

**Gas System  
Operator**

# Gas Operational Forum

**London Radisson Grafton**  
29<sup>th</sup> November 2018

**nationalgrid**

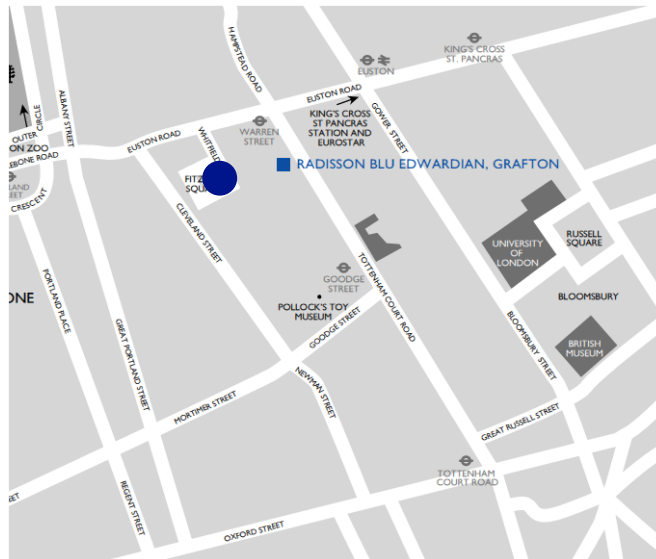


# Health & Safety

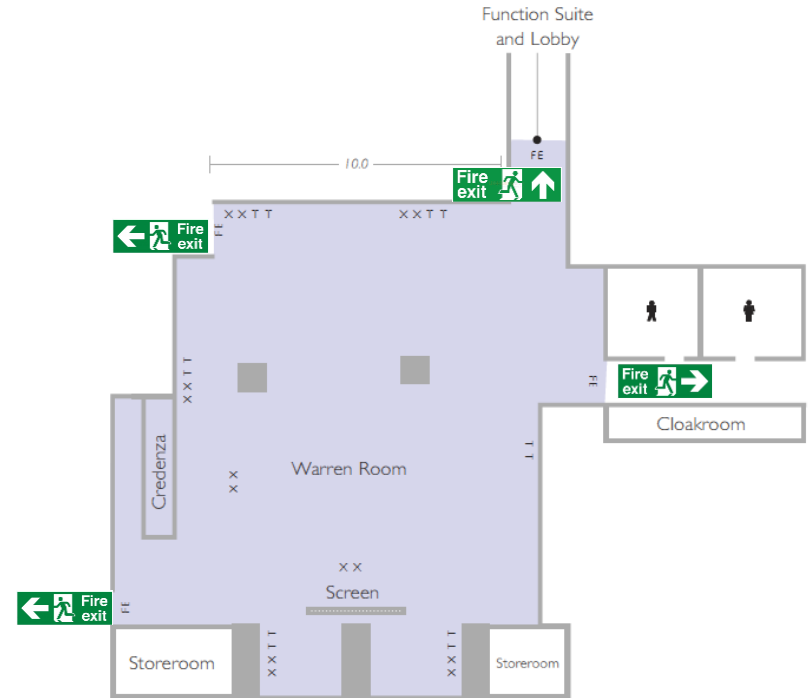
No Fire Alarm testing is planned for today

In case of an alarm, -please follow the fire escape signs to the evacuation point

