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Electronic Pressure Override Controller

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It is now apparent that a needs case exists to replace the existing pneumatic override control systems on gas network Offtakes and Multi Junctions throughout the transmission and distribution networks. This needs case is no longer a future requirement that can be planned, it requires addressing now as a priority to prevent potential catastrophic failure.

The Bristol Babcock pneumatic controllers –624's, were installed on all volumetric systems in the late 1970's to facilitate over and under pressure control on gas Offtakes and network supplies. The objective of these systems is to ensure downstream pipeline pressure does not breach safe operating limits (SOL) and maintains security of supply to downstream networks in the event of failure of other control systems ieRTU.

Since their introduction, nearly 50 years ago, knowledge and resource in this specialised pneumatic control arena is no longer available and training is unobtainable as these systems are now obsolete. Spares are extremely limited (if at all available) therefore a consequential failure of a system or its individual components could prove catastrophic, resulting in financial loss and reputational impact.

These systems constantly vent natural gas, environmentally harmful, costly to operate and are currently failing and past their operational design life.

Current Status

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The gas transmission and distribution networks have a huge estate of Bristol Babcock 624 controllers providing pneumatic pressure override protection. Current solution is obsolete, unsupportable, prone to failure and constantly vents natural gas.

The new electronic override solution has been developed to address a long standing, known, complex, safety related critical vulnerability and has the following benefits:-

- Non venting, electronic pressure management safety system assisting drive to net zero.
- Fully supported, non-plc, off the shelf solution.
- Non-programmable, stand alone.
- Cyber compliant solution.
- Developed to address a long standing, known, complex, safety related critical vulnerability.
- Fully independent operating system.
- Versatile solution ie full site pressure management or individual stream.
- Improved operator functionality.
- Diagnostic features.

Current Pneumatic ELD

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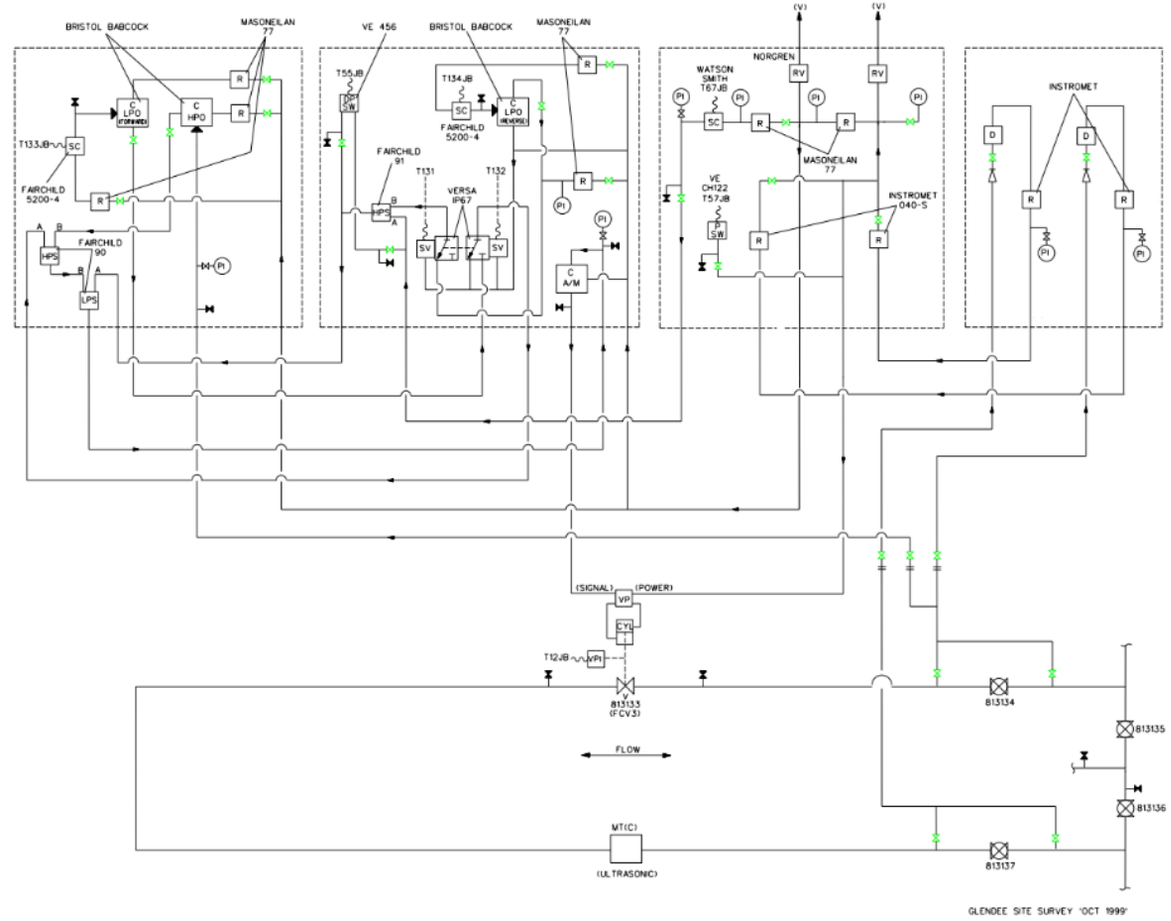

