



# **Gas Network Extensions in Northern Ireland**

## **Gas to the West (“GTW”)**

**Phoenix Innovation and Technology Transfer**

**May 2014**

## TABLE OF CONTENTS

1. BACKGROUND.....	3
2. TECHNICAL AND CONSTRUCTION.....	5
3. NATURAL GAS PREPARED HOMES AND LOCAL COUNCILS.....	10
4. KNOWLEDGE SHARING.....	12
5. RESOURCES.....	13
6. SYSTEMS.....	15
7. COMPRESSED NATURAL GAS VEHICLES.....	16
8. UTILISATION SUPPORT TO CONSUMERS.....	17
9. LEVERAGE OF FUNDING.....	20
10. DEVELOPMENT OF GAS NETWORK IN THE GTW LICENSED AREA.....	22
11. SUBSTITUTION OF HIGH PRESSURE PIPELINES – ALTERNATE DESIGNS.....	23

## 1. BACKGROUND

Phoenix Natural Gas Limited (“**Phoenix**”) is submitting this Innovation and Technology Transfer Paper to the Northern Ireland Authority for Utility Regulation (“**UR**”) in support of its application for a conveyance licence for distribution to assist the extension of the Northern Ireland natural gas network to the towns of:

- Dungannon including Coalisland;
- Cookstown including Magherafelt;
- Enniskillen including Derrylin;
- Omagh; and
- Strabane.

(the “**GTW Licensed Area**”).

Phoenix currently operates a licence granted to it in 1996 for the conveyance of natural gas (at distribution level) in Northern Ireland (“**the Licence**”)<sup>1</sup>.

Before the Phoenix investment, there was no existing natural gas infrastructure in Northern Ireland. The task set for Phoenix was an unusual project in the United Kingdom (“**UK**”), since it involved retro-fitting a gas distribution network in a major city. Most importantly, Phoenix faced the challenge of developing a network and a market for natural gas from scratch.

Since 1996 Phoenix has been successful in introducing natural gas to a new market and establishing a strong and vibrant supporting industry. Phoenix is the pre-eminent natural gas business in Northern Ireland. Phoenix has undertaken innovative pipe laying techniques and has developed a strong skills base and a reputation for making safety the top priority. Imaginative marketing campaigns and hands-on customer support has expedited growth in the customer base and is key in building markets.

---

<sup>1</sup> Phoenix’s original licence was a combined licence for the conveyance and supply of gas in the Licensed Area. The conveyance part of the licence allowed Phoenix to construct and operate both a transmission and distribution network in Northern Ireland, and the supply part of the licence allowed Phoenix to supply gas to customers from that network. In line with the requirements of the Second EU Gas Directive 2003/55/EC, Phoenix legally separated its gas supply division from its transmission and distribution business on 1 January 2007 and on 31 March 2008 Phoenix completed the sale of its transmission assets to Northern Ireland Energy Holdings. The supply and transmission parts of the original combined Phoenix licence now held by Phoenix have been revoked by DETI and all references to supply and transmission activities have been deleted from the licence.

Under the terms of the Licence, Phoenix is authorised to conduct its gas distribution business within an area covering approximately 40 per cent. of the population of Northern Ireland: Greater Belfast (comprising Belfast, Newtownabbey, Carrickfergus, Lisburn and North Down) and Larne (the "**existing Licensed Area**"). Since the Licence was first issued in 1996, Phoenix's existing Licensed Area has been extended to include Comber (in 2007) and specific larger customers on the periphery of the Licensed Area (e.g. Temple and McQuillan Quarries).

The Phoenix network currently extends to over 3,000 kilometres of intermediate, medium and low pressure mains, which distribute natural gas throughout the existing Licensed Area. As at 31 December 2013, Phoenix had made gas available (in accordance with the terms of its Licence) to c.301,000 properties within its existing Licensed Area, of which c.171,000 (57 per cent.) have been connected to the network.

Phoenix has established a downstream natural gas industry that has embraced a similar set of objectives to those of the Phoenix organisation. Independent installers, retailers and merchants align their businesses with the growth objectives set by Phoenix. Phoenix recognises the importance of an independent downstream natural gas industry and the benefits this can deliver e.g. improved customer service, additional investment, competitive prices and an ability to respond quickly to opportunities. Phoenix will play a key role in establishing the downstream natural gas industry across the GTW Licensed Area using the proven approach it adopted to establish a downstream natural gas industry across the existing Licensed Area.

## 2. TECHNICAL AND CONSTRUCTION

As Phoenix was only established in 1996, it had the benefit of being able to review best practice within traditional natural gas industries and to adopt, for its network, the elements that would deliver the best value solution for the Northern Ireland consumer.

Phoenix's business model is designed to facilitate the secure, safe, reliable, efficient and economic development and operation of the natural gas network in the existing Licensed Area.

Unlike other UK Gas Distribution Networks ("**GDNs**"), Phoenix chose to review (including risk assessments) and apply technical standards from recognised regimes in Great Britain ("**GB**"), the Republic of Ireland and Europe:

- Phoenix's distribution network operates at different pressure tiers than by traditional GB GDNs: Phoenix has a 7bar Intermediate Pressure ("**IP**") network; a 4bar Medium Pressure ("**MP**") network; and a 75 mbar Low Pressure ("**LP**") network. A traditional GB MP network operates at 2bar; and
- Phoenix's MP network is a fully welded High Density Polyethylene ("**HDPE**") system constructed in accordance with the latest industry standards that enables direct connection of properties to the network - approximately two out of every three connections are to Phoenix's MP network - which differs from standard practice in GB.

