Department for
Business, Energy
& Industrial Strategy

# NATIONAL PREVENTIVE ACTION PLAN: GAS

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# National Preventive Action Plan: Gas



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# 1. Executive summary

Over the period 2016-18, as set out in the UK Risk Assessment on Security of Gas Supply, the UK gas market is well placed to remain resilient, to all but the most extreme combination of severe infrastructure failure or supply shocks. The Risk Assessment described a number of preventive actions which have been or are being taken to continue to improve the security of gas supply. This Preventive Action Plan (PAP) provides additional commentary on the measures being implemented.

1.1. In September 2016, the UK Government updated its assessment of the risks affecting the security of gas supply in the UK. The Risk Assessment[1] was undertaken pursuant to Article 9 of Regulation (EU), Security of Gas Supply No. 994/2010[2] ('the Regulation'). The findings of the 2016 Risk Assessment were published in October 2016. The Risk Assessment additionally covered in detail a number of preventive actions which have been and are being taken to continue to improve the security of gas supply.

1.2. In line with the Regulation, this PAP contains additional commentary on the measures being implemented which will reduce risks to gas security. However, it does not seek to unduly duplicate the details already set out in the Risk Assessment.

1.3. The Risk Assessment demonstrated that, as a consequence of a mature market coupled with a significant and diverse supply capability and associated infrastructure, the UK is well placed to deliver high levels of security of gas supply. The approach taken in this PAP is to briefly summarise the results of the Risk Assessment published in October 2016, and to provide an update on the supplementary risk reduction measures described in the 2014 PAP. These include:

- The Gas Security of Supply Significant Code Review (Gas SCR) including proposals for a demand side response mechanism;
- The Wood Review;
- The Capacity Market; and
- Initiatives to develop shale gas resources.

Work is also underway between the UK and Ireland to meet EU internal market aims, through implementing new gas network codes.

1.4. The existing National Emergency Plan: Downstream Gas and Electricity (NEP) has also been reviewed in conjunction with the development of this PAP. The NEP is an evolution of an existing and well exercised plan and as such is produced as a separate

[1] https://www.gov.uk/government/publications/uk-risk-assessment-on-security-of-gas-supply-2016
[2] Regulation (EU) No 994/2010 of the European Parliament and of the Council of 20 October 2010 concerning measures to safeguard security of supply and repealing Council Directive 2004/67/EC.

document. The NEP contains measures to be taken to remove or to mitigate the impact of a gas supply disruption in accordance with the Regulation.

# 2. Introduction

In keeping with the requirements of the Gas Security of Supply Regulation (EU) No 994/2010, this PAP contains a brief summary of the measures needed to mitigate the risks to the security of gas supply in the UK.

2.1. Both the PAP and the NEP are an evolution of the respective documents published in 2014. The revisions of the PAP and NEP take into account comments made regarding the 2014 plans as outlined in the Commission Opinion document of 2nd March 2015. An Explanatory Memorandum of the 2014 UK PAP and NEP, addressing the points raised in the Commission Opinion document, was published by BEIS in July 2015[3]. The documents also include updates and feedback from a number of stakeholders consulted during 2016.

2.2. Stakeholders consulted, as appropriate, in the preparation of both the PAP and NEP were: National Grid, the Office of Gas and Electricity Markets (Ofgem) as the national regulatory authority in Great Britain, Health and Safety Executive (HSE) as the independent safety regulator in Great Britain, the Northern Ireland Authority for Utility Regulation (NIAUR) and the Department for the Economy (DfE) in Northern Ireland. The contents have also been shared with Irish authorities in the spirit of the UK/Ireland approach to regional co-operation, which has also produced a Joint Preventive Action Plan to cover agreed actions between Ireland, Northern Ireland and Great Britain.

2.3. This is a national PAP for the UK and as such embraces measures for both Great Britain and Northern Ireland. It also recognises specific initiatives underway between Northern Ireland & Ireland and supports the development of regional cooperation measures and agreements.

[3] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/452767/PAP_and_NEP_Explanatory_Memorandum.pdf

# 3. Risk Treatment

The UK Risk Assessment, published in October 2016, identified and assessed the impact of a reasonable worst case supply shock and highlighted case studies of events that have in the past caused market tightness. It found that over the period 2016-18, the UK gas market is well placed to remain resilient to all but the most extreme combination of severe infrastructure failure or supply shocks.

3.1. In September 2016, in line with the Regulation, the UK Government carried out an updated assessment of the risks affecting the security of gas supply in the UK. The Risk Assessment was based on a number of common elements as set out in the Regulation, including assessment of the Infrastructure Standard and Supply Standard, a description of the market, stress tests, and interactions with other Member States. In turn, this PAP is formed on the basis of the aforementioned Risk Assessment.

3.2. The Risk Assessment identified and assessed the impact of a supply shock equivalent to the loss of the largest single piece of gas supply infrastructure (the 100km Felindre pipeline connecting the two liquefied natural gas (LNG) terminals located at Milford Haven to the National Transmission System (NTS)) over the course of a day, week, month and entire winter and under both average and severe demand conditions. The Risk Assessment also included a series of three case studies to give an idea of events that have in the past caused supply shocks.

3.3. The Risk Assessment recorded that the N-1 calculation[4] resulted in a value of 127% (Appendix III) thereby meeting the Infrastructure Standard. A series of calculations to 2035 also demonstrated that, based on current information, the Infrastructure Standard continues to be met to 2035 (Appendix IV).[5]

3.4. With regard to the Supply Standard, cold spell analysis[6] in the Risk Assessment demonstrates that the UK achieves the requirements to ensure gas supply to protected customers even during 1-in-50 winter conditions. This analysis is supported by numerous reports and analysis including biannual summer and winter outlook reports as published on the Transmission System Operator's (TSO) website. In practice, the UK achieves the requirements of the Supply Standard through sharp commercial incentives, on

[4] The N-1 formula describes the ability of the technical capacity of the gas infrastructure to satisfy total gas demand in the calculated area in the event of disruption of the single largest gas infrastructure during a day of exceptionally high gas demand occurring with a statistical probability of once in 20 years.

