

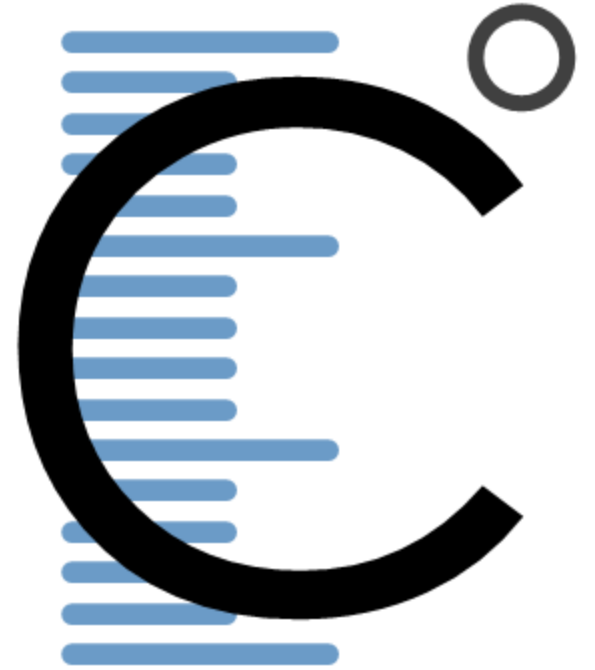
NEC Industry Exercise 2021

'Exercise Celsius'

Post Exercise Report

Network
Emergency
Co-ordinator

EXERCISE CELSIUS



We have published the 2021 NEC Industry Post Exercise Report as an interactive document.

This report has been authored by the Office of the NEC. It serves as a record of NEC Industry Exercise Celsius.



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2021 Post
Exercise Report**

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Abbreviations
Defined words and additional information, indicated in **purple** text, can be viewed in the abbreviations list by clicking the book symbol in the left-hand navigation bar

Call-out boxes

Text in blue boxes provides further detail on a subject

Further information
For more information on how industry manages Network Gas Supply Emergencies see National Grid's webpages:

[NGSE Webpage](#)

or contact the National Grid Emergency and Incident Framework Team:

Gasops.emergencyplanning@nationalgrid.com

Exercise Scope

The Network Emergency Coordinator (NEC) Safety Case requires the NEC to develop and deliver an annual exercise.

The overriding aim of the exercise is to demonstrate to the **NEC** that the gas industry is prepared and able to meet its obligations in the event of a Network Gas Supply Emergency (**NGSE**). The NEC is obliged to review the industry exercise to assure the exercise met its objectives, outline any lessons learnt, action areas for development, and publish the results of the review in a report to industry and the Health and Safety Executive (**HSE**). Full details of the exercise aim and objectives can be found in [Appendix 4](#). This year's exercise objectives were met though learning points have been identified which are summarised on [page 14](#).

Exercise Celsius took place over two days as detailed below. This report outlines the key areas of the exercise along with the identification learning points for industry.

Wednesday 29th September 2021 Pre-Emergency Day	Thursday 30th September 2021 Emergency Day
<ul style="list-style-type: none">• Gas Balancing Notification• OCM Balancing Trades• Scale-back of Off-Peak Exit Capacity• Operating Margins• Margins Notice	<ul style="list-style-type: none">• Stage 1: Emergency Specification Gas• Stage 2: Flow Directions & Load Shedding• Electricity Impact• Stage 3: Public Appeal and Allocation & Isolation

Scenario overview: This exercise proved that a scenario of significant supply losses from various sources was required to enable a full and detailed test of the pre-emergency strategy, and the declaration and utilisation of the full suite of NGSE tools. To support the test, the exercise was developed using data from 11th February 2021 which was a high demand day on the gas network, with national demand in excess of 400mcm, and saw gas form over 45% of the generation mix on the electricity system. Further information on the scenario can be found on [page 24](#).

More information on the role of the NEC can be found on [page 25](#)

Executive Summary

The overriding aim of the exercise was to demonstrate to the NEC that the gas industry is prepared and able to meet its obligations in the event of an Network Gas Supply Emergency (NGSE), whilst maximising understanding of the impact of a gas supply shortage on electricity.

Participation in this year's exercise was the widest ranging to date, allowing the opportunity to exercise processes and interactions across the energy sector. This level of participation also allowed for increased realism and the challenges that can bring.

<p>Gas and Electricity Interactions</p>	<p>The RIGSSE Project was formed in 2021 to review gas and electricity interactions during times of system stress. The project has successfully achieved an enhanced common understanding of the interaction between the two energy systems and is now in a phase of option design to solve detrimental interplays. During Exercise Celsius, the interactions between GSO and ESO benefited greatly from the use of a prototype dashboard, designed through the RIGSSE Project.</p>	<p>Public Communications</p>	<p>An industry wide media response was tested, which highlighted areas for further enhancements to whole system media management. Work should also be undertaken to modernise the public appeals process.</p>
<p>Gas Transporter Interactions</p>	<p>Due to an enhanced level of pre-response collaboration and sharing of planning assumptions, a step change was achieved in the pace at which 'emergency pressures' were determined at network offtakes. Other processes would benefit from this collaborative approach.</p>	<p>Load Shedding</p>	<p>The load shedding process on the NTS benefited from modernisation through use of a software application to collate, track and deliver written load shedding directions..</p>
		<p>Managing Supply</p>	<p>The Gas Availability Status (GAS) report was initiated with issues regarding terminals accessing the portal overcome. A new application to provide real-time tracking of communications with all NTS entry points proved to be successful.</p>

Gas and Electricity Interactions

The RIGSSE Project was formed in 2021 to review gas and electricity interactions during times of system stress. The project has successfully achieved an enhanced common understanding of the interaction between the two energy systems and is now in a phase of option design to solve detrimental interplays. During Exercise Celsius, the interactions between GSO and ESO benefited greatly from the use of a prototype dashboard, designed through the RIGSSE Project.

Exercise Celsius allowed the most in-depth simulation of gas and electricity system interactions to date. The GSO and ESO again utilised the exercise environment to share situational awareness across the two systems. A prototype information sharing dashboard, developed by the RIGSSE Project Team, was trialled and demonstrated that it is a fundamental tool in breaking down the long-standing communications barriers, determining whole system impact and establishing the minimum gas load required to sustain electricity system stability (the most accurate ever achieved).

