



Australian Gas Industry Trust

Overseas Study Tour 2008

Gas in the United Kingdom – a technical and engineering perspective

Report by Study Tour 2008 Recipient – Mark Baker

1 Executive Summary

As part of the 2008 Australian Gas Industry Trust (AGIT) Overseas Study Tour, I was provided with the unique opportunity to travel to various parts of Europe focusing on the engineering and technical aspects of the numerous facets of the industry with the endeavour to expose new technologies and methods of managing existing gas assets and infrastructure within Australia.

My itinerary first brought me to the International Gas Research Conference (IGRC) in Paris which extended over a three day period bringing representatives from around the globe including America, Europe, China, Japan and Australia.

The seminars and poster presentations covered a broad array of topics from asset management techniques to innovations in the Industry.

From Paris I travelled to London and met with Angela Love, Director for Gas, Energy Networks Association (ENA) UK. Angela and I spent the morning discussing the framework within Europe and the key roll of ENA including the regulating bodies and their associated relationships.

From there I travelled to Loughborough approximately two hours from London and attended the Critical Gas Emergency Planning Seminar hosted by the Institute of Gas Engineers and Managers (UK) and conducted by Steelhenge Consulting.

The day session focused on the existing infrastructure to manage a critical emergency and the resources available to successfully control and minimise the effect to customers and industry alike.

The following provides a summary of the events experienced including the, International Gas Union Research Conference, meeting with Angela love, Director for Gas, Energy Networks Association UK and the Critical Emergency Desktop Exercise.

2 International Gas Union Research Conference - Paris

My first point of call was attending the three day seminar at the International Gas Union Research Conference (IGRC) 2008 held at the Scientific Conference Centre in Paris.

The conference was attended by over seven hundred delegates and actively participated in forty five oral presentations developed through twelve sessions, with more than three hundred poster presentations and four specially prepared workshops.

The conference provide the unique opportunity to interact with colleagues who presented ideas in technology for the near future and exposure to developments in gas research, innovation and the insight into strategic challenges faced by the world wide gas industry.



Other issues presented and discussed involved; CO₂ capture, safety, methane hydrates, energy efficiency, energy generation, maintenance practices and information technology to improve the efficiency of the gas chain.

The sessions I attended included;

- R&D – Is technology the key to the changing market?
- Workshop – Pipeline Integrity
- Pipeline Integrity – What are the new challenges for Asset Management?
- Hydrogen – Does it have a future in Natural Gas Networks?
- Sustainable Energy – Is Natural Gas the Bridge to Sustainability?
- Next generation gas transmission and distribution – What is it?

R&D – Is technology the key to the changing market?

The first session *R&D – Is technology the key to the changing market?* discussed the common barriers of R&D and methods to introduce new technologies to allow innovation in every day operation. It was explained, to ensure a strategy of innovation is implemented; new technology must be identified early in a project life.

We all know that there exist risks and the cost of potential disruption with new technology and a clear set of goals and measurements to monitor the progress of a project are to be established.

Innovation will be better enabled if needs, constraints and challenges have been defined and shared across the organisation. Importantly, it is essential to have the face of exposure to new risks and provide common commitment to allow technology to mature.

Pipeline Integrity Workshop and Session on *What are the new challenges for Asset Management?*

The next two sessions incorporated a workshop and presentations on 'Pipeline Integrity', detailing issues relating to external interference and addressing issues of ageing pipeline assets and Pipeline Integrity Management Systems

As we are all aware, external interference on gas transmission pipelines is the largest contribution to risks today incorporating both frequency and magnitude. Prevention of external interference however, has reached a level of maturity whereby methods of best practise have provided good results.

Overall systems for prevention encompass asset management approaches, improved data collection, new technologies, protective measures and models to account for risk management.

Over the years, a greater understanding of the issues effecting ageing pipelines has been addressed including external corrosion and stress corrosion cracking. The improvements have been such that for a modern pipeline, there should be minimal risk of extensive corrosion.

In Europe as in Australia, the risk management process includes:

- Utilisation of appropriate long term prevention methods,
- Monitoring and inspection of the establishment and growth of corrosion,
- Application of models to determine corrosion 'hot spots',
- Understanding of structural significance of corrosion found and the likelihood of rupture rather than a leak,
- Remediation and repair of defects, including recoating,
- Regular re-inspection at prescribed intervals.

Studies have shown that external stress corrosion cracking is due to what is now known as high pH stress corrosion cracking with a second mechanism known as near neutral pH stress corrosion cracking. Failures have been determined as combined effects of pipe coating condition and pipeline operating conditions.