[5] The Joint Preventive Action Plan (JPAP) uses a look ahead figure for 2016/17 and as such notes a different result of 141%under a "Gone Green Scenario".

[6] Includes charts of the measures, volumes and capacities and timings as required by the Regulation.

shippers/suppliers, specifically the ‘cash-out’ regime to provide sufficient gas to meet the needs of all their firm customers on any gas day and under any weather conditions or other circumstances.[7]

3.5. In summary, the results of the Risk Assessment suggest that the UK gas supply infrastructure is resilient to all but the most unlikely combinations of severe infrastructure and supply shocks. However, the UK Government is not complacent and this PAP details risk reduction measures currently being progressed. In the medium to long term, there may be further challenges.

3.6. Gas demand from the electricity generation sector is expected to increase as gas fired plants replace coal fired power plants, which will progressively close due to the requirements of the Large Combustion Plant and Industrial Emissions Directives. Flexible gas fired generation will also be necessary to provide marginal electricity balancing as more renewable energy sources are installed. This is an area which will continue to be monitored and, if appropriate, mitigating steps will be identified and implemented to manage any potential impact.

3.7. The Transmission System Operator, National Grid, has undertaken scenario-specific analysis of our gas market within the context of unavailability of the Rough storage site (which accounts for around [75%] of GB’s gas storage by volume) for the whole of winter 2016/17 and the impact of Rough being unavailable coupled with an outage to Norwegian supplies. This analysis shows that in the former, under these conditions, there is sufficient capability to meet demand without the requirement for any additional market action whilst in the latter GB demand could be met without the need for Demand Side response (DSR)[8]. Nonetheless, we cannot completely rule out the possibility of a gas deficit under very stressed scenarios involving unlikely combinations of significant supply disruption, severe weather, or infrastructure failure. For this reason, we have also reviewed our emergency management procedures and are satisfied that these arrangements are well-understood by industry and the TSO and best developed to ensure the safety of the gas grid.

[7] The ability of shippers to meet demand under all circumstances, in response to the incentives, is of course subject to the shippers continuing to access the necessary credit and remain in business. There could come a point at which a shipper would become insolvent.
[8] http://www2.nationalgrid.com/UK/Industry-information/Future-of-Energy/FES/Winter-Outlook/

# 4. Risk Reduction Measures

The Risk Assessment makes it possible to identify key areas for development in order to improve resilience within the gas sector. Whilst it demonstrates that the UK's security of supply position is strong, the UK Government is not complacent and continues to work to reduce any security of supply risks and has arrived at six key proportionate risk reduction measures for the security of gas supply that effectively form the main preventive actions in this plan.

4.1. The UK has a liberalised, competitive energy market, which operates within a strategic framework set out by the Government. This approach ensures that commercial incentives combine with efficient processes to mitigate and manage the risks of any interruption. A more comprehensive description of this framework is provided in section 5. Moreover, in line with the Regulation, the practice of examining the results of the Risk Assessment and the Risk Treatment detailed above crystallises the way in which the UK has arrived at six key proportionate risk reduction measures for the security of gas supply these are:

- The Gas Significant Code Review (SCR) including proposals for a demand side response mechanism
- The Wood Review
- The Capacity Market
- Initiatives to develop shale gas resources
- Amendments to the Gas Safety (Management) Regulation 1996
- Regular Systematic Assessments of Risk to the GB Gas System.

4.2. It should be noted, however, that the UK Government sees monitoring the market, risk assessment and the application of risk reduction measures as a continual activity and may implement other measures as necessary to ensure security of supply.

## The Gas SCR including proposals for a demand side response mechanism

4.3. Ofgem began its Significant Code Review (SCR) in 2011 in response to concerns with gas emergency arrangements. The Gas SCR process included extensive stakeholder engagement on the ways in which current market arrangements could be improved to further enhance security of supply. The conclusions of the Gas SCR introduced reform to cash-out arrangements and set out a process for the development of a Demand Side Response (DSR) mechanism.

4.4. Previously, cash-out prices were frozen during a Gas Deficit Emergency (GDE), a period where there is a risk of insufficient gas supply to maintain safe operating pressures

in the gas network. Frozen cash-out prices meant the incentive to bring gas to the GB market could be weakened at precisely the time when it should be sharpest. The conclusions of the Gas SCR included unfreezing cash-out prices so that they can reflect market conditions during an emergency, with no cap on prices. These changes to cash-out arrangements came into effect on 1 October 2015.

4.5. In their final impact assessment on the SCR changes (published February 2014) Ofgem noted that it is possible that some shippers may choose not to take steps to mitigate the effects of a GDE. If the reforms increased the potential costs of a GDE to shippers, and "the probability of a GDE occurring is non-zero, we would question whether this is a rational response. Crucially then, to the extent that shippers respond to our proposed reforms …, they will reduce the likelihood of a GDE occurring in the first place, thus improving GB security of supply."[9]

4.6. The conclusions of Ofgem's Gas SCR placed an obligation on National Grid to develop a centralised demand side response mechanism to encourage greater demand-side participation from industrial and commercial users. National Grid's proposed DSR methodology has been approved by Ofgem and was implemented on 1st October 2016. This new DSR mechanism will allow end gas users to signal their willingness to make additional DSR energy quantities available following a Gas Deficit Warning. It is expected that, in some cases, this may provide sufficient additional system balancing volumes to avoid the system entering later stages of an emergency.[10]

## The Wood Review

4.7. In 2013 the then Secretary of State for Energy and Climate Change commissioned the Wood Review, an independently led review into maximising economic recovery from the UK Continental Shelf (UKCS). The Wood Review made four key recommendations to maximise economic recovery from the UKCS. These were:

- Government and industry to develop and commit to a new strategy for Maximising Economic Recovery from the UKCS (MER UK).