The exercise did not look to trial the ability to mitigate potentially detrimental interplays across the whole energy system during the pre-emergency phase. Instead, the opportunity was taken to further map these interplays to determine the whole system impact which, with enhanced understanding, will inform design work on mitigations which is ongoing through the RIGSSE Project. The gas pre-emergency strategy therefore purposefully played through without mitigation and caused the activation of OC6 demand control measures on the electricity system, as in Exercises Baltic and Arctic.

When an NGSE was declared, the dashboard was further utilised to determine the minimum load requirements of the generation units needed to maintain system stability on the electricity system, against the GSO's load shedding strategy to remove as much industrial demand as possible.

Key Outcomes

- The understanding of the impact of a gas supply shortage on the electricity system is now greater than ever
- The joint GSO & ESO information sharing dashboard is a fundamental tool in understanding whole system impact

RIGSSE Project:

The Exercise 'Baltic' (2020) report highlighted that the subject of gas and electricity system interactions required an industry wide focus to solve the detrimental interplays between the two energy systems which the NEC Exercise has highlighted since 2018. The RIGSSE Project is soon to reach completion following twelve months of work to 'review the impact of a gas supply shortage on electricity'. Since Exercise Baltic, the RIGSSE Project has become an Energy Emergency Executive Committee (E3C) Task Group; set out eight opportunity areas against the project problem statement; determined viable options to achieve these opportunities; and started detailed option design. In addition to this project being stakeholder led, there will be a formal industry playback in Q1 2022 seeking further input into the option designs before moving to a phase of implementation.

Gas and Electricity Interactions

The RIGSSE Task Group will shortly be replaced by a new Whole System Task Group, which will take responsibility to ensure the learning points identified from Exercise Celsius are progressed into action alongside the other findings of the RIGSSE review.

Learning Points		Associated Whole System Task Group actions
1	The information sharing dashboard is a fundamental tool in enhancing whole system situational awareness, but it remains a prototype	The GSO and ESO will continue to develop the prototype information sharing dashboard and embed it into standard process, whilst maintaining a manual dashboard as an interim solution during Winter 2021/2022
2	There is an opportunity for the two System Operators to determine the principles for how they would mitigate impacts to whole system health	BEIS, Ofgem, the GSO and the ESO have established a Winter 2021/2022 trial set of GSO and ESO owned principles. These principles determine the triggers for when it is appropriate for the two System Operators to share situational awareness, and when the two System Operators may decide to take whole system actions so neither system is severely impacted when the other has alternative actions available. Learning from this trial will be captured post winter and used to inform whether any further actions are required to establish an enduring solution.
3	A dedicated ESO Liaison responder within the NEMT was trialled and proved to be a vital role in the situational awareness sharing process	Alongside the actions associated with learning points 1 & 2, the GSO and ESO will assure a suitable number of responders are trained to utilise the information sharing dashboard and associated trial principles, should they be required during Winter 2021/2022
4	Two independent routes of communication naturally formed during the exercise, namely GSO to BEIS and ESO to BEIS. This disconnect caused some uncertainty with the overall response picture	BEIS, the GSO and the ESO have already reviewed this learning and agreed a protocol to share situational awareness as a tripartite when there are actual, or potential, gas and electricity system interactions
5	There is an opportunity for GDNs and DNOs to collaborate to better understand the behaviour of embedded generation and the impact across both systems of electricity demand control or gas isolation actions being undertaken	E3C will facilitate, through the Gas and Electricity Task Groups, collaboration between GDNs and DNOs to achieve a broader view of distribution level gas and electricity interactions. This will be undertaken with a view to reviewing principles under which GDNs and DNOs can share information both before and during a response

Findings from Exercise Celsius shall feed through to the RIGSSE Project's development of detailed option designs against a total of eight opportunity areas. Implementation of these option designs will be undertaken by governance from a newly formed E3C 'Whole Energy System' Task Group, which will replace the RIGSSE Task Group. The findings of the RIGSSE Task Group will be played back to industry in Q1 2022.

Gas Transporter Interactions

Due to an enhanced level of pre-response collaboration and sharing of planning assumptions, a step change was achieved in the pace at which 'emergency pressures' were determined at network offtakes. Other processes would benefit from this collaborative approach.

In the build up to Exercise Celsius, the **E3 Alignment Group** took action to increase the pace at which emergency pressures can be determined across network offtakes. Understanding these pressures is a fundamental part of forming the response strategy; if emergency pressures can be maintained, then less impactful response actions are required.

In 2021 the Transporters were asked to pre-determine emergency pressures and planning assumptions across their network offtakes to enable a shorter and more focused discussion during an incident, as opposed to building a cross network understanding from the onset of a response. This, alongside a new aggregation tool tested by the **NEMT** Demand Team, enabled the Transporters to focus response discussions, analysis and pre-emergency actions on offtakes which represent the greatest concern, c.5 per **LDZ** out of the c.120 offtakes across the network.

The E3 Alignment Group sponsored a 'Demand Day' training workshop in mid 2021. This collaboration proved to be a successful means by which participants could discuss and improve upon response processes and strategies, including those trialled in Exercise Celsius. The event was attended by over 80 Transporter representatives and a similar event is planned for 2022.

The learning points detailed overleaf present opportunities for the Gas Transporters to continue to enhance collaboration both before and during a response. The maturity which has been reached through collaboration at the E3 Alignment Group and the **Gas Task Group** will now aim to solve the need to modernise some long standing processes and to develop whole system approaches to gas system stress.

Key Outcomes

- There was a significant increase in pace in determining emergency offtake pressures
- Collaborative training events provide a positive forum for pre-response information sharing and there is clear benefit in continuing these events as part of industries emergency preparedness

Gas Transporter Interactions

The Gas Transporter Interactions learning points have already been fed through from the NEC to the E3 Alignment Group, who have reviewed them and formed actions on their workplan to address areas for improvement into 2022.