The main benefits of a 4bar MP network and direct connection of services are that Phoenix has been able to:

- minimise the diameters of its network thereby reducing the cost of construction; and
- undertake a greater proportion of insertion of polyethylene ("**PE**") pipes into the old towns' gas network. Currently c.40% of the Phoenix's network has been constructed this way. The old towns' gas network was purchased by Phoenix from local government and Phoenix would explore similar opportunities on the Gas to the West project.

A conservative estimate of the savings in construction cost delivered by these two innovative approaches to date is c.£40m.

Phoenix's construction contract is subject to the Official Journal of the European Union ("**OJEU**") procurement thresholds and is fully detailed within the Phoenix Low Pressure Operational Business Plan. In summary, each of the four contracts awarded to McNicholas Construction Services Limited ("**McNicholas**") have benefitted from a different philosophy than that traditionally adopted in utility businesses; each contract has operated through "Alliance" contracting principles, a virtually unknown practice in 1996. Since then many companies throughout the UK have tried, largely unsuccessfully, to adopt this philosophy. Phoenix has found the Alliance philosophy beneficial in delivering efficiency savings and adding value for the consumer.

Alliance contracting works on the principle that the client and the contractor set consistent targets and objectives and work together to deliver these. Phoenix and McNicholas have a fully integrated management structure which avoids any duplication in resources, enables a larger pool of resources to be redeployed across activities as operations require and ensures that the party best placed to manage a particular risk, manages that risk. This contractual relationship has also enabled Phoenix to get close to the product suppliers and manufacturers; a Design Review Group (consisting of Phoenix, McNicholas and all key product suppliers) enables Phoenix to challenge the traditional product designs and methods of working to deliver innovative, bespoke and often unique solutions which produce efficiency savings, customer service and value improvements.

Phoenix intends to manage the construction contract across the GTW Licensed Area in accordance with the established processes already in use in its existing Licensed Area.

Some of the examples of the benefits delivered by this approach are:

#### **Integrated flow limiter**

Phoenix operates a 4bar medium pressure network. As connections are made directly to this, Phoenix introduced an additional safety device, a flow limiter. If a service connection is damaged, the flow limiter triggers and cuts off the flow of gas. This means that less gas escapes into the atmosphere which has obvious environmental benefits as well as significantly reducing the safety implications of damage to Phoenix's network.

Phoenix also challenged the product designs. Traditionally two separate products were required; a PE reducing coupler and a flow limiter. This created an issue in that once the service connection was completed and the excavation hole backfilled, it was not possible to check whether the construction team had installed the flow limiter. In conjunction with its supply chain partners, Phoenix designed a new integrated product which consisted of the reducing coupler and the flow limiter which ensured that the flow limiter was always installed. This solution not only improved the overall safety of the Phoenix operation but also delivered cost savings as the integrated single product was cheaper to produce than the two separate products.

### **Pre-assembled meter installation**

The traditional method, and the one still used in Great Britain and in the Republic of Ireland, for installing a new service connection into a property is for a service-laying team to construct the gas pipe from the road to the customer's property and for a separate service engineer to install the gas meter. This results in two visits by two separate "teams" to each customer's premises. Phoenix, in partnership with McNicholas and the integrated supply chain, challenged this traditional approach and considered undertaking the complete installation using just one team and a single visit.

To deliver such a solution involved upskilling the McNicholas teams to enable them to commission gas meters. No such training existed in the UK so Phoenix and its alliance partners sourced a training organisation and devised a limited scope meter training module, which enabled the service-laying teams to obtain the necessary training and accreditation to commission gas meters.

This step allowed the meter installation to be completed by one team and thereby deliver cost savings. Phoenix then sought further improvements to the traditional process. Under a traditional approach, a meter box was delivered to Phoenix and McNicholas by one manufacturer, the meters delivered by a separate manufacturer, and construction teams first installed the meter box and then fitted the meter in the customers' premises. In collaboration with its supply chain, Phoenix explored the opportunity of having a pre-assembled meter installation delivered to the stores. A pre-assembled installation meant that the meter was already fitted in the meter box. The delivery of the pre-assembled meter installation provided not only capex savings during the installation process but also ongoing opex savings. Such opex savings arose because the opportunity for defective workmanship was reduced due to the fact that critical fittings were connected in a factory environment (instead of being done in a dirty, wet environment by a construction team) by the manufacturer. This in turn reduced the potential number of Public Reported Gas Escapes: as the opportunity for gas leakage was reduced, the number of jobs that Phoenix's engineers would have to attend on an emergency call out decreased. The installation time was also reduced.

Recently Phoenix has challenged the traditional meter installation one stage further. It is standard practice that a copper inlet is installed as the transition 'fitting' from the PE pipe external to the meter box to the meter inlet connection. Phoenix has redesigned this so that the PE is now taken into the meter box up to the meter inlet connection. This again reduces the overall cost of the service connection as the unit cost of PE pipe is significantly cheaper than copper.

Based on the number of meter installations Phoenix has undertaken to date, we estimate that the saving to consumers is c.£5m.

The Design Review Group has also delivered prefabricated meter banks, PE valves to replace metallic valves and PE inlet to meter boxes to replace copper inlets to name but a few.