A brief overview was provided on a Pipeline Integrity Management System (PIMS) utilised in the UK on how to achieve optimum safety and reliability of pipeline systems. The PIMS appears to provide a high level of information to compliment established methods used for planning, design, construction, operations, servicing and maintenance. The process consists of a number of sub processes that incorporate a Geographical Information System (GIS), Electronic Management System (EMS) and Plant Maintenance (SAP). Similar systems exist in Australia, but possible improvements may be achieved with PIMS.

Hydrogen – Does it have a future in Natural Gas Networks?

The session on 'Hydrogen in Natural Gas Networks' was intriguing, with a five year sponsorship from the UK government, the project has focussed on the transition towards hydrogen being the sustainable energy carrier for the future and readily available being a bi-product of biomass, refineries and chemical processes. The scenario depicted a mix of twenty five percent hydrogen with seventy five percent natural gas in a distribution network.

The addition of hydrogen to natural gas also referred to as 'green gas' can both contribute to security of supply and the reduction of CO₂ emissions. The project is continuing its investigations with regard to acceptable consequences for safety, life cycle and socio-economic aspects, durability of the system, gas quality management and performance of end-user appliances.

The final results of the research and potential implementation will be lengthy with considerable more development to be undertaken.

Sustainable Energy – Is Natural Gas the Bridge to Sustainability?

On the topic of sustainable energy, natural gas is obviously a preferred fuel with clear advantages over others with anticipated increases in demand as a result of power generation.

Within Europe, it is also considered a move towards natural gas vehicles will penetrate the market reducing the use of diesel and petroleum.

As a result, the key challenge for the industry is to keep pace with supply with the continuing search and investment into oil and gas reserves.

In addition, there also exists the need to place further research on the alternatives such as bio-fuels and hydrogen as previously mentioned.

Next generation gas transmission and distribution – What is it?

With the continuous growth and demand for natural gas, it was acknowledged at the conference that businesses face the challenge of expanding pipeline networks all around the world while facing harsh operational conditions, restrictive environmental issues, increasing construction costs including ageing assets.

More than ever, businesses must identify sustainable methods to maintain and operate networks ensuring its performance in response to changing market demands and control the total cost of pipeline expenditure. Both capital and operating expenditures must be expertly managed to ensure sustainable operation for the life of pipeline networks.

Besides adopting best pipeline engineering practices and standards, businesses must continuously seek new technologies in order to ensure effective solutions to the ever increasing energy demand and transportation.

Other technologies and topics viewed included;

- The MBW 'Soil Pick', a hand held apparatus used for the excavation of compacted material and soil utilising a high speed stream of compressed air to expose underground services without the risk of service integrity,
- 'CISBOT', 'Cast Iron Joint Sealing Robot', developed by Consolidated Edison of New York, for the internal sealing of cast iron joints by anaerobic methods without disruption of supply,
- Ultrasonic Gas Metering by Panasonic incorporating pressure monitoring, automatic isolation in the event of an emergency and automatic leak detection,

- Alternate Electrofusion Repair Patches (ERP) marketed by Elofit, for the rehabilitation of the integrity of questionable butt fusion joints and repair of damaged PE pipe,
- Gas Technology Institute, IL USA, provided solutions for joint detection for all metal joints, by 'acoustic asset location' for metal and non metal assets including polyethylene pipe and a portable methane detector for improved leakage survey and leak pinpointing,
- Development and introduced by 'Disenco' a domestic Emissions Saving Unit 'ESU' being a gas supported micro power plant for combined heat and power generation with suggested reductions on annual domestic electricity and carbon emissions.

The three day conference provided an abundance of available information, far too great to fully absorb over its duration with further reference to be undertaken. The sessions may be viewed on the IGRC web site.

3 Energy Networks Association UK



Director for Gas Energy Networks Association (UK) – Angela Love.

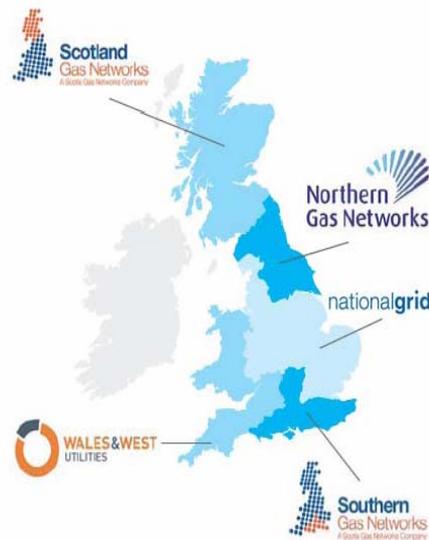
The meeting with Angela was informative and most enjoyable as we discussed numerous aspects of the role of ENA (UK) and how it influences industry, regulators and the market place.