This is at the rear of the Hotel by Fitzroy Square



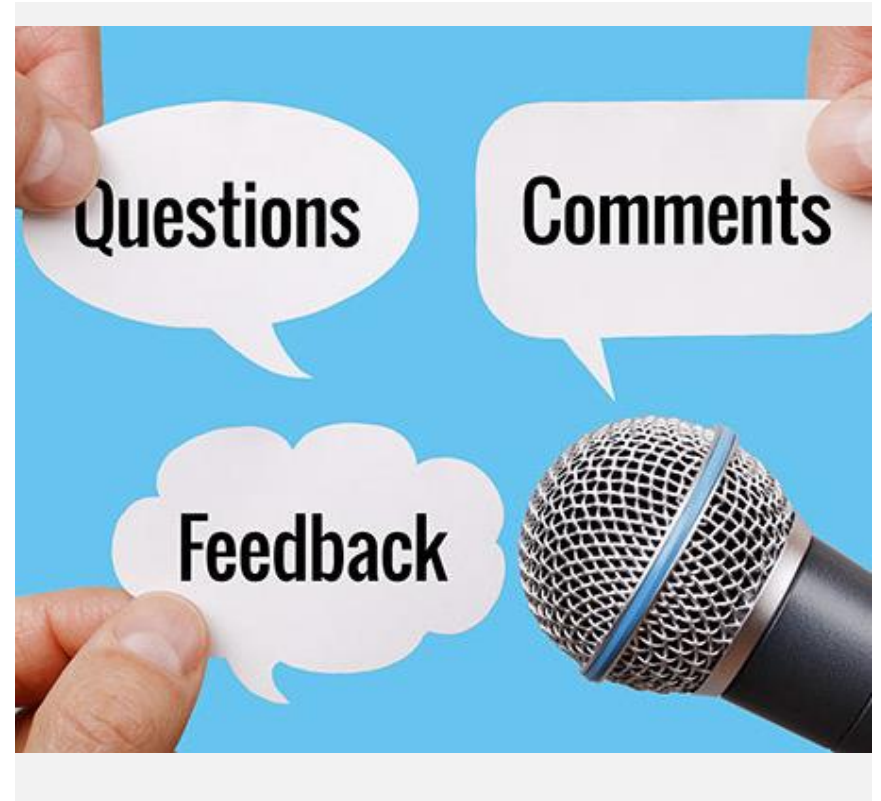
## Warren Room Fire Exits



# Feedback & Questions

**For any questions during the forum you can:**

- Ask during the presentations
- Speak to an NG representative during the break
- Utilise the Query Surgery time at the end of the Forum



# Agenda

01	Previous Operational Forum Actions and Feedback since last forum	09:30
02	Brexit – Day 1	09:35
03	GASSCO Guest Presentation	10:20
04	Operational Overview	11:00
05	Linepack Strategy	11:05
06	Interesting Days	11:25
07	Winter Preparedness	11:35
08	Winter Outlook Questions	11:45
09	Emergency Exercise	12:00
10	Margins Notice & Gas Deficit Warning Review	12:10
11	Gas Balancing Arrangements	12:20

## For Information

12	Operational data enhancements working group	12:25
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## Breaks:

Morning Break

10:40 – 11:00

Lunch Break & Query Surgery

12:30 onwards

# National Grid and Xoserve Attendees



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## Gas Operations

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- Jon Davies
- Martin Cahill
- Cara Finn
- Craig James
- Rob Gibson

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## Future Markets

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- Phil Hobbins
- Emma Piercy

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## Energy Insights

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- Simon Durk

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## Customer & Stakeholder Relations

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- Dave Turpin

# 01

## Previous Actions and Feedback since last Forum

November 2018



# Previous Actions

<b>Item</b>	<b>Action</b>	<b>Detail</b>
<b>Interesting Days October</b>	<b>Information requested regarding NG Trading on the 1<sup>st</sup>/2<sup>nd</sup> October and 21<sup>st</sup> October</b>	<b>This will be covered in Interesting Days agenda item for today's Forum</b>
<b>Winter Preparedness Session</b>	<b>NG to share findings from Winter Preparedness session in October Forum</b>	<b>This will be covered in Winter Preparedness agenda item for today's Forum</b>
<b>Responses to Operational Data Enhancements Paper</b>	<b>Deadline to respond to Operational Enhancements paper by 6<sup>th</sup> November</b>	<b>Deadline for this has now passed, however working group is still open for sign-up</b>
<b>UIG</b>	<b>Xoserve to share findings for analysis on enduring UIG</b>	<b>Xoserve present at meeting for today</b>

# Feedback Since Last Forum

<b>Feedback</b>	<b>Description</b>	<b>Actions</b>
<b>Brexit Feedback</b>	<b>Multiple Questions received on Brexit Preparations</b>	<b>Ofgem and BEIS to present at today's forum</b>



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02

Brexit – Day 1

Ofgem/BEIS

nationalgrid





Department for  
Business, Energy  
& Industrial Strategy

# Gas Operational Forum

## Brexit Update

Justin Goonesinghe  
Head of EU Exit - Gas

29 November 2018

# Background

- Overview of BEIS team and approach to stakeholder engagement
- Withdrawal Agreement
  - Overview
  - Process going forwards
- Political Declaration
  - Overview
  - Energy text