- Excessive pipework
- Obsolete equipment
- Large footprint
- Labour intensive
- Skills shortage
- Constant venting
- Multiple pressure stabbings

Functional Comparison

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Functionality	Current Pneumatic	Electronic
HPO/LPO and Electronic (P5) control	Y	Y
Auto/Man Selector	Y	Y
Auto/Man Alarm	N	Y
Auto/ Man Lockable	N	Y
Maintenance Switch	N	Y
Override Reset	N	Y
Constant Natural Gas Venting	Y	N
PID Functionality	Crude	Accurate
SIL Potential	N	Y
Pneumatic Actuator Compatible	Y	Y
Electric Actuator Compatible	N	Y
Cyber Compliant	Y	Y
ATEX Compliant	Y	Y
Equipment/Component Availability and Supported	N	Y
Revealed Failure Mode– Alarms Local and Remotely	N	Y

Electronic Override System

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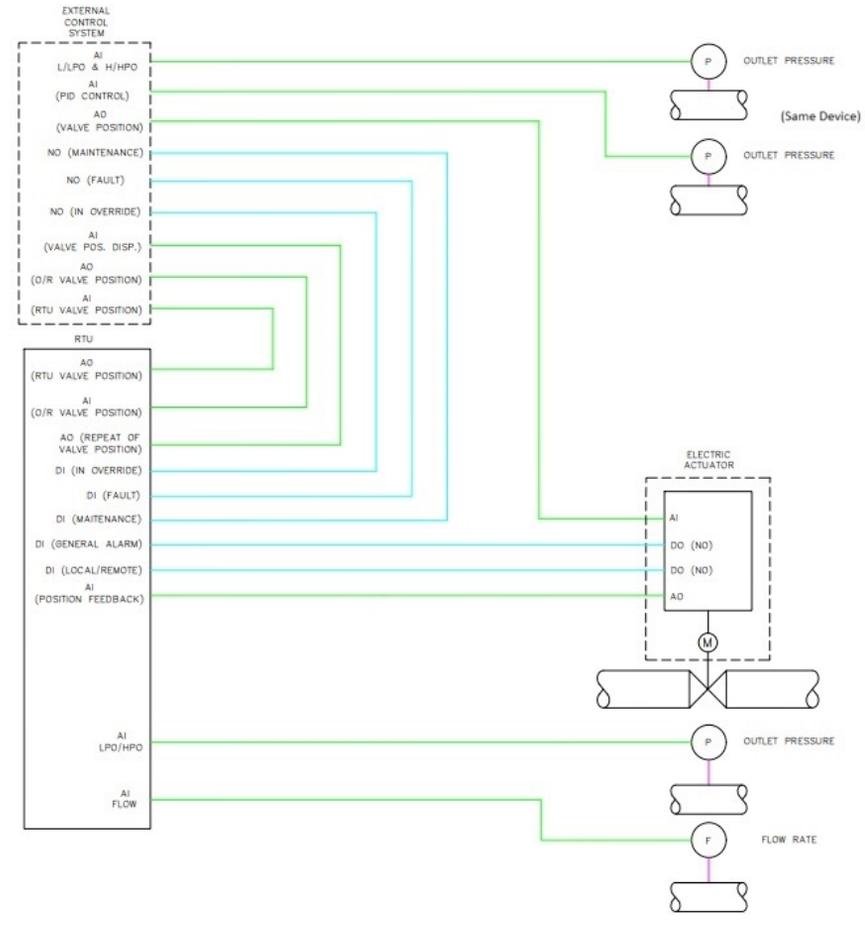
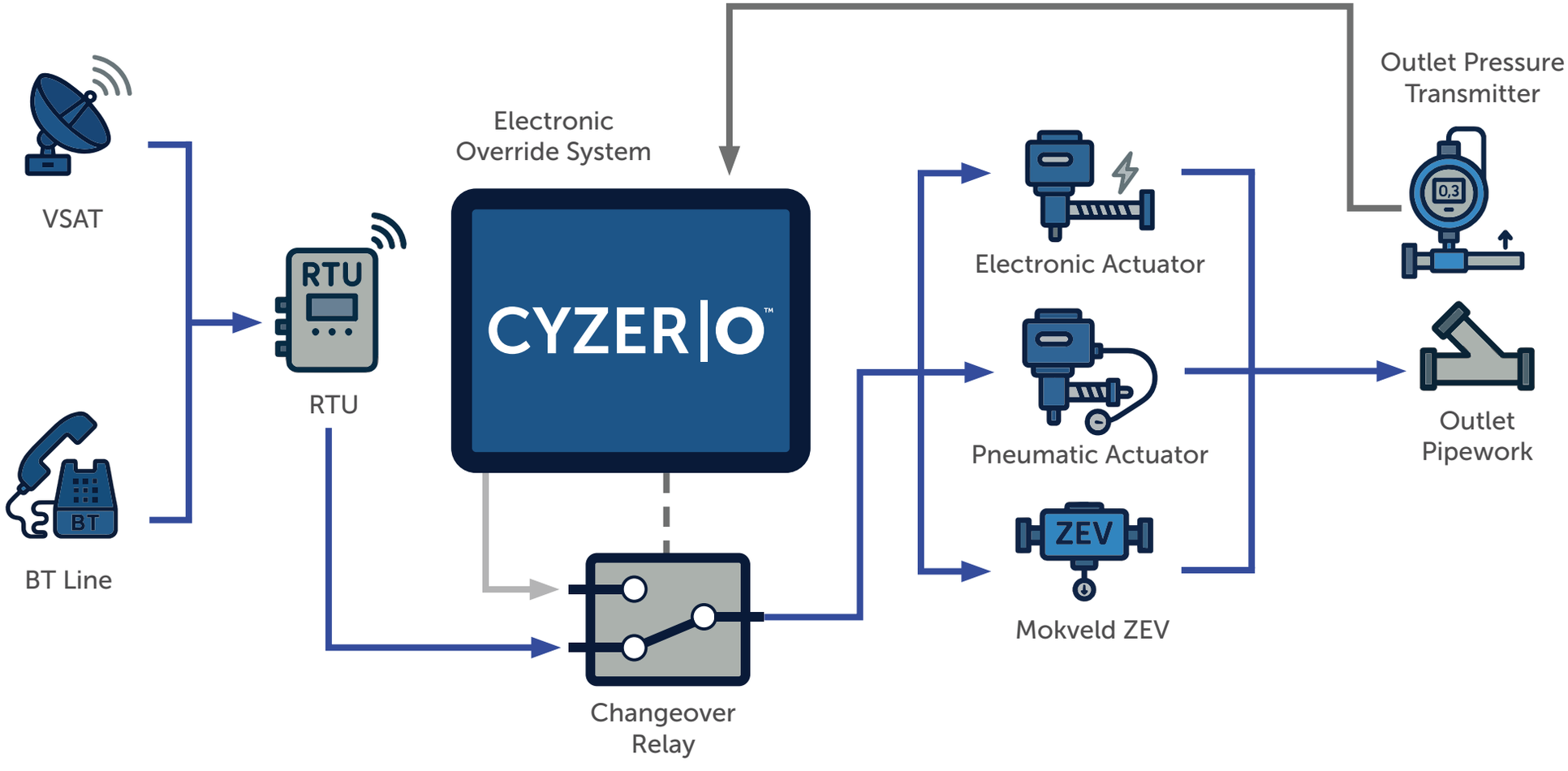
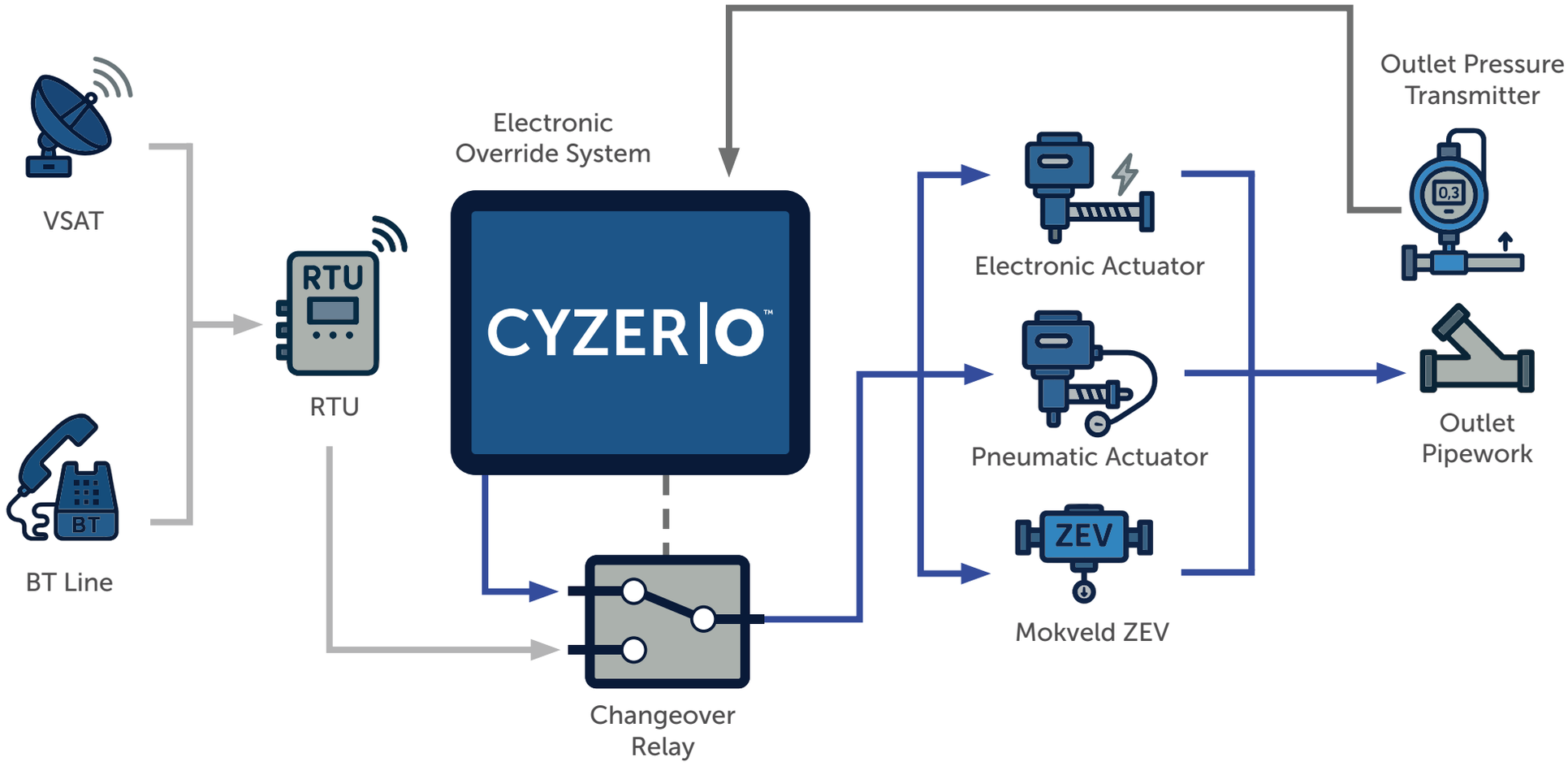