Another benefit of the Alliance contract is that it has, at its core, an incentive mechanism to reward both Phoenix and the contractor for initiatives that deliver efficiencies. Payment to the contractor is based on a profit sharing mechanism i.e. a pain/gain mechanism that uses tender rates submitted by the contractor to determine the 'target' rate for a quantity of work and then payment is made using the actual costs that were incurred doing that work. Any difference, both positive and negative, between the target rate and the actual cost is shared between Phoenix and the contractor. This means that if both parties work together to reduce costs, the contractor would see an increase in its profit levels but Phoenix would still see a final cost that is less than the traditional approach delivered by the target rate. The transparency that is created by capturing the true cost of completing an activity in its core subcategories e.g. plant, materials, labour etc., enables both Phoenix and the contractor to focus on areas where costs are under pressure and understand the underlying reasons for those pressures. Similarly in areas where costs are performing well it still enables both Phoenix and the contractor to identify opportunities for improving costs still further. Further detail is provided in section 9.3 of the Phoenix Low Pressure Operational Business Plan. Some examples of initiatives delivered through this approach are:

- Phoenix and McNicholas were the first companies in Northern Ireland to introduce smaller directional drilling rigs to operate in urban areas thus reducing:
  - the amount of excavation required to build the network;
  - waste to landfill; and
  - unit costs of construction.

We estimate that a saving to date of c.£20m compared to traditional open cut methodology.

- Reduction in the level of waste pipe by recycling 'off-cuts' into service ducting, valve chambers etc.
- Reduction in fuel usage by 5% (c.£25k) per annum by installing tracker devices on all operational vehicles and through better work planning.
- Reduction of level of bad costs (damages, public liability claims etc.) from 4% of the overall contract costs to 2.5% (a saving of c.£150k per annum) by
  - photographing every job before leaving the site to have a clear record of how the site was left,
  - adapting vehicles to make them more 'user friendly' to reduce potential for accidents etc.



Unlike most clients who only know how much they have paid a contractor to construct something, and do not know whether that contractor has made a profit or a loss on that activity, Phoenix has a full understanding of what it has actually cost to complete its construction work.

A further initiative by Phoenix that has delivered significant savings and enhanced customer service is the introduction of the simplified Pay as You Go (“PAYG”) Libra meter solution:

#### **Pay as You Go (PAYG) metering**

The main sources of fuel for customers’ homes before the introduction of natural gas in Northern Ireland were coal and oil. As customers were used to paying for their fuel supply on a regular basis, they wanted the option of paying for natural gas in the same way. There was little stigma attached to this payment method in Northern Ireland (in contrast to the position in Great Britain). Phoenix therefore worked hard to introduce PAYG metering as a positive solution for customers. PAYG metering proved a very popular solution for natural gas customers. Today, on average, two out of every three new meters installed in Phoenix’s existing Licensed Area are PAYG.

In the early years, the only PAYG metering solution available to consumers was achieved through the use of Great Britain-style quantum meters. These meters provided a PAYG facility but also a debt repayment facility. Phoenix believed that this technology was overly complicated for customers who were happy to use PAYG metering. Phoenix had always had responsibility for procuring domestic size gas meters and therefore started to explore with meter manufacturers the opportunity of developing a simpler, less expensive, PAYG metering solution that did not have any debt facility. In partnership with Landis and Gyr, Phoenix developed such a meter, which had the advantage of being simpler to use, less expensive to build, and less problematic with regards operation than the traditional quantum meter. Following a successful operational trial, Phoenix adopted this new meter as the PAYG metering solution for customers.

The new PAYG meters resulted in reduced capex but also delivered operational cost savings. The reduced complexity relative to the traditional quantum meter means there are three times fewer call-outs per year due to meter issues. The benefit in the reduction in call-outs for meter problems continues to be passed onto customers as reduced opex forecasts.

Phoenix estimates that to date the construction cost savings of installing PAYG meters compared to the traditional quantum meter is c.£3m.

### **3. NATURAL GAS PREPARED HOMES AND LOCAL COUNCILS**

#### *NATURAL GAS PREPARED HOMES*

Although demand for natural gas may be generated in an area when the network is being physically constructed, it is not possible to connect consumers until construction of that network completes. This basic concept is a particular issue for new developments. New developments are central to the development of the industry; once an architect or a developer chooses to install natural gas, 100% of the properties within that development will connect to the network. If an alternative fuel is chosen, it is likely to be a significant time before these consumers would consider switching to natural gas. It is therefore essential that natural gas infrastructure is made available to new developments.

Phoenix identified an innovative solution to ensure that new developments within its existing Licensed Area but without access to the natural gas network at the time of construction (largely developments on the extremities of its existing Licensed Area), would ultimately connect. Phoenix worked with developers to ensure that natural gas infrastructure was constructed and service connections were made to each property and to natural gas standards. Consumers were initially supplied with gas via an underground Calor Gas tank and were converted to natural gas when Phoenix's network reached the development. These "natural gas prepared homes" ensure that Phoenix continues to connect all new build opportunities in its existing Licensed Area.

Phoenix will adopt a similar approach for the GTW Licensed Area and will meet with architects and developers to discuss the programme and design of natural gas prepared homes. Phoenix has already responded to some initial enquiries from architects and developers within the GTW Licensed Area on the principles of natural gas prepared homes.

#### *PUBLIC REALM SCHEMES*

Phoenix has had initial discussion with local councils in the GTW Licensed Area to understand their plans for Public Realm Schemes. Public Realm Schemes improve the overall look of a town by upgrading existing footpaths and pedestrian areas with high specification surfaces e.g. granite.