- BEIS should create a new independent body (the Oil and Gas Authority), responsible for operational regulation of the UKCS, focused on supervising the licensing process and maximising economic recovery of the UK's oil and gas reserves in the short, medium and long terms. The new body should take additional powers to facilitate implementation of MER UK.
- To underpin delivery of the new MER UK strategy, Government should fully utilise its existing powers and take a series of additional powers and sanctions, for example

[9] https://www.ofgem.gov.uk/sites/default/files/docs/2014/02/1402_gas_scr_ia.pdf
[10] https://www.ofgem.gov.uk/publications-and-updates/gas-security-supply-significant-code-review-conclusions

establishing a clear system of (private) informal and (public) formal warnings which could ultimately lead to the loss of operatorship and then license.

- The new body should work with Industry to develop and implement the six sector strategies outlined in the Wood Review (covering exploration, asset stewardship, regional development, infrastructure, technology and decommissioning), along with suggested actions

The review also predicted that full implementation may see an addition 3-4 billion barrels of oil equivalent (boe) produced from the UKCS over the next 20 years.

The Government has now fully implemented the Wood Review recommendations. The Government published the Maximising Economic Recovery strategy in March 2016 and have established the Oil and Gas Authority as a fully effective, independent steward and regulator of offshore oil and gas recovery. The Oil and Gas Authority is working with industry and cooperating with its counterparts in neighbouring North Sea countries to maximise economic recovery of the UK Continental Shelf.

## The Capacity Market

4.8. The Capacity Market is a market-wide mechanism open to all providers of power generation that are able to supply reliable capacity, including demand side response and storage, (except for providers in receipt of support from other policy measures) in order to avoid over-compensation and deliver value for money.

4.9. Gas plants are expected to play an important role in the Capacity Market because they have the potential to provide reliable capacity. The Capacity Market provides an upfront payment, which will make investment in new gas plants less risky and help deliver the investment in gas plants needed to ensure security of electricity supply. It includes financial penalties for non-delivery of electricity at times of system stress, so will also strengthen incentives for the provision of resilient gas supply chains and sufficient storage.

## Shale Gas

4.10. A study published by the British Geological Survey in June 2013 estimated gas in place of over 35,000 bcm in the Bowland-Hodder shale formation in the north of England, with 4.4 billion barrels of shale oil estimated to be present in the Weald Basin. The Shale Gas team in the Department for Business, Energy and Industrial Strategy (BEIS) works closely with regulators and industry to support the development of the UK's shale industry whilst ensuring robust regulations are in place to safeguard public safety and protect the environment. Shale gas companies have received planning permission for projects to test the flow of gas in Lancashire and North Yorkshire, which will help the industry assess the commercial viability of production from the Bowland-Hodder formation.

4.11. Government activities continue to focus on building the conditions to enable safe exploration of the potential of UK shale gas. This included delivering the underground access clauses of the Infrastructure Act 2015, which simplified the procedure for accessing land over 300m underground for the purposes of oil and gas extraction and geothermal energy. In August 2015, a joint DCLG-BEIS Ministerial statement emphasised that local authorities should ensure planning decisions are made within statutory timeframes and we have provided funding to support them in this.

## Amendments to the Gas Safety (Management) Regulation 1996

4.12. Currently schedule 3 of the Gas Safety (Management) Regulation GS(M)R means that only gas with a relatively narrow Wobbe Index (WI) range can enter GB gas networks without being processed.

An increase in the importation of gas over time has meant an increase in processing costs in order to make it fit the current regulations. This is expensive with the overall cost expected to increase as we import more gas.

Should the HSE (following an appropriate review) recommend that the WI range be extended (i.e. amend the requirement of schedule 3 of the GS(M)R then more gas would be able to enter the network without processing. This should reduce costs for both consumers and shippers and make GB's LNG terminals more attractive to shippers thus improving security of supply.

## Regular Systematic Assessments of Risk to the GB Gas System

4.13. The Government has introduced a process of regular, systematic assessments to examine the risks to the gas system over the longer term and the level of security we can expect it to deliver. We are currently undertaking the first fundamental assessment and expect to run these at approximately 5 yearly intervals. We will draw on this to undertake annual reviews in line with our Statutory Security of Supply Report commitments.

# 5. Framework

The strategic framework set out by the UK Government makes it possible to articulate the obligations on natural gas undertakings. Operating within this framework is a liberalised, competitive energy market providing strong commercial incentives. These combine with efficient processes to ensure effective risk mitigation measures.

5.1. The key elements of this overall framework are:

- The maximisation of economic production from indigenous resources;
- A well-functioning commodity market that delivers a high quality, reliable and competitive service to consumers;
- A well-functioning capital market that works with the Government to provide necessary levels of investment in energy infrastructure;
- An enabling regulatory framework that is set by the Government, in areas where the market acting alone might not achieve adequate levels of security; and
- Strong and diverse markets that are promoted both within the EU and internationally.