Learning Points		Associated E3 Alignment Group actions
6	The Gas Transporters have not been successful in establishing an appropriate pre-emptive process through which a risk assessment can be rapidly provided to the NEC in order to support the decision to admit 'emergency specification gas' into the Network.	This is a learning point from Exercise Arctic in 2019. The proposed changes to the gas quality section of GS(M)R distracted the progress on this finding. These changes are still ongoing so action is now required
		The E3 Alignment Group has agreed a risk assessment for all GDNs to utilise when they are informed 'emergency specification gas' could enter their LDZ
		The GDNs are individually seeking final approval from senior management to allow these risk assessments to be completed at the tactical level of the response. This will be completed by the end of January 2022
		The compilation of these risk assessments will be considered by NGG's NTS Duty Manager who will have delegated authority from the Director of Operations and the Responsible Engineer for the National Transmission System to determine the impact of 'emergency specification gas' on the NTS
7	There is an opportunity to expand on the success of sharing of planning assumptions in the determining of emergency pressures, across the strategies involved in an NGSE	The GDNs will share with NGG the planning assumptions involved in removing industrial demand through load shedding in the LDZs. This will involve the GDNs sharing a list of their top 200 customers (per LDZ) and develop decay curves (per LDZ), which are an estimate of the profile over which gas is being taken by LDZ customers each day. This will help to inform the forecast and strategy for load shedding based on the time of day at which it is actioned. Though more simplistic, NGG will outline their planning assumptions, in load shedding on the NTS, back to the GDNs.
		The GDNs will share with NGG the planning assumptions in each LDZ's isolation plan
8	There is an opportunity to optimise the process for NEMT sharing the declaration of an NGSE once issued by the NEC	NGG will review the protocol for issuing the NEC approved declaration of an NGSE to assure there is no delay in this being communicated to industry.
9	Preparation and collaboration is fundamental to a successful response	The E3 Alignment will continue to sponsor an annual 'Demand Day' collaborative training workshop
		For the second year running the E3 Alignment Group will operate a protocol for periods of high gas demand, which sees E3 Alignment Group members convening for an exceptional meeting when certain triggers are met

Public Communications

An industry wide media response was tested, which highlighted areas for further enhancements to whole system media management. Work should also be undertaken to modernise the public appeals process.

The media management element to Exercise Celsius was as wide ranging as the operational response. Communication Team representatives from all gas and electricity transmission and distribution companies liaised with their operational colleagues and collaborated through a series of **Energy Networks Association** facilitated conference calls.

The learning points from this participation have already been delivered to the **E3C Communications Task Group (CTG)** who will own actions arising on their 2022 workplan.

Key Outcomes

- The opportunity to manage whole system communications was undertaken by Communications Team representation from all gas and electricity transmission and distribution companies



Relevant Working Groups

- Communications Task Group

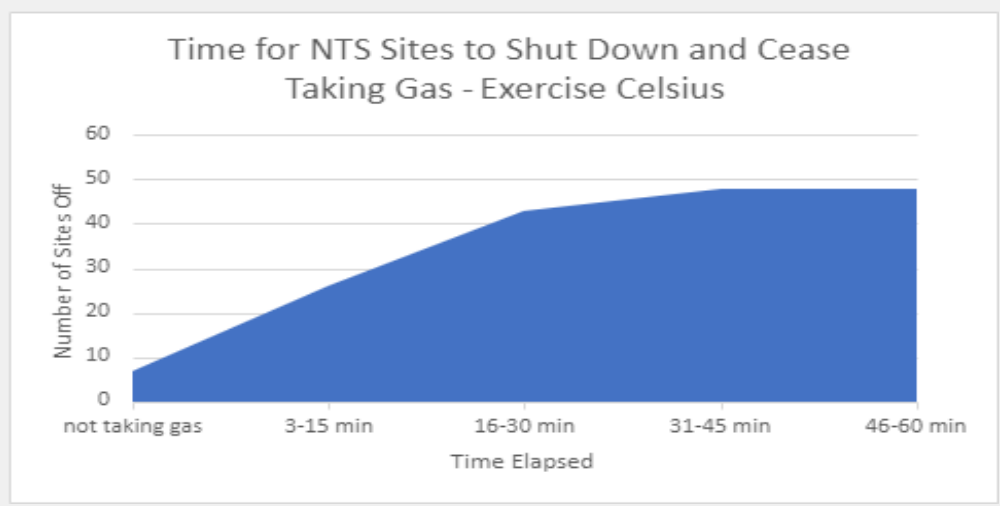
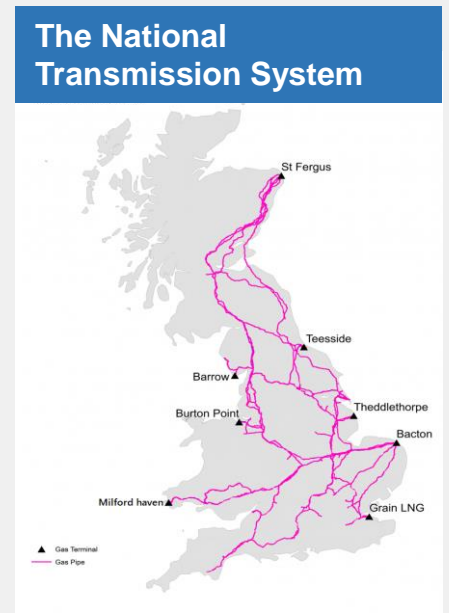
Learning Points

10. There is an opportunity to enhance and mature prepared media lines, information graphics and consumer advice which is cognisant of whole system impact
11. There is a need to review and modernise the process for issuing public appeals, with a focus on how advice to conserve gas is disseminated, who coordinates the issuing of this information, and to understand how the public are likely to respond
12. It is recommended that Communications Teams undertake standalone exercises to improve and refine the outcomes of learning points 10 and 11, alongside other CTG work scopes, to mature organisational learning outside of the fast pace of the NEC Industry Exercise

Load Shedding Performance - NTS

The load shedding process on the NTS benefited from modernisation through use of a software application to collate, track and deliver written load shedding directions.

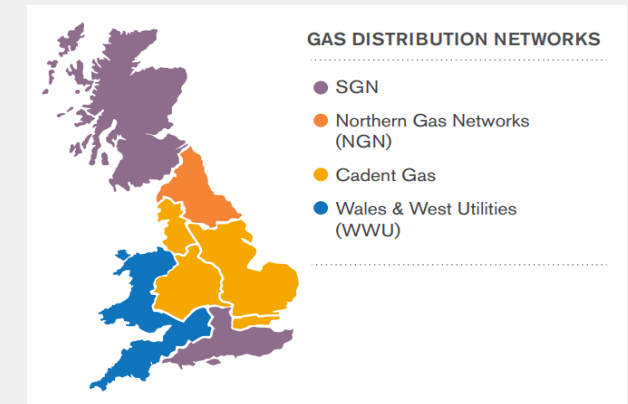
Out of the 52 sites directly connected to the NTS, one site is in the process of decommissioning, and was therefore not taking gas, and one site was on a known outage and therefore was not contacted. Out of those which were contacted, two sites did not respond to the call. Follow up contact has been made with these sites and telephone information confirmed. It is understood that the call was simply missed as they were not taking gas and taking a minimum baseload respectively. In a real-world event the Shipper Team would endeavour to make contact and NGG could mobilise an engineer to the site to make direct in person contact.