However it is much more expensive to excavate and reinstate high specification surfaces than traditional tarmac surfaces thereby increasing the overall cost of constructing natural gas network in public realm areas. Phoenix will continue to liaise with local councils to explore the opportunity of installing ducting in advance of any upgrade. Phoenix can then insert natural gas pipes through the ducting therefore minimising the cost of constructing the natural gas network when the network reaches the town.

Although this approach is more expensive than constructing natural gas network in a traditional tarmac surface, it is less expensive than constructing natural gas network in a public realm area where ducting has not been installed. This would deliver a better solution for members of the public



in the area and will provide a more positive image for natural gas which is of particular importance when trying to grow natural gas connections in a new area.

#### 4. KNOWLEDGE SHARING

Over the last c.17 years, Phoenix has hosted visits from gas companies in Brazil, Argentina, China, India, Egypt, Serbia and Great Britain who wish to understand and learn about the practices and processes adopted by Phoenix in developing the natural gas network in its existing Licensed Area.

Phoenix, as one of the largest privately funded greenfield gas distribution developments of its time, was a model of how to build a natural gas industry from scratch; from developing in-house resources, challenging traditions, to using new technologies which minimised cost and enhanced value for consumers. In the same vein Phoenix was keen to learn from these companies having a common saying that *“we are not too proud to steal someone else’s good idea.”*

This knowledge transfer continues through regular dialogue with companies such as firmus energy, Fulcrum connections and Bord Gáis Éireann. Phoenix is also an active member of the Institution of Gas Engineers and Managers (**IGEM**) and sits on its technical committees ensuring that new standards are appropriate for the Northern Ireland natural gas industry. Phoenix worked closely with IGEM to set up a local Irish Section which hosts regular technical briefings for those working in the industry.

Phoenix is also an active member of the Northern Ireland Safety Forum, the All Ireland and Great Britain Safety Forum, Energy and Utilities Skills, the Northern Ireland Joint Utilities Group, the Northern Ireland Road Authority and Utilities Committee, the Confederation of British Industry and a number of other organisations. Phoenix uses such opportunities to share experiences, to learn from operations in other areas of the natural gas industry or from different industries, and to incorporate that learning into its own operation.

## 5. RESOURCES

Natural gas was first made available in Northern Ireland in 1996. At this time there was therefore no local specialised skills base available to Phoenix to develop the industry. As the industry rapidly expanded it became necessary to develop resources on the basis that not only did Phoenix need more resource but so did the rest of the industry. It was an accepted fact that Phoenix would lose experienced resources to other parts of the industry and as such Phoenix had to develop a method of training technical staff in a way that ensured sufficient resource was always available to meet demand and that those resources were productive during their c.2-year training process.

One such approach was to revisit the way in which system control rooms were resourced. It was common practice that control rooms were manned by experienced engineers who took critical decisions on behalf of operational engineers during an emergency or incident. Phoenix decided that a better system would be to establish controlled processes and procedures within the control room, written by experienced operational engineers, that less experienced staff would follow as and when required to escalate any issue to an experienced operational engineer. This meant that the control room could be manned by less experienced staff and also provided an opportunity for Phoenix to develop these staff to become experienced operational staff as and when required.

It was also common practice for a control room to have less busy periods during the evening and overnight. Phoenix decided that a better system would be to utilise these periods to train control room staff and develop their engineering skills. This was achieved by tasking control room staff to undertake network design and costing and allowing them to develop their engineering skills in a controlled environment. This approach delivered further manpower efficiencies; fewer operational engineers were needed due to the network design and costing being completed in the control room and Phoenix was able to fill operational engineering vacancies e.g. when experienced resources moved to other parts of the industry, from the control room staff.

To compliment this, Phoenix established an IGEM recognised engineering development programme. This enabled engineering staff to progressively take on more technical roles e.g. undertaking live gas operations and participating in emergency standby rotas. To date this programme has advanced the development of a large proportion of engineers employed throughout the Northern Ireland natural gas industry.

Control room staff also undertake other core business activities during the less busy periods e.g.

- updating Phoenix's asset register with meter exchanges completed by emergency engineers
- monitoring security screens of the construction compound at Airport Road West thereby removing the need for 24-hour manned security at the compound. This delivered economic payback in just one year.

Phoenix, in conjunction with McNicholas and Phoenix Energy Services (“PES”), has also successfully developed staff via both the “upskilling” and the apprenticeship routes.

McNicholas have:

- developed over 30 apprentices;
- upskilled over 50 of their workforce i.e. making them multi-skilled e.g. the engineers fitting pre-assembled meters (see above); and
- developed the NVQ management skills of their management team

through the Phoenix contract. Significant funding has been leveraged from local Government via the Department of Learning (“DEL”), from Energy and Utility Skills (“EUS”) and from the Construction Industry Training Board (“CITB”). This funding has supported over 75% of the training and accreditation.

PES has developed a large number of service engineers via the apprenticeship route. PES:

- currently has 5 apprentices;
- has developed 31 apprentices who are now fully qualified:
  - 16 are working for PES; and
  - 15 are employed in other parts of the local natural gas industry.

Significant funding has been leveraged from DEL and from EUS. DEL also provides funding for the upskilling of qualified PES service engineers. Further details are provided in section 2.3 of the Phoenix Low Pressure Operational Business Plan.

Phoenix will, in conjunction with the construction contractor and PES, duplicate the approach to training, development and funding within its existing Licensed Area across the GTW Licensed Area.