## Roles and Responsibilities

5.2. The roles and responsibilities of the key market participants are set out below:

- The respective Government departments – BEIS in Great Britain and DfE in Northern Ireland have a strategic role in ensuring that the overall policy framework is clear, safeguarding security of supply, supporting the necessary investment in energy infrastructure and promoting energy efficiency.[11]
- The regulators – Ofgem in Great Britain and the Northern Ireland Authority for Utility Regulation (NIAUR) in Northern Ireland – work within the framework set by the Government and are responsible, with the Government, for protecting the interests of both current and future consumers, including the security of energy supplies. Both regulatory authorities have a role in ensuring that licensed companies carry out their responsibilities with respect to protecting customers.
- Energy companies are responsible for delivering energy infrastructure and ensuring sources of energy are available to meet demand in a competitive market. To enable

[11] BEIS is responsible for energy policy for Great Britain. The DfE is responsible for energy policy in Northern Ireland as this is a devolved matter. Given the dependence of Northern Ireland on gas from Great Britain, a secure gas market in Great Britain supports a secure gas market in Northern Ireland.

competition there is legal separation between the transportation of gas and the shippers and suppliers that take ownership of the gas once it enters the network.

## Legislation

5.3. There are two main pieces of legislation that provide the GB framework under which the current gas emergency arrangements are set. These are the Gas Act of 1986 (the Gas Act) and the Gas Safety (Management) Regulations of 1996 (the GS(M)R). Northern Ireland has similar legislation as described in 5.17.

- **The Gas Act 1986** (as amended) is the fundamental legislation underlying the UK gas market, providing for the regulation of gas shipping, transport, and supply. It prohibits the shipping, transport, or supply of gas without a licence, unless an exemption has been granted by the Secretary of State. It also sets out the basic regulatory framework establishing Ofgem as the gas regulator, a Gas Consumers' Council (now Consumer Focus), and provides authority for the Secretary of State to require the promotion of energy efficiency. The Act has been subject to frequent changes to make sure it keeps pace with the evolving energy policy environment.
- **The GS(M)R** is the legislation which sets out the requirement for a network which has more than one gas transporter to have a Network Emergency Coordinator (NEC). The GS(M)R requires parties across the gas industry to cooperate with the NEC and each other (this duty is not specifically limited to preventing or minimising a gas supply emergency). The GS(M)R also places a duty on gas conveyors and the NEC to hold a safety case accepted by the Health & Safety Executive (HSE) and makes it an offence not to conform to an accepted safety case. The NEC safety case sets out the role and responsibilities of the NEC in the event of an emergency. This includes particulars of the procedures that the NEC has established to monitor the situation throughout a supply emergency and for coordinating actions across affected parts of the gas network. It also sets out the stages of a gas deficit emergency (GDE) that the NEC may declare in order to minimise the risk or impact of a supply emergency. Appropriately, these are described more fully in the NEP.

## Gas Licences

5.4. All persons licensed by Ofgem are required to comply with the conditions of their licences. The licences for the gas industry are categorised into transporter, shipper, supplier and interconnector licences. The licence conditions are separated into standard licence conditions which apply to all licensees, special licence conditions which are conditions specific to each individual licensee (e.g. National Grid Gas) and standard special conditions of licences which apply to a class of licensees. Licences for gas producers are issued by BEIS. Storage and LNG operators are regulated by Ofgem but

the regulatory requirements with which they have to comply are set out in the Gas Act, rather than in licences.

5.5. There is a licence condition for transmission system operators to plan the system to meet the 1-in-20 peak aggregate daily demand, including but not limited to, within day gas flow variations on that day. The condition states that the 1-in-20 peak demand level should be calculated to include the load reduction through interruption or for contractual reasons and requires that historic data from at least the 50 previous years should be used when identifying the 1-in-20 peak day.

## Incentives to supply sufficient gas

5.6. Gas shippers are incentivised to balance their gas supplies and demands through imbalance or 'cash-out' charges set out in the UNC:

- 'Short' shippers — those that have not put as much gas onto the system as their customers are taking off — are required to pay the System Marginal Buy Price[12] for the volume of gas for which they are short.
- 'Long' shippers — those that have put more gas onto the system than their customers are taking off — are paid the System Marginal Sell Price[13] for any additional gas they flow onto the system.

5.7. Thus in most circumstances long shippers would be paid less than they would have received from selling their excess gas in the market. Similarly, short shippers would usually be charged more than they would have likely paid for buying the gas in the market. Hence, there is an incentive for shippers to try to keep their supply and demand in balance.

5.8. The level of cash-out will generally reflect system tightness, so that cash-out will rise when supplies are scarce relative to demand. It is these short term cash-out prices that incentivise shippers to balance their positions and invest in sources of flexibility to allow them to hedge against higher imbalance charges in the future. In addition the TSO, can, as Residual System Balancer, through its balancing actions move the cash-out prices to drive the balance.

5.9. Cash-out is in line with the European security of supply objectives in Article 8(2) of Regulation 994/2010 as it is a market-based measure which does not distort competition nor hamper the internal market in gas.

[12] The System Marginal Buy Price is the greater of the system average price (average trade price at the on-the-day commodity market, OCM) plus 0.0263 pence/kwh and; the price of the highest balancing action offer price in relation to a Market Balancing Action taken by National Grid Gas for that day.
[13] The System Marginal Sell Price is the lesser of the system average price minus 0.0263 pence/kwh, and the price of the lowest balancing action offer price in relation to a Market Balancing Action taken by National Grid Gas for that day.

5.10. In particular, we believe that cash-out has a positive impact on the security of supply of both the UK and neighbouring Member States. Cash-out is designed to prevent supply deficit within Great Britain which, if it occurred, is likely to impact negatively on the flows of gas to the island of Ireland and Belgium. Furthermore, cash-out allows prices to rise to attract new sources of gas in a period of supply tightness and this is fundamentally important in attracting LNG to Europe in a global market.