Performance history (last 5 years)	
Exercise Name and Year of delivery:	Percentage of sites who could be contacted and would stop using gas within one hour:
Celsius 2021	96%
Baltic 2020	94%
Arctic 2019	87%
Zeus 2018	86%
Yield 2017	92%
X-Ray 2016	90%

Load Shedding Performance - LDZs

This year's load shedding performance in the LDZs is stable overall compared to the equivalent test in 2019. It is reassuring that a better result was achieved when the GDNs tested their ability to raise their top 50 sites in 2020. It is assessed that the bulk of sites which could not be contacted this year are smaller industrial users which use less gas. Whilst this may be the case, the E3 Alignment Group will continue to collaborate to improve load shedding performance, including taking action to modernise the process.



Exercise Celsius 2021 – Performance Breakdown							
GDN	No. of sites attempted to be contacted	No. of sites where contact was made, and site <u>would</u> stop using gas		No. of sites where contact was made, and site would <u>not</u> stop using gas		No. of sites who could <u>not</u> be contacted	
Cadent	1000	954	95%	25	3%	21	2%
NGN	400	324	81%	25	6%	51	13%
SGN	600	498	83%	0	0%	102	17%
WWU	600	586	98%	0	0%	14	3%

Performance History (last 5 years)			
Exercise Name and Year of delivery	No of sites attempted to be contacted	No of sites where contact was made, and site would stop using gas	
Celsius 2021	2600	2362	91%
Baltic 2020 ¹	600	572	95%
Arctic 2019	2751	2400	87%
Zeus 2018	2638	2088	79%
Yield 2017	2633	2031	77%
X-Ray 2016	2662	1935	73%

¹The 2020 assurance activity was scaled down to top 50 sites due to COVID-19

Load Shedding Performance


There are 52 sites currently directly connected to the National Transmission System. **NGG** conducted the assurance activity of contacting all of these sites during the live exercise and achieved the same result as last year (expanded on [page 10](#)).

This year, the standard assurance activity of the **GDNs** contacting their top 200 sites per **LDZ** resumed, following the restrictive activities as a result of the COVID-19 pandemic.

This year's load shedding performance in the LDZs, (expanded on [page 11](#)) is stable when compared to the 2019 results (the last time the GDNs contacted their top 200 sites).

The **E3 Alignment Group** is responsible for continuous improvement in load shedding capability. With the pending loss of the ability to use fax to deliver load shedding directions, the E3 Alignment Group shall conduct a review to modernise the load shedding process.

During Exercise Celsius a prototype software based application was trialled to collate, track and deliver the written load shedding directions to sites connected to the **NTS**. The application is capable of delivering the **GS(M)R** direction notice via email, the most secure alternative to fax, and the GDNs are seeking to understand if they can develop a similar 'app' based concept for their own processes.

 **Relevant Working Groups:**

- E3 Alignment Group

Key Outcomes

- The GDNs achieved overall stable results in contacting their largest industrial sites across their LDZs.
- The load shedding assurance test conducted during Exercise Celsius, specific to **NTS** connected sites, achieved a 96% success rate, an improvement on the previous year's performance

Learning Points

13. There is a need for all Transporters to modernise the process for delivering load shedding directions

What is Load Shedding?

Load shedding is the procedure used by Gas Transporters, at Stage 2 of an **NGSE**, to secure a graduated and controlled reduction in demand on all or part of their systems in order to keep the system securely pressurised.

This is achieved by making direct or indirect contact with large consumers and directing them that they must stop or reduce their consumption of gas, as per the Gas Safety (Management) Regulations 1996.

Managing Supply

The Gas Availability Status (GAS) report was initiated with issues regarding terminals accessing the portal overcome. A new application to provide real-time tracking of communications with all NTS entry points proved to be successful.

The **G.A.S Report** was requested via the **Oil and Gas Authority (OGA)** portal at the start of the Pre-Emergency day of Exercise Celsius. A request was made for a response to be provided within one hour of being notified, as per the agreed protocol.

A number of sites were unable to upload their submissions, via the G.A.S portal. However, this was identified and followed up, via telephone calls, made by **NGG**. All of the eighteen sites submitted their data, either through the portal or verbally to NGG, within one hour of notification. Feedback has already been provided to the OGA in relation to the difficulties experienced by some users in accessing and using the GAS Report portal. Storage Information was also received within one hour of being requested directly from the storage sites.

The progress of contact with all entry points was monitored and captured via a prototype software application which enhanced overall situational awareness and the development of the strategy as the information became available.

Further, flow directions associated with the Stage 2 **NGSE** action to maximise flows were successfully delivered to all terminals and storage sites.

Key Outcomes

- Utilising the recently developed Supply Team prototype software application allowed real-time tracking on the progress of the GAS Report, Storage Information Request and the progress of Flow Direction Notices.

Learning Points

14. There is a requirement to ensure that terminals utilising the GAS portal have the correct login details and are competent in its use*.

*This learning point will be fed back to the OGA for their consideration.

Learning Points

The 14 learning points arising from Exercise Celsius are detailed below. These will be reviewed and action plans progressed by the relevant industry group. The Office of the NEC shall report progress against the actions to address each learning point through the bi-annual assurance report, and in regular NEC liaison meetings.

Gas and Electricity Interactions (Whole System Task Group)

1. The information sharing dashboard is a fundamental tool in enhancing whole system situational awareness, but it remains a prototype.
2. There is an opportunity for the two System Operators to determine the principles for how they would mitigate impacts to whole system health.
3. A dedicated ESO Liaison responder within the NEMT was trialled and proved to be a vital role in the situational awareness sharing process.
4. Two independent routes of communication naturally formed during the exercise, namely GSO to BEIS and ESO to BEIS. This disconnect caused some uncertainty with the overall response picture.
5. There is an opportunity for GDNs and DNOs to collaborate to better understand the behaviour of embedded generation and the impact across both systems of electricity demand control or gas isolation actions being undertaken.

Gas Transporter Interactions (E3 Alignment Group)

6. The Gas Transporters have not been successful in establishing an appropriate pre-emptive process through which a risk assessment can be rapidly provided to the NEC in order to support the decision to admit 'emergency specification gas' into the Network.
7. There is an opportunity to expand on the success of sharing of planning assumptions in the determining of emergency pressures, across the strategies involved in an NGSE.

Learning Points

Gas Transporter Interactions (E3 Alignment Group) (cont.)