## 6. SYSTEMS

Phoenix's core systems have been developed on a modular basis i.e. a central asset register is accessed by separate modules that support specific operational activities. This modular basis:

- provides flexibility for system development to support new or changing operational requirements;
- has proven significantly cheaper to develop and maintain than similar functionality systems utilised by other network operators; and
- enables Phoenix to adapt modules and develop new modules within much smaller timeframes than similar functionality systems utilised by other network operators.

The delivery of full domestic supply competition in Phoenix's existing Licensed Area is one example of the benefits of Phoenix's modular approach; Phoenix was able to specify, build and implement the required systems to support domestic customer switching within one year at a cost of c.£100k. This compares favourably both in terms of time and of cost to systems to support customer switching utilised by other network operators e.g. Phoenix understands that Bord Gáis Éireann, Northern Ireland Electricity and National Grid have each spent millions of pounds to deliver their switching systems.

Phoenix was also the first to provide a customer switching solution for the simplified PAYG Libra meter; Phoenix worked in conjunction with the meter manufacturer and one of the main payment collection outlets, Paypoint, to come up with an innovative solution whereby a PAYG consumer switching supplier would automatically pick up a message on their payment card at a nominated Paypoint outlet and this would automatically update their gas meter with their new supplier's information. Phoenix also sought agreement with the meter manufacturer that they would absorb a percentage of the development costs of the system. The cost to the natural gas consumer was therefore only c.£100k. If Phoenix had not sought to deliver a unique solution, PAYG switchers would have required a site visit from a service engineer to update their meter with their new supplier's information; based on the number of PAYG switchers to date, this solution has saved the natural gas consumer c.£1.2m.

Phoenix is currently evaluating field-based handheld technology to assist with work management of its emergency service, construction and maintenance activities. This technology would reduce the amount of paperwork and more readily facilitate communication from geographically dispersed areas.

Phoenix will duplicate the approach to developing systems within its existing Licensed Area across the GTW Licensed Area.

## 7. COMPRESSED NATURAL GAS VEHICLES

Phoenix is part of a consortium to introduce the first Compressed Natural Gas (“CNG”) vehicle into Northern Ireland. CNG is:

- natural gas that has been transported through the Northern Ireland gas networks;
- a cleaner fuel than diesel or petrol; and
- expected to compare favourably on cost.

CNG therefore offers the opportunity to lower emissions and to reduce travel costs. CNG will also reduce the overall cost of natural gas to the Northern Ireland consumer given the higher volumes of natural gas flowing through the networks.

CNG vehicles are already used in many of the larger European cities e.g. Madrid has c.3,000 buses and its entire refuse collection running on CNG. The consortium aims to introduce CNG into Northern Ireland by encouraging Belfast City Council to run its refuse collection on CNG. As Phoenix and its contractor have a significant fleet of vehicles, Phoenix is also exploring the possibility of running its own fleet on CNG.

With renewable transport targets for member states set at 10% for 2020, significant opportunity and progress must be made. This initial opportunity identified within Belfast City Council and within Phoenix’s own fleet can be replicated throughout the current natural gas Licensed Areas. Phoenix is also committed to exploring CNG opportunities in the GTW Licensed Area which would provide opportunities for Councils, Translink, hospitals and haulage companies etc. to run their entire fleet on CNG.

In Sweden, c.50% of the CNG used for road fuel comes from renewable sources; organic waste and energy crops are used to produce biogas typically consisting of 60% methane, 35% Carbon Dioxide and 5% impurities. This biogas is cleaned using specialised scrubbing equipment and the methane injected into the natural gas grid. Phoenix is working with the consortium to explore the opportunities of biomethane (produced from anaerobic digestion plants) being injected into the natural gas grid in Northern Ireland. This would enable locally produced gas to be transported to any consumer connected to the natural gas grid.



## 8. UTILISATION SUPPORT TO CONSUMERS

Natural gas, being a low sulphur clean burning fuel, lends itself to the adoption of a number of techniques not available to oil. Some examples from Phoenix's existing Licensed Area are:

- Direct Firing of Drying and Baking ovens as opposed to the use of steam batteries or indirect firing;
- Load recuperative aluminium melting;
- Direct fired space heating;
- Radiant Tube space heating;
- Steam boiler flue gas recuperation;
- Combined heat and power systems; and
- Modular Boiler Installation to replace steam calorifiers.

While a number of suppliers/manufacturers are active within each of the seven categories, this was not the case when natural gas was introduced into Northern Ireland in 1996; Phoenix had to work closely with manufacturers, product suppliers, distributors, wholesalers, retailers and the wider trade to establish a proper supply chain that would enable consumers to benefit from the natural gas technologies available throughout the rest of the UK and across Europe. One of the key initiatives implemented by Phoenix was the annual Natural Gas Investment conference. This full day conference brought together several hundred senior representatives from various companies involved in the natural gas product supply chain across the UK and Europe to showcase the investment opportunities in Northern Ireland. This conference stimulated interest and enabled these companies to establish a 'presence' in Northern Ireland which opened technology opportunities to consumers converting to natural gas.

Phoenix also provided full conversion project management support for consumers converting to natural gas by:

- introducing the new products;
- helping with installation design;
- providing a choice of appropriate installers; and
- assisting on economic business cases to justify the investment in natural gas technology.

Phoenix also supported the development of the industry by holding numerous seminars to extol the benefits of combined heat and power, direct firing and energy efficiency including decentralisation.