## Transparency

5.11. National Grid widely publishes a range of data items on its website and is required to take a co-operative and co-ordinated approach with other TSOs through its activities within ENTSOG and the European Transparency Platform. National Grid publishes all the required data items stipulated in the third energy package within the obligated timescales. The National Grid website provides access to Operational Data to all relevant industry stakeholders, with the aim to reduce market uncertainty, reinforce equal access to information, and increase information transparency, facilitating efficiency in the capacity and energy markets whilst providing equitable and timely access to its operational and market information.

## Maintenance

5.12. To ensure a high level of safety and reliability in operation, it is essential that a system of inspection and maintenance exists for assets associated with the gas transmission and distribution network.

5.13. In accordance with each network's Safety Case, maintenance activities shall comply at all times with any statutory or legislative requirements, in order to meet legal obligations. The main legislative drivers are the Pressure Systems Safety Regulation 2000 (PSSR), the Pipeline Safety Regulations 1996 (PSR), the Equipment and Protective System Intended for Use in Potentially Explosive Atmospheres Regulations 1996 and the Electricity at Work Regulations 1989.

5.14. Maintenance, operational practices and procedures adopted by the networks are designed to optimise performance. This approach maximises overall reliability and reduces the risk of failure. It also produces minimal overall operating cost by increasing the useful life of pipelines and plant.

5.15. It is network policy to continually review operational and maintenance procedures and practices to ensure they remain valid. This review is based upon historic evidence from the existing strategy, the development of new maintenance techniques and operational feedback. This process is audited periodically.

## Legislation, Licences and Codes: Northern Ireland

5.16. For Northern Ireland, similar legislation mirrors that which is in force in GB. The relevant legislation is set out below.

5.17. The main piece of legislation with respect to emergency arrangements is the Gas Safety (Management) Regulations (Northern Ireland) 1997 (GS(M)R(NI)). The responsibility for enforcing GS(M)R(NI) rests with the Health and Safety Executive Northern Ireland (HSENI).

5.18. GS(M)R(NI) requires anyone conveying gas to have a safety case accepted by the HSENI. The legislation envisages two types of safety cases: one to be submitted by those conveying gas and one by the Northern Ireland Network Emergency Coordinator (NINEC), currently Phoenix Natural Gas Ltd. The NINEC and the lead TSOs (PTL and GNI(UK)) play the key roles when co-ordinating the response to an emergency.

5.19. The NINEC safety case must demonstrate the arrangements that the holder has established to coordinate the actions to be taken to prevent an emergency from occurring and actions to be taken during an emergency. The safety case of those conveying gas should include arrangements to cooperate with the NINEC, others conveying gas, and gas suppliers in the event of a gas emergency. There is also a requirement that arrangements are regularly tested.

5.20. The Energy (Northern Ireland) Order 2003 sets out the principal objective and duties of the DfE and NIAUR with regards to the protection of consumers. Both the DfE and NIAUR must carry out their gas functions having regard to the need to ensure a high level of protection of the interests of consumers of gas and to secure a diverse, viable and environmentally sustainable long-term energy supply.

5.21. The NIAUR may grant a licence to convey, supply and store gas under the Gas (Northern Ireland) Order 1996. The relevant licences contain conditions with respect to emergency arrangements and also to establish a network code which covers the steps to be taken by TSOs and shippers in the event of an emergency on the transportation system.

# 6. Other Preventive Measures

In addition to the strategic framework set out by the UK Government, other preventive measures are in progress and/or being monitored (in the case of potential medium to long term risks). This plan also records these preventive measures across the energy sector.

## Diversifying gas routes and sources of supply

6.1. The UK already has a large and diverse capacity to import gas from a wide range of import routes and sources. UK based shippers have access to: domestic production from the UK Continental Shelf; pipeline imports from Norway, Belgium and The Netherlands; and LNG imports from global markets through any of the 4 LNG regasification terminals. As the proportion of gas from the UKCS has declined, the market has provided strong, diverse import infrastructure. This has meant that storage has generally played the role of smoothing out price volatility (particularly inter-seasonally). In addition, withdrawals from storage and demand-side response provide additional flexibilities to ensure the gas network remains in balance. There are various proposals by commercial operators to expand this capacity further.

6.2. Gas Shippers are incentivised to secure diverse supplies through the balancing duty, which charges shippers for every unit of imbalance between their customers' demand from, and their input into, the National Transmission System.

6.3. Meanwhile, Government builds and maintains strong relationships with key gas producing countries and stands ready to help as required to facilitate any supply contracts domestic shippers wish to sign.

## UK Projects

6.4. National Grid's current annual 10 Year Statement (November 2016) lists the following projects:

**Proposed UK Import Projects:**

| Project | Operator / Developer | Type | Location | Start up | Capacity (bcm/y) | Status |
|---|---|---|---|---|---|---|
| Isle of Grain 4 | National Grid | LNG | Kent | - | - | Open Season |
| Norsea | ConocoPhillips | LNG | Teesside | - | - | Planning granted, no FID. |

| | | | | | | |
|---|---|---|---|---|---|---|
| LNG | | | | | | Currently on hold |
| Port Meridian | Port Meridian Energy | LNG | Barrow, Cumbria | - | 5 | Open Season |
| Amlwch | Halite Energy | LNG | Anglesey | - | ~30 | Approved Onshore |
| | | | | **Total** | **30+** | |

## Proposed Storage:

| Project | Operator | Location | Space (bcm) | Status |
|---|---|---|---|---|
| Gateway | Stag Energy | Offshore Morecambe Bay | 1.5 | Planning granted, no FID |
| Islandmagee | InfraStrata | County Antrim, Northern Ireland | 0.5 | Planning granted, no FID |
| King Street | King Street Energy | Cheshire | 0.3 | Planning granted, no FID |
| Preesall | Halite Energy | Lancashire | 0.6 | Planning granted, no FID |
| Saltfleetby | Wingaz | Lincolnshire | 0.8 | Planning granted, no FID |
| Whitehill | E.ON | East Yorkshire | 0.4 | Planning granted, no FID |
| | | **Total** | **8.7** | |

# 7. Regional Cooperation Measures

This is a National PAP for the UK and as such embraces measures for both Great Britain and Northern Ireland. This PAP also recognises specific initiatives underway between Northern Ireland & Ireland and supports the development of Regional Cooperation Measures and agreements.