8. There is an opportunity to optimise the process for NEMT sharing the declaration of an NGSE once issued by the NEC.
9. Preparation and collaboration is fundamental to a successful response.

Public Communications (Communications Task group)

10. There is an opportunity to enhance and mature prepared media lines, information graphics and consumer advice which is cognisant of whole system impact.
11. There is a need to review and modernise the process for issuing public appeals, with a focus on how advice to conserve gas is disseminated, who coordinates the issuing of this information, and to understand how the public are likely to respond
12. It is recommended that Communications Teams undertake standalone exercises to improve and refine the outcomes of learning points 10 and 11, alongside other CTG work scopes, to mature organisational learning outside of the fast pace of the NEC Industry Exercise

Load Shedding (E3 Alignment Group)

10. There is a need for all Transporters to modernise the process for delivering load shedding directions

Managing Supply (Oil and Gas Authority)

14. There is a requirement to ensure that terminals utilising the GAS portal have the correct login details and are competent in its use.

2022 Exercise Programme

Further to delivering the actions arising from the learning points identified from Exercise Celsius, the E3 Alignment Group and the Gas Task Group will deliver the annual series of assurance events across 2022, culminating in the 2022 NEC Industry Exercise. This year's assurance will be complemented by an additional and comprehensive focus on the restoration phase of an NGSE, Exercise 'Disrupt'.

**Exercise 'Disrupt'
Industry Engagement
Workshops**
- Jan/Feb 2022 -

**Critical Transportation
Constraint Exercises**
(One for each GDN, alongside NGG)
- Feb/Mar 2022 -

**Emergency Curtailment
Quantities (ECQ) Industry
Webinar**
- Mar 2022 -

**Exercise 'Disrupt'
Operational Tabletop
Exercise**
- Apr 2022 -

**Exercise 'Disrupt'
Communications
Tabletop Exercise**
- Apr 2022 -

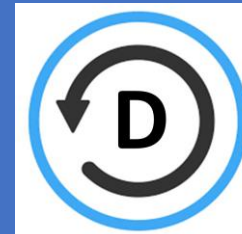
**Exercise 'Disrupt'
Simulated Restoration
Exercise**
- Apr 2022 -

**Demand Day Training
Workshop**
- June 2022 -

**NETMAN 1 Assurance
Exercises**
(One for each GDN control room
shift, plus Gas Networks Ireland, all
alongside the NGG Demand Team)
- July 2022 -

**GDN Load Shedding
Assurance Exercises**
(One for each GDN with the NGG
assurance taking place in the industry
exercise)
- Autumn 2022 -

NEC Industry Exercise 'D'
- Oct 2022 -



Exercise Disrupt

The Gas Task Group has committed to deliver a series of industry events, throughout 2022, to examine and assure preparedness for the restoration of the gas network following an NGSE

Progress Since Exercise 'Baltic' (2020)

The learning points arising from the 2020 NEC Industry Exercise 'Baltic' are set out in the following table, along with a progress statement and completion status.

- Where a learning point marked as **complete** does not mean that it should not be revisited or the learning utilised to inform a similar area, or alternate process, and where this opportunity is already clear a short description is provided.
- Where a learning point is marked as **ongoing** the learning point from this year's report is referenced to demonstrate that understanding is developing progress is being made since the original identification of this learning.

Out of the 17 learning points arising from Exercise 'Baltic', 12 are considered complete and 5 are ongoing due to the scale of the work scope (see progress statements for further detail).

Learning Points From Exercise Baltic	Progress	Status
Remote Response		
1. Enhancements will be made to visualisations produced by NGG (quality and timeliness) in order to improve remote response capability.	Throughout the 2021 exercise programme, continual improvements to the utilisation of MS Teams has developed the ability to provide rapid situational awareness. Furthermore, the development of team specific tools (including prototype software apps to track the delivery of GS(M)R direction notices) improved how processes can be delivered remotely.	Complete – with further opportunities to enhance visualisation
2. Responders working remotely could be impacted by power cuts and, if these are caused by a shortage of gas, they may be widespread. The only workaround for this is for staff to travel to offices with uninterruptible power supplies after the power cuts have been initiated.	NGG conducted an assessment on the impact of power cuts affecting NEMT responders which will continually be reviewed as part of the risk management process. The physical response facility at National Grid House has sufficient power resilience to manage a response, therefore additions to the E3 procedure include a decision tree to support the Incident Controller's determination of the most suitable location from which to instigate a response, dependant on the external factors involved.	Complete – with further opportunities to increase resilience to a National Power Outage across the energy industry

Progress Since Exercise 'Baltic' (2020)

Learning Points From Exercise Baltic	Progress	Status
Gas and Electricity Interactions		
3. When there is a gas supply shortage, there is an unassessed impact on the electricity network. This impact needs to be pre-emptively understood and more effectively coordinated.	Throughout 2021, the RIGSSE Project Team has successfully worked to understand the impact of a gas supply shortage on the electricity system. The project will now implement options to achieve an effective form of 'Whole Energy System' coordination.	Ongoing - concern of the RIGGSE Task Group
4. There is further work required to ensure that the ESO and GSO employees who will be communicating with each other during a shortage of gas have a good enough understanding of each other's networks to make the communications quick and effective, while complying with the Utilities Act 2000.	The RIGSSE Project has supported work to develop methods of enhancing GSO and ESO interactions. BEIS, Ofgem, the GSO and the ESO have established a Winter 2021/2022 trial set of GSO and ESO owned principles. These principles determine the triggers for when it is appropriate for the two System Operators to share information, and when the two SOs may decide to take whole system actions so neither system is severely impacted when the other has alternative actions available.	Ongoing - as per Celsius learning point #3
5. Communications between GSO and ESO are challenging given differences in terminology and balancing methodologies. Further pre-emptive work is required to aid the ease of this communication.	During 2021, a prototype information sharing dashboard, developed by the RIGSSE Project Team, was trialled in Exercise Celsius and demonstrated that it is a fundamental tool in breaking down the long-standing communications barriers, determine whole system impact and establish the minimum gas load required to sustain electricity system stability (the most accurate ever achieved).	Ongoing - as per Celsius learning point #1
6. Establishing a common understanding across a range of industry and regulatory parties of the market actions available to GSO and ESO, and their potential impact on distribution connected loads from both a gas and electricity perspective, would provide a foundation to support analysis of the increasing level of embedded gas generation.	Specifically trained GSO and ESO Liaison representatives will form part of the response to a gas supply deficit, which is impacting, or has the potential to impact, upon the electricity network. These representatives will have the ability to understand commonly used cross sector terminology and will utilise the information sharing dashboard to understand impact to the electricity system, with a view to both system operators taking alternative actions to avoid this impact.	Ongoing - concern of the RIGGSE Task Group