- Only requires a single O/L Pressure Transmitter
- All electronics located within the safe area
- Existing pneumatic system can be retained (elevate set-points)
- Simply insert the new electronic panel in series with the existing RTU output
- Minimal additional power requirement (battery charger / UPS)

Normal Operation



Override Condition



High Level Overview of Operation

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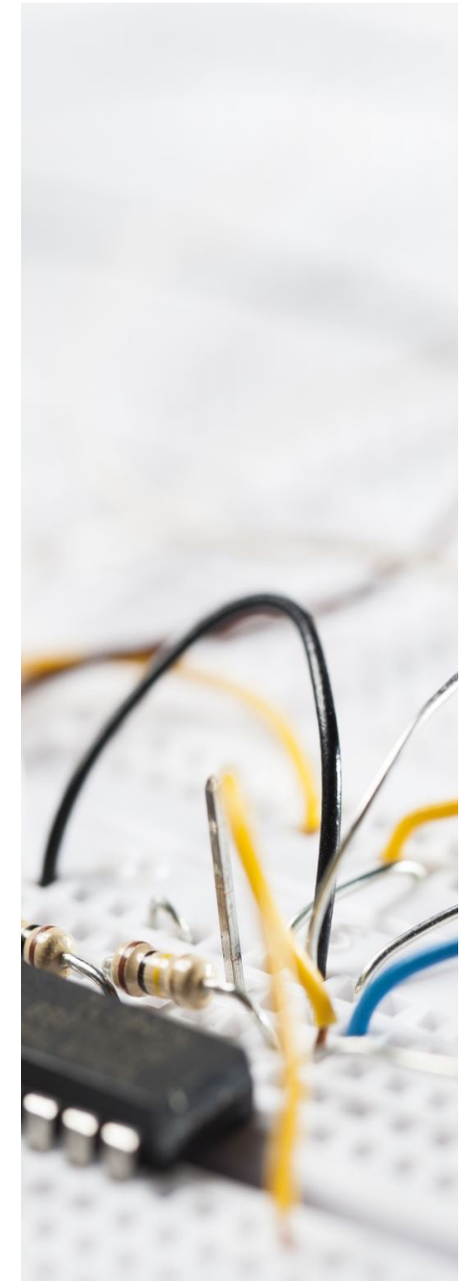
- External overrides are higher/lower than electronic overrides from within RTU.
- Failure high or low ie – pressure exceeds limits above or below set point of electronic override then Electronic Solution isolates RTU 4-20mA output, supplies new 4-20mA control output to FCV to maintain a predefined pressure set point as input into the PID controller in the electronic solution.
- PID controller maintains predefined pressure set point value.
- Electronic override panel trip relay automatically latches, indication present on panel.
- Alarm generated to control room via RTU and is displayed on electronic override panel.
- Trip condition requires manual reset on site following rectification of original fault.
- Auto/Man feature enables manual control of volumetric system and allows control signal matching when switching from manual control back to auto.
- Constant monitoring of system health.
- Unique tracking feature within RTU ensuring bumpless transfer when control handed back to RTU.



Benefits & Features

Can be used with existing pneumatic FCV/PCV, can be used with new eclectic actuator.	Future proof concept remain installed and functional if pneumatic actuator/valve is replaced with electric.	Single or multi stream application (Total Pressure Management System).	Simple parallel install with minimal outage requirements.	Fully compatible/ integrated with existing or new RTU system.
Self Diagnostics. – (control room alarm on malfunction).	Integrated into existing pneumatic system for assurance if required.	Fully independent and stand alone.	Physical panel size approximately 500w x 500h x 300d – all in mm.	Steady State load requirement - 24v DC, approximately 1amp.
FPSA's completed (CHAZOP, HAZOP, HAZID).	Cyber Evaluated at CORE – successful.	Prototype built and successfully tested.	Scalable solution (Full site – 1, 2, 3 FCV/PCV streams).	Fully developed solution (ready to go).

Conclusion

- It is strongly recommended to consider this pressure management solution to address the risks associated with the current pneumatic systems.
- A further consideration is the end Users responsibility to comply with Gas Safety(Management) Regulations1996 (GSMR) which states:-

  'The Safe Management of Gas Flow through a Network and a duty to minimise the risk of a gas supply emergency'.

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