7.1. In the event that a Member State cannot fulfil the N-1 Standard on a national basis, the Regulation permits the adoption of a regional approach towards meeting the N-1 Standard, by completing a Risk Assessment based on combined security of supply. Ireland does not currently meet the N-1 calculation criteria on its own and so partnered with the UK to create a Joint Risk Assessment. The Risk Assessments show that the UK meets the criteria both on a National basis and when considered jointly with Ireland. If a group of member states (in this case the UK and Ireland) complete a Joint Risk Assessment, they must also complete a Joint Preventive Action Plan (a Joint Emergency Plan is not required. See sections 7.3 – 7.4).

7.2. As evidenced below, the existing Regional Cooperation between the UK and Ireland is mature and this philosophy is embedded into existing protocols.

7.3. Regular all party Emergency Planning stakeholder meetings are held, Emergency Plans are aligned and tested collectively annually, and finally TSO-TSO dialogue occurs frequently. This approach recognises the overall dependence of the Island of Ireland on gas interconnectors with GB for security of supply, the size of the associated demand relative to that of the wider GB system and also that there is no wider connection of the gas network in Ireland to Europe and hence transit flows do not occur.

7.4. As a consequence it has been collectively agreed between the jurisdictions that the existing Emergency Plans and more detailed established operational protocols (which exist outside of the EU Framework) are satisfactory and therefore that a Joint Emergency Plan is not required. Further detail and examples of these arrangements are given below.

7.5. For example, here follows a description of security of supply fora and initiatives:

- The All - Island Energy Emergencies Group (AEEG): This group considers the issues with respect to all-island emergency planning. It comprises DfE, DCCAE, NINEC, regulatory authorities as well as the gas and electricity transmission and distribution system operators from both Northern Ireland and Ireland.
- The UK/Ireland Gas Emergency Group meets every 6 months to continue to pursue a regional approach to emergencies, in line with the requirements of Regulation 994/2010, to promote common terminology across the Island and with GB, and to support a strategic communications plan to be used during

emergencies. Its membership includes National Grid Gas, Ofgem and BEIS, and counterparts from Northern Ireland/Ireland.

7.6. Communications: While internal communications within companies are well developed, companies were keen to form and integrate communications links and develop protocols with each other and government. DfE and the Department of Communications, Climate Action and Environment (DCCAE) press offices have engaged with gas and electricity companies' press officers in their own jurisdictions to carry on the process of familiarisation with each other's processes and to learn how to translate technical information into public language. A joint communications strategy to be used during emergencies was agreed in September 2011 between the NI gas industry, the NI Regulator and DfE. Communications protocols continue to be reviewed during and subsequent to gas emergency exercises.

7.7. Joint All Island Load Shedding Plans: Arising from action agreed at the meeting on 9 December 2010, a sub-group of the All-Island Emergency Group was established to review the safety issues underpinning load shedding arrangements in each jurisdiction. The group met for the first time on 18 April 2011. It was agreed that safety and protection of customers is paramount and that the principles governing the safe operation of the system can and should be articulated in a streamlined manner using common terminology across both jurisdictions. NGEM, NINEC, HSENI and CER (Ireland) i.e. those with statutory responsibility for gas safety on the Island of Ireland are currently finalising arrangements.

7.8. Following a 2016 gas emergency exercise, TSO to TSO arrangements have been reviewed to ensure there are no delays in utilising the South-North gas pipeline in a gas emergency.

7.9. In addition, there is a detailed operating procedure which sets down the Joint Protocol between GB, Northern Ireland and Ireland for Load Shedding in Gas Supply Emergencies. The relevant principles are as follows

7.10. In the context of a gas supply emergency in GB that could affect the availability of gas to the Moffat network exit point, the overriding principle that will be applied is one of proportionality. In a Network Gas Supply Emergency any reduction of flows through the Moffat interconnector will be proportionate with actions being enacted on the GB network, unless specific geographical circumstances occur which require proportionally higher or lower load reduction in the north of GB.

7.11. In this way, domestic consumers in Ireland, Northern Ireland and the Isle of Man would be given the same priority as domestic consumers in GB unless there were geographical circumstances that required proportionally higher or lower load reduction in the north of the UK.

7.12. Emergency Exercises: The gas industry carries out an annual operational exercise to test the arrangements that are in place. Northern Ireland/Ireland exercises have been run in conjunction with the GB exercise, and within the island of Ireland only. The exercises

focus on load shedding arrangements in the event of a supply disruption. These are well practiced areas and arrangements are considered sufficiently robust.

# 8. Closing Remarks

The UK gas market is resilient to all but the most unlikely combination of high demand and supply disruption. The UK Government continues to work closely with its stakeholders on additional projects to improve resilience within the sector and prevent disruption.

8.1. The UK Government welcomes the Regulation's requirement that this national PAP is continuously reviewed and published at regular intervals. A joint PAP has also been developed to incorporate regional arrangements between Ireland, Northern Ireland and Great Britain.

