanks to the development of several technologies. Indeed, it is thanks to a combination of solutions that we will able to achieve the new European ambition in green gases production:

- Improve the CAPEX with lower footprint
- Optimise biomass conversion to increase methane production
- Reduce methane losses to improve environmental footprint but also increase biomethane revenue
- Identify new co-products to create new revenues

A FRESH NEW LOOK FOR GPA EUROPE

We're excited to announce that as of November 2022, we are rebranding with a new logo and colour scheme.

We want to share with you our rationale behind the updates, and what they represent for GPA Europe and our members

GPAE
GAS PROCESSORS ASSOCIATION EUROPE
ENABLING CLEAN ENERGY

Our new logo represents the transition of our industry towards the new energy future and our commitment to support our members within the gas processing community during this time. Our logo symbolises our movement towards promoting a cleaner, greener, energy future. We have a key role to play in Europe as the future of energy is changing.

However, we want to be clear that our mission hasn't changed, we are still here bringing the European gas processing industry together but feel the fresh new logo resonates better with the focus areas of our members.

Our mission:

"To promote technical and operational excellence and to service as a forum for the exchange of ideas and information for all participants in the European gas processing industry. Whilst creating value for our members through improving knowledge sharing, technology, people development and public acceptance of our industry."

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

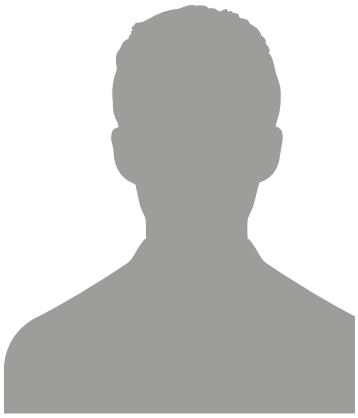
Meet the teams **Future Energy**

Team Lead

David Simmonds - Retired

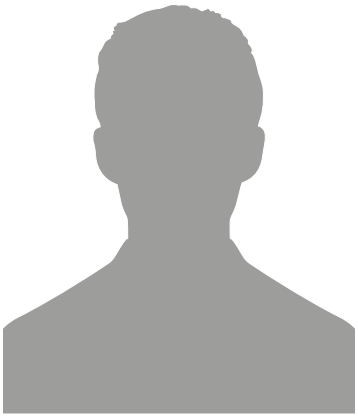
Hamish Blackwood - Fluor

Boris Ertl - BP



Stephen Lamport - Advisian Group

Samantha Nicholson - Fluor



Philip Walsh - McDermott

Meet the teams **Marketing**

Team Lead

Paul Hopkinson - Kelvion UK

Gary Bowerbank - Shell Global Solutions

Adriano Gentilucci - Dow Europe GmbH

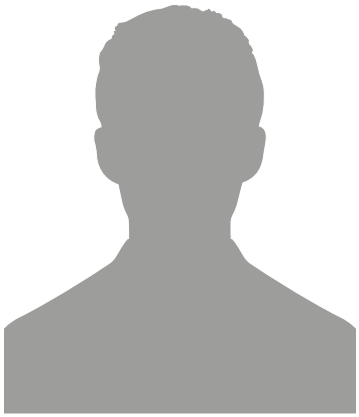
Alex Woldhuis - Petrogenium

Meet the teams **Training**

Team Lead

Fiona George - Worley

Paul Hopkinson - Kelvion UK



Sigbjørn Svenes - Equinor

In each future edition of *In Brief* we will provide you bring you 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

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.**

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GAS PROCESSORS ASSOCIATION EUROPE
ENABLING CLEAN ENERGY

@GPA-EUROPE-LIMITED @GPAEUROPE @GPA-EUROPE-LTD

CORPORATE MEMBERS

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

Level 1 Members

Air Liquide Global E&C Solutions Germany GmbH
Aker Solutions
Amines & Plasticizers Ltd
Arkema France
Atlas Copco Energas GmbH
Axens
BASF SE
Bechtel Ltd.
BP Exploration Operating Co. Ltd.
CB&I Ltd
Costain
DNV GL
Dow Chemical Co.
ENGIE - CRIGEN
Equinor
Fives Cryo
Fjords Processing France SAS
Fluor Ltd.
Gassco AS
Grace GmbH
Huntsman Belgium BVBA
Johnson Matthey
Kellogg Brown & Root
Oil & Gas Corrosion
Pall Europe
Parker Hannifin - PECO
Petrofac Engineering Ltd
Saipem SpA
Sazeh Consultants
Schlumberger OneSurface
Schlumberger Purification Solutions
Shell Global Solutions International BV
SIME
Spirax Sarco
Technip Energies
Tecnimont S.p.A
TotalEnergies 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
Bryan Research And Engineering
Chart Energy and Chemicals Inc
Escher Process Modules BV
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
UOP BVBA.
Vahterus Oy
VTU Engineering GmbH
WinSim Inc
Zeochem AG

Level 3 Members

Abbey Industrial Sales Co Ltd
Bohr Limited
FUJI FILM Manufacturing Europe
Gas Liquids Engineering Ltd
Gasconsult Ltd
ISG
Kirk Process Solutions
MPR Services
Optimized Gas Treating
Petrogenium
Phillip Townsend Associates Ltd.
SDS Separation Technology B.V.
Sulphur Experts
Thermasep
Transform Materials LLC
Upstream Concept Engineering

Academic Members

Hydrocarbon Processing
Politecnico di Milano
University of Surrey
University of Bradford