Progress Since Exercise 'Baltic' (2020)

Learning Points From Exercise Baltic	Progress	Status
Gas Transporter Interactions		
7. Future exercises will better reflect the existing proactive means of alerting the GDNs to a shortage of gas.	For Exercise Celsius, contact with the GDN was undertaken before the NEMT mobilised, simulating this being undertaken by the GNCC, a more accurate reflection of reality. In this notification call the GDNs were requested to submit their NETMAN 1 forms enabling a time saving compared to previous exercises.	Complete
8. NGG will adapt communication tools to consolidate information received from the GDNs.	NGG developed a NETMAN 1 aggregation tool which was trialled during Exercise Celsius. This tool supported the identification of offtake pressures which analysis predicted would be breached as a result of the gas supply shortage scenario. The aggregation tool also serves as a means of identifying priority load and indicative return from load shedding in the LDZs, all vital information for the determining of the response strategy.	Complete
9. A review is underway to better identify the technical expertise required for certain technical roles in the NEMT.	During 2021, a review of all NEMT positions was undertaken. This led to the introduction of new NEMT members and a consolidation of existing responders to assure that their skill set remained close to the team which they populated.	Complete – will now be conducted on an annual basis by NGG
10. The E3 Alignment Group undertakes continuous review of training resources and response documentation. Updates will be made to this material to incorporate lessons learnt from Exercise Baltic.	Post Exercise Baltic, a collaborative approach to roles and responsibilities of the respective teams involved in Transporter interactions has been achieved by means of a specific 'Demand Day' which, as a result of its success, will be conducted on an annual basis.	Complete – will now be held on an annual basis
11. The time between NEMT responders receiving refresher training will be reduced.	Work continues to increase the training frequency from three yearly to annually to mitigate the risk of knowledge decay. More than ten exercise events were held between Exercise Baltic and Exercise Celsius, which served as valuable opportunities to develop responder experience.	Complete

Progress Since Exercise 'Baltic' (2020)

Learning Points From Exercise Baltic	Progress	Status
<i>Continued.. Gas Transporter Interactions</i>		
12. The E3 Alignment Group will conduct pre-emptive work to determine baseline assumptions in key data values. These can then be clarified in a response.	The sharing of planning assumptions on emergency pressures at NTS offtakes proved an effective approach to increase pace in a response to a gas deficit. This year's report recommends this approach is mirrored across other elements of the response strategy.	Complete – with further opportunities to enhance other processes as per Celsius learning point #7
13. The E3 Alignment Group will sponsor a 'Demand Training Workshop' for all GDN, NEMT Demand Team and Incident Controller responders.	The 'Demand Day' training workshop was attended by over 80 Transporter responders and will now be delivered on an annual basis, due to its success.	Complete – will now be held on an annual basis

Learning Points From Exercise Baltic	Progress	Status
Public Communications		
14. Further work is required to create and enhance existing pre-prepared messaging which includes info-graphics, which can be promptly shared via social media and through traditional media outlets.	Throughout 2021, work was undertaken by the Communications Task Group to update the ENA response protocols. These include a bank of prepared media lines. This year's report recommends these lines continue to be enhanced with info-graphics and a focus on whole system messaging.	Ongoing – as per Celsius lesson #10
15. The process for alerting communications stakeholders to an energy event with national implications requires to be further refined, pressure tested and an annual cadence for same developed and embedded.	The industry notification process, facilitated by the ENA, was tested in Exercise Celsius.	Complete

Progress Since Exercise 'Baltic' (2020)

Learning Points From Exercise Baltic	Progress	Status
Load Shedding		
16. The E3 Alignment Group is responsible for continuous improvement in load shedding capability. Though this year's result is positive, it demonstrates a small portion of the load available in the LDZ. The group shall strive for 100% conformance from their industrial customers.	The E3 Alignment Group shared each organisations approach to load shedding including call scripts and methods for conducting communications checks. This year's performance is collectively 2% more effective than the equivalent 2019 exercise data (though data for WWU is still to be obtained). A step change is assessed to be achieved through this year's report recommendation to modernise the load shedding process.	Complete – new actions associated with Celsius learning point #13
Managing Supply		
17. Utilising the real time curtailment log, which contributed to the success of tracking load shedding, would be beneficial to the NEMT Supply Team tracking completion of the GAS Report.	Utilising the recently developed Supply Team prototype software application allowed real-time tracking on the progress of the GAS Report, Storage Information Request and the progress of Flow Direction Notices.	Complete

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Appendices

- 1 Exercise Participation
- 2 Exercise Scenario
- 3 The NEC
- 4 Exercise Aim and Objectives
- 5 List of Abbreviations and Definitions
- 6 Industry Working Groups



Appendix 1 – Exercise Participants

National Grid Gas estimates over 350 industry participants took part in Exercise Celsius from a range of areas, as illustrated here:

Government and Regulators	National Grid	Terminal Operators and LNG Importation Terminals		Storage Facilities	National Transmission System – Directly Connected Sites
Department for Business Energy and Industrial Strategy (BEIS)	Crisis Management Team (CMT)	TERMINALS:		Aldbrough – Equinor/SSE Gas Storage	Gas Distribution Network Operators
Oil and Gas Authority (OGA)	Network Emergency Management Team (NEMT)	Easington - Gassco, Langeded	St. Fergus - Ancala (Wood), SAGE	Hatfield Moor – Scottish Power	
Health and Safety Executive (HSE) <i>[Observing]</i>	Corporate Affairs Response Team (CART)	Easington - Centrica Storage, Rough	St. Fergus - NSMP (PX)	Hilltop – EDF Energy	
Office of Gas and Electricity Markets (Ofgem)	Gas Transmission (GT) Silver Command	Easington - Perenco, Dimlington	St. Fergus - Shell	Hole House – EDF Energy	Cadent
Network Emergency Coordinator (NEC)	National Grid Electricity System Operator (ESO)	Burton Point - ENI	St. Fergus - National Grid	Holford – UniPer	Northern Gas Networks (NGN)
Energy Networks Association	Electricity System Distribution Network Operators	Bacton - Shell, BBL	Teesside - Antin (Wood), CATS	Hornsea – SSE Gas Storage	SGN
		Bacton - National Grid	Teesside - PX	Humbly Grove – Humbly Grove Energy	Wales and West Utilities (WWU)
		Bacton - SEAL	Barrow - Spirit Energy	Stublach - Storengy	Interconnectors
		Bacton - Perenco	Somerset Farm		BBL – BBL Company
		LNG TERMINALS:			Irish interconnector – Gas Networks Ireland (GNI)
		Milford Haven – South Hook		Shippers	Interconnector Limited
		Milford Haven – Dragon			
		Isle of Grain – National Grid			