8.2. The UK Government continues to work closely with its stakeholders and supports the consultations routinely executed by industry.

8.3. The relevant publications by National Grid as System Operator are:

- "The Summer and Winter Outlook Reports": Published annually following stakeholder consultation. This provides information to market participants on the supply and demand situation for the coming winter;
- "Transporting Britain's Energy": National Grid's annual consultation process on forecasting supply and demand which informs the Ten Year Statement and the Development of Energy Scenarios publications; and
- "Ten Year Statement": Published annually - a rolling ten-year forecast of gas transportation system usage and likely system developments that can be used by companies which are contemplating connecting to the system, or entering into transport arrangements, to identify and evaluate opportunities.

8.4. In Northern Ireland the Utility Regulator publishes the Gas Capacity Statement which provides an assessment of the ability of the transmission network to meet forecast demands on the network over a ten year period.

8.5. Information is also consolidated annually in the Statutory Security of Supply Report, which is published by BEIS and produced jointly with the economic regulator (Ofgem) with input from National Grid. That report provides analysis on security of supply risks and drivers, and scenarios to help inform the market.

# Appendix I

## Interconnectors

The UK currently has four gas interconnectors with other Member States:

- Interconnector UK (IUK), operated by Interconnector (UK) Limited, which flows gas in both directions between Bacton and Zeebrugge in Belgium;
- The BBL pipeline, operated by BBL Company, which currently flows gas from Balgzand in the Netherlands to Bacton;
- The two Moffat pipelines (IC1 and IC2), operated by GNI(UK), which are currently configured to flow gas from Moffat in Scotland to Ireland; and
- The South-North Pipeline (SNP) operated by GNI(UK) between Ireland and Northern Ireland.

# Appendix II

## Public Service Obligations (PSOs)

Great Britain has no PSOs in relation to security of gas supply. Notification of any PSOs for security of gas supply will need to be given to the European Commission under the requirements of the 3rd Energy Package, together with their possible effect on national and international competition.

# Appendix III

## Updated N-1 Calculation

The N-1 formula, as described in Annex I of the Regulation (EU) 994/2010, is as follows:

$$N-1[\%] = \frac{EP_m + P_m + S_m + LNG_m - I_m}{D_{max}} \times 100, \quad N-1 \geq 100\%$$

## N-1 Calculation for the UK (flows in mcm/d) - Winter Outlook15/16

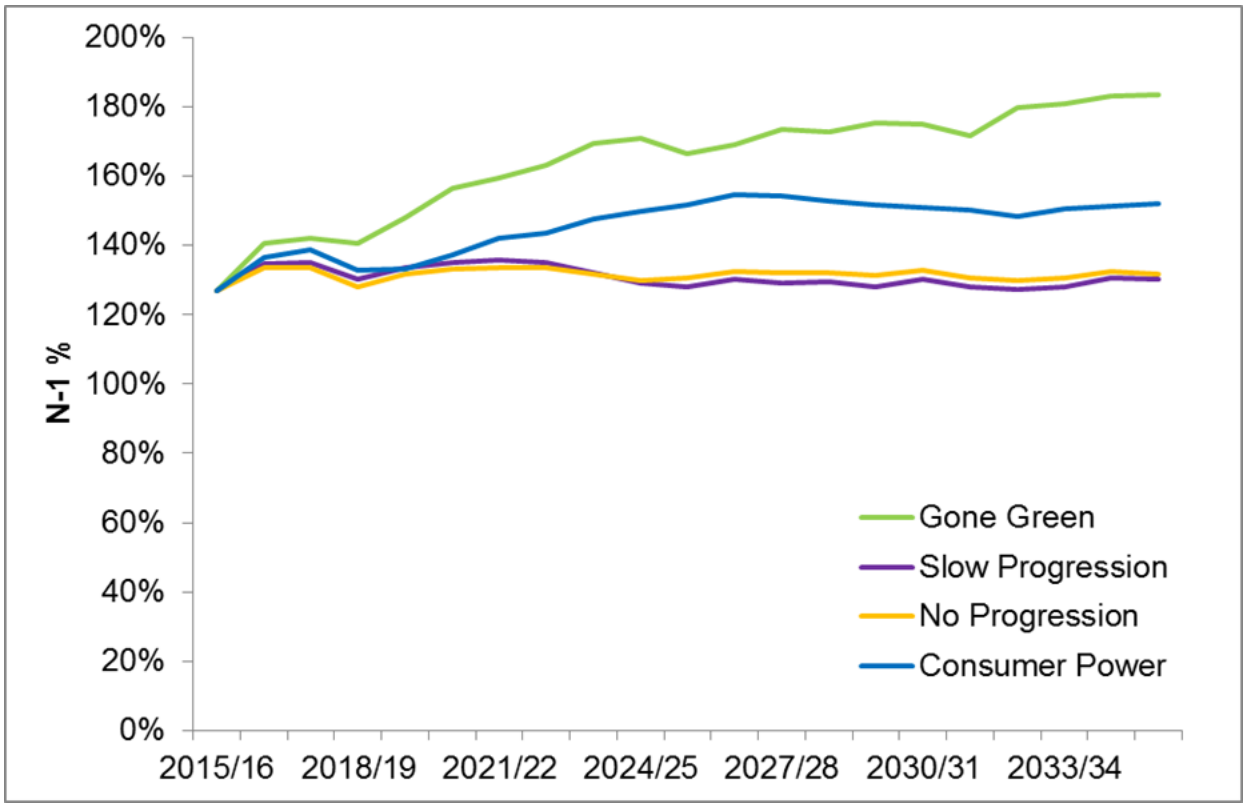
| | Capacity (mcm/d) | Notes |
|---|---|---|
| Main Infrastructure ($I_m$) | 86 | Felindre Pipeline to reflect the combined capacity of both Milford Haven LNG terminals |
| Max imports ($EP_m$) | 253 | Excludes LNG imports (includes IUK (74), BBL (48), Langeled (70), Vesterled (36), FLAGS - Tampen & Gjoa (25) |
| Max indig. production ($P_m$) | 112 | Total indegenous production from the UK sectors of both the North Sea and Irish Sea along with gas produced onshore |
| Max storage ($S_m$) | 146 | The technical capacity of UK storage |
| LNG ($LNG_m$) | 145 | Includes South Hook (59), Dragon (27), Grain (59) |
| Max demand ($D_{max}$) | 449 | Diversified 1-in-20[14] demand. Includes gas flows to Northern Ireland but excludes Ireland |