Phoenix also held the annual Gas Energy Management Awards to showcase modern gas utilisation techniques to a broad spectrum of existing and potential gas consumers.

Phoenix continues to encourage individual consumers to investigate technologies appropriate to their specific needs. This support and advice continues to be provided daily by Phoenix's Energy Advisors and monthly at the meetings of the Northern Ireland Natural Gas Association ("**NINGA**"):

#### *Northern Ireland Natural Gas Association*

NINGA has a strong industry brand identity that is owned and operated by Phoenix with installation companies attending monthly meetings of the association. NINGA has been influential in developing the skills base of the local industry, tackling issues of quality, marketing skills, supply chain issues, as well as training.

The monthly events continue to attract up to 200 companies and are particularly useful in the development of new Gas Safe Registered Installation Companies as they develop their skills to effectively promote and install natural gas to their customer base.

The NINGA brand is well recognised within the wider Northern Ireland plumbing and heating fraternity, regularly featuring in regional trade magazines, lobbying on industry issues and facilitating industry events such as the launch of the Boiler Replacement Allowance.

The development of a NINGA 'West' branch is key to establishing a working proactive independent trade in the GTW Licensed Area.



*Picture: Nelson McCausland MLA launches the Boiler Replacement Allowance at NINGA*

#### *NINGA website*

In 2012 Phoenix developed a bespoke NINGA website that offers additional real time support to companies listed on the Phoenix Register of Listed Installation Companies. The information available on this website is multifarious, initially offering functional information installers regularly require such as a real time gas availability checker, a gas vs. oil fuel tracker and key industry contact details. The website also offers such companies a wealth of industry material built up over many years that is designed to assist them with promoting

natural gas in their local area. Finally an online shop allows such companies to order items such as promotional leaflets, business cards and advertising boards.

#### *NINGA Committee*

In 2012 Phoenix established the NINGA Committee whose membership is made up of a range of personnel representing a range of different industry sectors.

The NINGA Committee have offered the wider industry, which employs up to 3,000 people, a voice not only within the industry but a voice to consumers.

Phoenix envisage the NINGA Committee embracing industry members from the GTW Licensed Area and using their vast years of natural gas experience to play a key role helping to inform stakeholders and consumers and assisting those companies less experienced.

Further detail is provided in section 7.2 of the Phoenix Low Pressure Operational Business Plan.

Although Northern Ireland has a well-established natural gas supply chain, Phoenix envisages having to reintroduce some of these approaches in the GTW Licensed Area to ensure that natural gas conversions happen in all sectors and aims to replicate the technical support and project management support currently offered by its Sales Advisors.

## 9. LEVERAGE OF FUNDING

In the early stages of its development, Phoenix identified the significant contribution that Government could make to the success of the natural gas industry; Government owned and run properties make up a significant proportion of the total properties within Phoenix's existing Licensed Area and it was therefore essential that Phoenix worked effectively with local Government to convince them of the benefits of converting to natural gas.

The Northern Ireland Housing Executive ("NIHE") is the single public sector housing body in Northern Ireland. Phoenix established a professional working relationship with the NIHE and in 2001 persuaded them to adopt the policy that natural gas would become its fuel of choice (where natural gas was available) for all heating replacements on its 15-year replacement cycle. This was an important milestone in Phoenix's and the Northern Ireland natural gas industry's development; the NIHE has over 40,000 properties within Phoenix's existing Licensed Area and to date over 30,000 have converted to natural gas. The close and trusted working relationship between Phoenix and the NIHE means that the number of natural gas conversions are maximised each year. Joint planning of operations means that in some instances network construction is rescheduled to meet the NIHE's timescales and in other instances heating system replacements are delayed to allow Phoenix time to construct the network. This approach has been essential in delivering a successful industry in Phoenix's existing Licensed Area; almost one-in-five properties connected to the natural gas network are NIHE properties and seven out of ten NIHE properties are using natural gas. The total cost of the heating system conversions undertaken by the NIHE is c.£100m and is funded by Government. This has significantly reduced the cost of natural gas for all consumers by increasing the volumes of gas transported by Phoenix through its network and by preventing the need for Phoenix to provide a financial incentive to NIHE tenants to connect to natural gas.

Phoenix has adopted a similar approach with all local Government agencies e.g. Health Trusts, schools, the Police Service of Northern Ireland, the Ministry of Defence, and Government own property management departments. Phoenix has convinced each of these agencies that natural gas is the way forward and that a conversion programme should be established for their properties. This has proven successful with the vast majority of local hospitals, primary and secondary schools, police stations, Ministry of Defence bases and Government buildings converting to natural gas. This has significantly reduced the cost of natural gas for all consumers by increasing the volumes of gas transported by Phoenix through its network and by preventing the need for Phoenix to provide significant financial incentives.

Phoenix also pioneered the Boiler Scrappage Scheme in Northern Ireland. This scheme was in operation in Great Britain but had not been introduced by the Northern Ireland Executive. Phoenix used its regulated incentive money to design and implement a grant which mirrored the contribution that utilities in Great Britain made towards the Great Britain scheme. The Phoenix Boiler Scrappage Scheme proved successful generating several thousand new connections. Phoenix's success encouraged local Government to introduce a Boiler Replacement Allowance for Northern



Ireland with funding of c.£12m. Phoenix also works closely with other funds such as the Northern Ireland Sustainable Energy Programme and Warm Homes to identify and 'handhold' the consumer through the conversion process.