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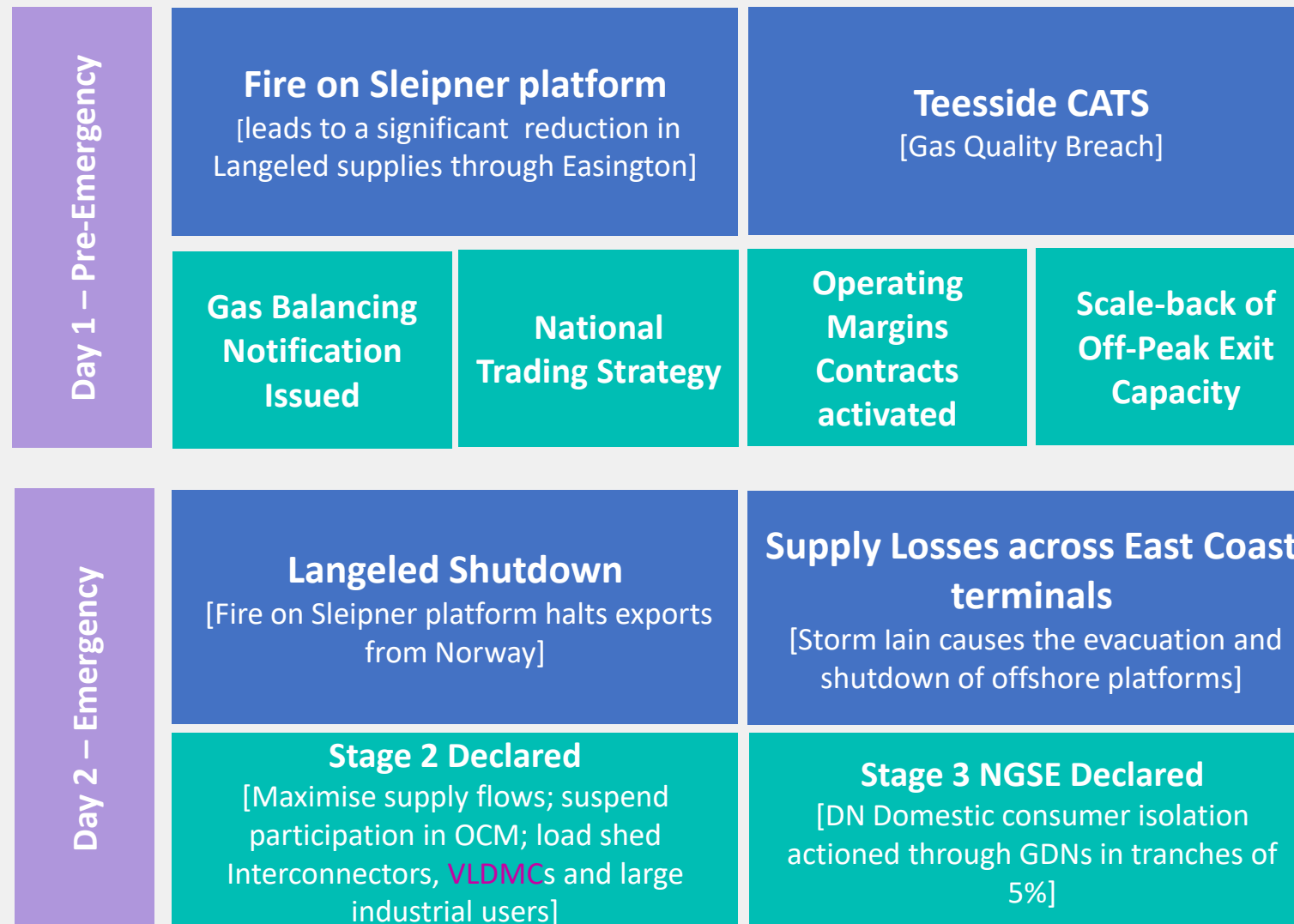
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Appendix 2 – Exercise Scenario



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Appendix 3 – The NEC

The Network Emergency Coordinator (NEC) is an independent industry role, established under the Gas Safety (Management) Regulations (GS(M)R), whose duty is to co-ordinate the actions across affected points of the gas network to prevent or minimise the consequences of a Network Gas Supply Emergency (NGSE). This is defined as “an emergency endangering persons arising from a loss of pressure in a network, or part thereof”.

The role of the NEC is currently undertaken by National Grid Gas and is independent from any commercial interests of any organisation within the Gas Industry.

Industry participants such as Transporters and Shippers have a legal duty to cooperate with the NEC, who has the powers to direct the defined duty holders. The arrangements and procedures put in place to facilitate these powers are tested annually and this report covers the NEC Industry Exercise 2021, namely ‘Exercise Celsius’.



Appendix 4 – Exercise Aim and Objectives

Aim

The aim of the annual NEC industry exercise is to demonstrate to the NEC that the gas industry is prepared and able to meet its obligations in the event of an Network Gas Supply Emergency (NGSE).

This is demonstrated by effective two-way communications processes across the industry and its stakeholders; timely and accurate information being shared between participants; and effective emergency strategies being produced and implemented.