At peak: N-1 (Winter Outlook 15/16) = (253 + 112 + 146 + 145 - 86) / 449 = 127%

[14]The demand used in the N-1 calculation is Dmax as defined in Annex 1 of the regulations(EU(994/2010)) -"The total daily gas demand (in mcm/d) of the calculated area during a day of exceptionally high gas demand occurring with a statistical probability of once in 20 years."- This is the diversified demand and makes the report consistent with both the regulations and National Grid's Winter Outlook.

# Appendix IV

## Projected N-1 calculations by year to 2035




Source: National Grid

# Appendix V

## Meeting the Supply Standard

UK 'protected customers' gas volumes are split into the following definitions as per the Regulation:

- Household customers;
- Small and medium-sized enterprises connected to a gas distribution network; and
- Essential social services where loss of gas supplies could endanger health (as long as these customers and small and medium sized enterprises do not exceed 20% of final use of gas)

The volumes needed to fulfil this standard and UK infrastructure capacities are outlined in the table below based on estimated volumes for the conditions specified in the Regulation for winter [ 2016/17 ]

This table shows that the volume of Small and Medium Enterprises (SMEs) and essential social services does not exceed the Regulation's limit of 20% of final demand. It also shows that the UK's infrastructure is capable of meeting the Supply Standard even with 1-in-20 demand conditions and the loss of the single largest piece of infrastructure.

| | **Day 7 under 1-in-50 conditions** | **Day 30 under 1-in-50 conditions** | **Day 30 average winter conditions** |
|---|---|---|---|
| **Households (mcm/d)** | 219 | 186 | 157 |
| **SMEs (mcm/d)** | 71 | 60 | 53 |
| **Essential social services (mcm/d)** | 3 | 3 | 3 |
| **Total demand, including other categories (mcm/d)** | 409 | 358 | 321 |
| **Percentage SME and social services** | 18.1 | 17.6 | 17.4 |
| **UK infrastructure capacity 1 October 2016(mcm/d)** | 676 | 676 | 676 |
| **UK N-1 infrastructure capacity 1 October 2016 (mcm/d)** | 590 | 590 | 590 |

Source: National Grid

## Glossary

| | |
|---|---|
| **AEEG** | All-Island Energy Emergencies Group |
| **BBL** | Balgzand to Bacton Line |
| **BCM** | Billion Cubic Meters |
| **BGS** | British Geological Survey |
| **BEIS** | Department for Business, Energy and Industrial Strategy |
| **BOE** | Barrels of Oil Equivalent |
| **CER** | Commission for Energy Regulation |
| **DCCAE** | Department of Communications, Climate Action and Environment |
| **DfE** | Department for the Economy |
| **DSR** | Demand Side Response |
| **E3C** | Energy Emergencies Executive Committee |
| **EMR** | Electricity Market Reform |
| **ENTSOG** | European Network of Transmission System Operators for Gas |
| **FID** | Final Investment Decision |
| **Gas SCR** | Gas Security of Supply Significant Code Review |
| **GB** | Great Britain |
| **GDE** | Gas Deficit Emergency |
| **GNI(UK) Limited** | Gas Networks Ireland |
| **GSNI** | Geological Survey of Northern Ireland |
| **GS(M)R** | Gas Safety (Management) Regulations 1996 |
| **GSMR(NI)** | Gas Safety (Management) Regulations (Northern Ireland) 1997 |
| **HSE** | Health & Safety Executive |
| **HSENI** | Health and Safety Executive Northern Ireland |
| **IUK** | Interconnector UK |
| **LNG** | Liquefied Natural Gas |
| **MCM/D** | Million Cubic Meters per Day |
| **NEC** | Network Emergency Coordinator |
| **NEP** | National Emergency Plan – Downstream Gas and Electricity |
| **NGEM** | National Gas Emergency Manager |
| **NI** | Northern Ireland |
| **NIAUR** | Northern Ireland Authority for Utility Regulation |
| **NINEC** | Northern Ireland Network Emergency Coordinator |
| **OFGEM** | Office of Gas & Electricity Markets |
| **PAP** | Preventive Action Plan |
| **PCI** | Project of Common Interest |
| **PSO** | Public Service Obligations |
| **PSSR** | Pressure Systems Safety Regulation 2000 |
| **PSR** | Pipeline Safety Regulations 1996 |
| **PTL** | Premier Transmission Limited |
| **ROI** | Republic of Ireland |
| **SNIP** | Scotland-Northern Ireland Pipeline |
| **SNP** | South-North Pipeline |
| **SSSR** | UK Statutory Security of Supply Report |
| **TSO** | Transmission System Operator |
| **UK** | United Kingdom |

| | |
|---|---|
| **UKCS** | UK Continental Shelf |
| **UNC** | Uniform Network Code |

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