Phoenix will continue to build on these relationships and work closely with such agencies to coordinate network construction and consumer conversion programmes to ensure that the roll out of natural gas in the GTW Licensed Area is as successful as in its existing Licensed Area.

## **10.DEVELOPMENT OF GAS NETWORK IN THE GTW LICENSED AREA**

Phoenix details comprehensive plans to develop the natural gas network in the GTW Licensed Area in the Phoenix Low Pressure Operational Business Plan submission.

The GTW Licensed Area is remote from Belfast. It would not be practicable or cost effective to consolidate operational activities for Phoenix and the GTW business in Belfast. Instead efficiencies can be achieved by having an operations depot in Omagh.

Omagh will provide a more centrally located base for Phoenix's operational staff and for Phoenix's construction contractor operating within the GTW Licensed Area than at Phoenix HQ. Further details of staff deployment etc. are covered in the Phoenix Low Pressure Operational Business Plan.

A site in Omagh would mean that, excluding Derrylin at c.40 miles, all other towns within the GTW Licensed Area would be a similar distance from the operations depot in Omagh as towns within Phoenix's existing Licensed Area are from the operational base in Belfast i.e. c.25 miles.

Phoenix's construction contractor operating within the GTW Licensed Area will manage a number of temporary yards for storing materials etc. to support the high level of network construction required in each town in the early years. This proved an effective and efficient practice when constructing the network within Phoenix's existing Licensed Area,

Phoenix recognises that there may be some operational differences between its existing and the GTW Licensed Area and believes that such issues can be reduced with careful project management e.g. constructing three services in one day in Enniskillen should deliver a similar unit cost of connection as constructing three services in one day in Belfast. Distance only becomes a significant factor if the numbers of activities undertaken at a given location are not maximised e.g. constructing three services in one day - one in Enniskillen, one in Dungannon and one in Strabane - would deliver a higher unit cost of connection than constructing three services in one day in Enniskillen. In the early years it may therefore be necessary to connect properties in each town on individual days to ensure that the optimum number of activities are undertaken each day e.g. connect properties in Omagh on a Monday, Strabane on a Tuesday etc.

As detailed in the Phoenix Low Pressure Operational Business Plan, Phoenix has the skills and experience within its current operation to deliver a successful network, customer connections and wider natural gas industry. Through utilisation of these skills, Phoenix's policies, systems and procedures and with further training and development of additional staff in Phoenix's tried and tested staff development programmes, Phoenix is confident that it can make the GTW Licensed Area as successful as its existing Licensed Area.

## 11. SUBSTITUTION OF HIGH PRESSURE PIPELINES – ALTERNATE DESIGNS

### *Overview*

Phoenix, in the c.17 years of operation to-date, has amassed considerable experience in network planning, design, construction and operation. The design aspect of this includes the development of high level and detailed network analysis models. For the purposes of this section of the application, Phoenix has created high level models based upon the load and customer data supplied by Fingleton McAdam (“FMA”). These models have been used to evaluate the feasibility of substituting LP pipelines for High Pressure (“HP”) pipelines.

It should be noted that the following analysis is based purely on the information provided by FMA. Phoenix has not carried out the detailed load and route surveys required to provide robust, detailed designs and costs for the alternative designs. Following licence award, Phoenix will carry out the detailed design work that is required in order to verify the feasibility or otherwise of these designs.

In line with the published criteria from DETI, Phoenix has also examined the feasibility of extending the network to *more remote geographical areas* beyond the towns covered by this application. Phoenix understands that there is considerable desire across Northern Ireland for natural gas to be made available and indeed notes a recent request by MLA Tom Elliott that the Clogher Valley be added to the GTW project.

As part of this application, Phoenix has examined the feasibility of connecting towns in the near vicinity to the GTW project but would suggest that, upon award of licence, a work strand be developed with UR to investigate the viability of other possible extensions.

For clarity, the assumptions made in carrying out this study are:

- loads and peak network demands are as per the FMA study;
- load growth beyond the FMA report have not be considered;
- desktop route surveys have been carried out – detailed site surveys are required in order to validate the feasibility of these proposals;
- all prospective customers can be supplied from a LP pipeline i.e. there is no requirement, for process reasons, for HP; and
- the design for supplying Strabane from LP pipelines comprises three separate scenarios:
  - Supply Strabane only with the expected flows as per the FMA report;

- Supply Strabane with additional capacity being made available to supply Lifford (which is small town across the river Foyle from Strabane. Lifford is in the Republic of Ireland and, as such is outside the remit of UR. The possibility of cross border cooperation could be considered – this project could be eligible for EU funding under Projects of Common Interest). The actual gas load requirements for Lifford have not been fully assessed as part of this study;
- Supply Strabane, Lifford and with additional capacity being made available to supply Letterkenny (which is the largest town in Donegal. As with Lifford the possibility of cross border cooperation could be considered). As with Lifford, the actual gas load requirements for Letterkenny have not been fully assessed as part of this study.
- the design for supplying Derrylin from LP pipelines will have some additional spare capacity. Some of this capacity could be used to supply the town of Ballyconnell. As with Lifford, this is a small town in the Republic of Ireland. It lies approximately 8km from the village of Derrylin. The actual load requirements for Ballyconnell have not been fully assessed as part of this study.
- The design for supplying Cookstown from LP pipeline will pass adjacent to and may have the capacity to supply the town of Coalisland. The load requirements for Coalisland have not been fully assessed as part of this study.