Objectives

- Test that the post Exercise 'Baltic' enhancements to process have delivered a step change in the speed and accuracy with which Transporters share information and make collaborative decisions to inform the response strategy
- Test industry's operational emergency response communication processes, such as the activation of the Gas Availability Status Report; liaison between the GSO and ESO; and publication of Emergency declarations and directions
- Test mid-project enhancements to process arising from the Review of the Impact of a Gas Supply Shortage on Electricity (RIGSSE) E3C Task Group project, and utilise the scenario to further enhance understanding of interactions between gas & electricity – through broader participation of the Electricity System Operator and Electricity Distribution Network Operators
- Test industry's ability to warn and inform the public through participation of Corporate Affairs representatives
- Test that recommendations from previous industry emergency exercises have been delivered and are effective
- Validate emergency procedures, specifically, National Grid's E3; the E3 documents of the Distribution Networks; and the recently amended E1(v.10) and NEC Safety Case
- Set a basis for the E3C Gas Task Group to assure the Gas Industry's capability to return to normal operations post NGSE - in separate education, assurance and exercise events in 2022

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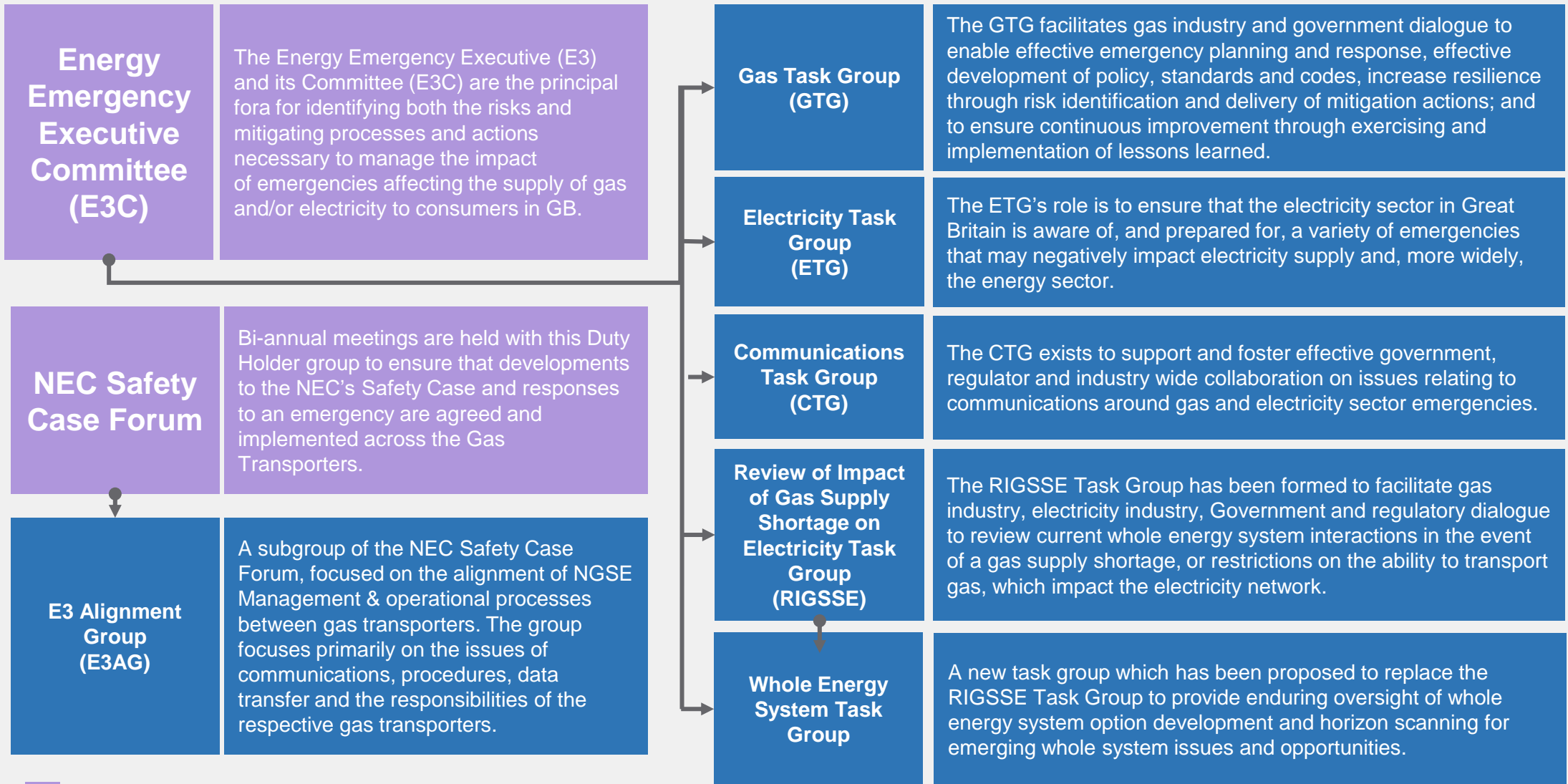
Appendix 5 – List of Abbreviations and Definitions

BEIS	Department for Business Energy and Industrial Strategy (UK Government)	GSO	Gas System Operator (National Grid Gas)
CART	Corporate Affairs Response Team (National Grid)	GTG	Gas Task Group (see App 6 – Industry Working Groups)
CTG	Communications Task Group (see App 6 – Industry Working Groups)	HSE	Health and Safety Executive (UK Government)
DNO	Distribution Network Operator (Electricity) (See ENA website – Who's My Network Operator)	LDZ	Local Distribution Zone within Gas Distribution Networks
E3AG	E3 Alignment Group (see App 6 – industry working groups)	MCM	Million Cubic Metres (Gas unit of measurement for NTS)
E3C	Energy Emergency Executive Committee (See Industry Working Groups)	MN	Gas Margins Notice (See NG Website)
ENA	Energy Networks Association (See ENA website)	NEC	Network Emergency Co-ordinator (see App 3 - The NEC)
ENCC	Electricity National Control Centre (National Grid)	NEMT	Network Emergency Management Team (National Grid - GSO)
ESO	National Grid Electricity System Operator	NGG	National Grid Gas
GBN	Gas Balancing Notification (See NG Website)	NGSE	Network Gas Supply Emergency (See NG website)
GDN	Gas Distribution Network (See ENA website – Who's My Network Operator)	NTS	National Transmission System (National Grid)
GNCC	Gas National Control Centre (National Grid Gas)	OGA	Oil and Gas Authority (UK Government) (See OGA website)
GS(M)R	Gas Safety (Management) Regulations 1996	RIGSSE	Review of the Impact of a Gas Supply Shortage on Electricity – Task Group (see App 6 – Industry Working Groups)
Emergency Specification gas	GS(M)R makes provision to widen the standard gas quality specification to 'prevent a supply emergency'	GAS Report	Gas Available Status Report which enables NGG to better request information, via the OGA GAS Portal, to understand gas availability from the offshore and onshore sector
Embedded generation	Gas fired generation which is connected to distribution systems on both the gas and electricity networks	OC6	Electricity Operating Code No. 6 details the demand control strategy in the event of insufficient active power generation being available to meet electricity demand (See NG ESO website)

Appendix 6 – Industry Working Groups

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= Principle forum
 = Sub-forum



**Network
Emergency
Co-ordinator**



Office of the Network Emergency Co-ordinator

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