Angela indicated ENA is the trade association for the UK energy transmission and distribution license holders and acts in the interest of the energy sector to achieve excellence in relationships with stakeholders. The focus is to influence the industry on issues including regulation, engineering services, environment and occupational health and safety.

ENA is the largest industry body in the energy sector and acts as the strategic focus to direct communication for the industry

This also includes influencing and assisting the government, the regulator and other industry related industries to pursue effective legislation and regulations.

The distribution networks within the UK have developed from private island networks to national interconnected networks over the decades to meet reliability and supply issues.



The regulator in the UK is the Office of Gas and Electricity Markets (OFGEM), and is the governing authority ensuring maximum utilisation of energy supplies promoting competition.

The authority determines strategies, sets policy priorities and takes direct control and enforcement if deemed necessary.

We discussed that the current climate in Australia lacks funding in R&D, since the privatisation of the various gas organisations and I was advised that this was also a major issue in the UK.

Of recent years an Innovation Funding Initiative for Sustainable Development (IFI/SD), has been introduced in the UK. The scheme was established to primarily provide an incentive to encourage the network owner to apply innovation in the technical development of distributor's networks.

The IFI/SD incentive is designed to create a risk/reward balance consistent with research, development and demonstration. The IFI/SD is intended to provide funding for projects primarily focused on the technical development of the network, environment and safety to the end consumer.

At the same time, projects are only eligible for funding where the proposal aligns with one or more of the OFGEM five sustainable development themes as indicated below;

1. Managing the transition to a low carbon economy,

2. Eradicating fuel poverty and protecting vulnerable customers,
3. Promoting energy saving,
4. Ensuring a secure and reliable gas supply,
5. Supporting improvement in all aspects of the environment.

Regulating bodies here in Australia need to take note of this initiative with a similar program to be established and implemented to encourage network owners to focus on innovation and engineering development to ensure future growth and development in ever expanding networks and gas transportation.

It was a pleasure meeting with Angela, with a rewarding morning being spent.

Planning for a Critical Gas Supply Emergency

On the final leg of my tour, I participated in a day long exercise in the awareness and management of a critical gas emergency and the implications that could occur and arrangements that currently exist in the UK.

I travelled to Loughborough approximately two hours out of London and attended a Critical Gas Emergency Planning Seminar hosted by the Institute of Gas Engineers and Managers (IGEM) and conducted by Steelhenge Consulting.



Sponsors for the day included Energy Networks Association (ENA) and Health and Safety Executive (HSE).

The aim of the workshop was to provide awareness to gas engineers and emergency planners on the emergency arrangements and likely future developments in the UK.

The workshop was based on input from industry and government energy emergency planning experts combined with discussion on the case study on the day.

The objectives achieved from the day included;

- A familiarisation of the current arrangements in place for dealing with both local and national gas emergencies from supply failure and network failure
- Explored the implications of gas emergencies through practical exercise and discussion
- Acknowledge potential future developments in the gas industry
- Enhanced personal knowledge and understanding of the events and infrastructure to manage an incident.

The case study for the day detailing events of a critical incident was ironically the 'Longford' incident.

VENCorp provided a well documented account of the events surrounding the Longford incident to Steelhenge Consulting who delivered the case study.

Comments of praise were given to the management of the incident including the professionalism of the media maintaining open communication to the public in all aspects surrounding the incident including venues of assistance and day to day updates of the event.

An interesting comment expressed on the day by Steelhenge Consulting was that if such an event occurred in the UK, permission for the public to relight their appliances would not be permitted.

The day was rewarding, especially as the case study was based on Longford and that this was used as a role model scenario for the management of such a major incident and that the event occurred in Australia over ten years ago.

4 Conclusion

From a technical and engineering focus, the study tour provided me with the opportunity to witness first hand current and forthcoming technologies, asset management techniques, safety management plans and the initiatives regulating bodies are taking to ensure the long term sustainability of gas storage and transport.

Key relationships were established and much knowledge was gained from and shared with the organisations visited.

If I was asked to identify an item of most potential significance that would be beneficial in Australia, I believe the Innovation Funding Initiative for Sustainable Development (IFI/SD), as offered by OFGEM would be beneficial.

This would provide Australian operators with incentives to undertake far more interest in 'research and development' encouraging utilities to invest in new methodologies in operation and maintenance.

Finally, I would like to express my gratitude to the Australian Gas Industry Trust for the opportunity to participate in the 2008 Study Tour.