### *Methodology*

A model was created that replicated the basic configuration of the HP system as proposed by FMA. In other words, the same lengths, pipe details and routes as the FMA study were used. A replica model was then developed to operate at Distribution Pressures and using the maximum diameters that have been employed in the Phoenix network.

This model was used to discount, or otherwise, the possibility of using Distribution Pressures (LP pipelines) as an alternative to HP pipelines. The figure below shows the FMA arrangement, with the towns to be connected in red, the proposed pipeline as designed by FMA in green and the existing HP pipelines as operated by BGE(NI) in purple.





Pipeline Run No.	Description	Nominal Diameter (mm)	Approx. Length (km)	Design Flow (kSCMH)	Design Pressure (bar)
2	Derryhale AGI to Dungannon AGI	250	28	48	85
3	Dungannon AGI to Cookstown AGI	150	17	13	85
4	Dungannon AGI to Omagh AGI	250	38	23	85
5	Omagh AGI to Enniskillen AGI	200	35	12	85
6	Enniskillen AGI to Derrylin AGI	200	23	6	85
7	North-West Pipeline to Strabane AGI	150	28	7.5	85

This design requires Above Ground Installations (“AGI”) for reducing the pressure of the gas from HP for introduction into LP pipelines. The AGIs considered as part of this study are as listed in the table below.

<b>AGI Name</b>	<b>Flow (kSCMH)</b>
Dungannon	12
Cookstown	13
Omagh	11
Enniskillen	6
Derrylin	6
Strabane	7.5

### *Revised Transmission Proposals*

In order to transport the quantities of gas specified in the FMA report, a portion of the proposed transmission system is required. Using the network analysis model mentioned above, it will be possible to construct some of the network at either 7bar or 4bar.

Phoenix, as part of its innovative design and operation of its existing network, has renowned expertise in the construction and safe operation of 7bar HDPE and 7bar to 4bar Intermediate Pressure Reduction Stations (“IPRSs”). It is this expertise that enables Phoenix to offer this revised transmission proposal. To date Phoenix has constructed and is operating c.100km of 7bar pipeline and 36 IPRSs.

The revised design is as follows:

- the pipeline from Derryhale to Dungannon and the one from Dungannon to Omagh remain as per the FMA proposal;
- the pipeline from Omagh to Enniskillen is substituted by 355mm PE operating at 7bar;
- the pipeline from Enniskillen to Derrylin is substituted by 315mm PE operating at 4bar. It is assumed that the source for this will be an Intermediate Pressure Reduction Station installed as part of the distribution system to feed Enniskillen;
- the pipeline from Dungannon to Cookstown is substituted by 315mm PE operating at 7bar. It is assumed that the AGI supplying Dungannon will also supply this main; and
- as stated above, the pipeline feeding Strabane presents three possibilities – supplying Strabane only, supplying Strabane and Lifford and supplying Strabane, Lifford and Letterkenny;
  - Option A – Strabane only: is substituted by 315mm PE operating at 4bar. It is assumed that an AGI will be built to supply gas from the North West Pipeline;
  - Option B – Strabane and Lifford;
  - Option C – Strabane, Lifford and Letterkenny.



Pipeline Run No.	Description	Nominal Diameter (mm)	Material Steel/PE	Approx. Length (km)	Design Flow (kSCMH)	Design Pressure (bar)	End Pressure (bar)
2	Derryhale AGI to Dungannon AGI	250	Steel	28	48	85	N/A
3	Dungannon AGI to Cookstown	315	PE	12	13	7	5.0
4	Dungannon AGI to Omagh AGI	250	Steel	38	23	85	N/A
5	Omagh AGI to Enniskillen	450	PE	46	12	7	6.0
6	Enniskillen to Derrylin	315	PE	27	6	4	3.2
7 (A)	North-West Pipeline AGI to Strabane	315	PE	24	7.5	4	2.9
7 (B)	North-West Pipeline AGI to Strabane, Capacity of 800 scmh for Lifford	315	PE	24	8.3	4	2.6
7 (C)	North-West Pipeline AGI to Strabane, Capacity of 800 scmh for Lifford, 10,000 scmh for Letterkenny	450	PE	24	18.3	7	6.0

*Note: Designs 7B and 7C do not include the mains that would be required to supply Lifford or Letterkenny.*

The revised designs result in a reduction in the number of AGIs required, as detailed in the table below.

<b>Name</b>	<b>Type</b>	<b>Flow (kSCMH)</b>
Dungannon	AGI	12
Cookstown	Not required	13
Omagh	AGI	11
Enniskillen	Not required	6
Derrylin	Not required	6
Strabane	AGI	7.5

### *Conclusion*

From this analysis that Phoenix has carried out, subject to the assumptions mentioned above, there is considerable scope for considering substituting LP pipelines for HP pipelines. The total length of HP pipeline required would drop to approximately 66km from 169km while, based on these preliminary designs, 109km of LP pipeline would be substituted.

The construction costs of LP pipelines are considerably less than the construction of HP pipelines. Indicatively Phoenix has estimated a possible net saving of c.£15m to c.£20m compared to the FMA costs.

Immediately upon award of Preferred Bidder Status, we will begin the detailed load surveys/design works/stakeholder engagement required in order to finalise the feasibility or otherwise of these designs and the possibility of supplying the town of Coalisland. Similarly Phoenix will engage with UR to investigate the feasibility of making capacity available for other towns in Northern Ireland and for cross-border supplies to Lifford/Letterkenny/Ballyconnell.