## ‘No Deal’ Day 1

- Statutory Instruments
  - ND prep
- Gas Technical Notice
  - Background
  - After 29 March
  - Actions for businesses and stakeholders
- Carbon Emissions Trading
  - ‘No deal’

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Gassco guest  
presentation

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# Gassco – Bringing Norwegian gas to Europe

National Grid – Operational Forum November 2018



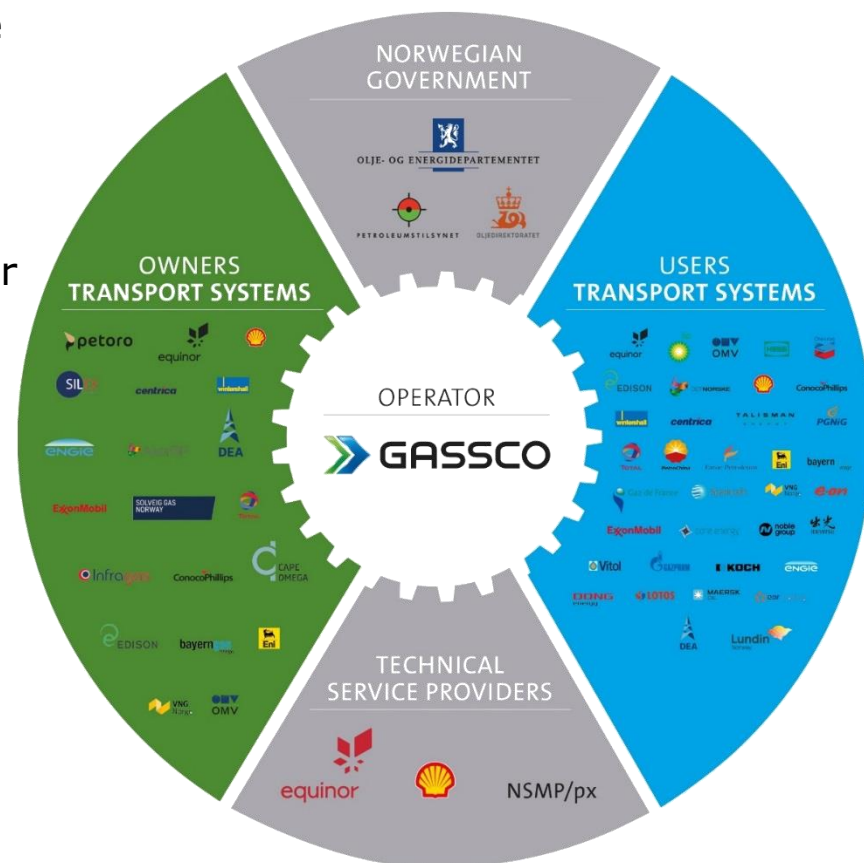
# Gassco AS

- A state-owned company, established by Parliament in 2001
- A neutral and independent operator for the integrated gas transport system from the Norwegian continental shelf to European countries
- Goal is to present a well-run transport system, to the benefit of users, owners and customers:
  - System Operations
  - Capacity Management
  - Infrastructure Development
  - Asset Management (with and without Technical Service Providers)
- Offices/operation in Norway, Germany, Belgium, France and UK
- Employees: approx. 320



# Gassled, Gassco and Technical Service providers

- **Gassled** is a joint venture that *owns* the majority of the integrated gas infrastructure on Norwegian Continental Shelf
- **Gassco** *operates* the Norwegian gas infrastructure on behalf of Gassled and other Joint Ventures
- The transportation tariffs are stipulated by the Ministry in a separate regulation
- The access regime and Gassco's various roles under the system is further regulated in the petroleum regulations
- **Technical Service Providers (TSP)**: Equinor, Shell, px : daily operations of a number of assets





# The Norwegian gas transport system

- Integrated infrastructure system
- 8 800 km of pipelines
- 3 major processing plants
- 6 export receiving terminals in Europe
- Riser platforms
- Some 80 fields delivering gas



# System Operation

Planning, monitoring, controlling and coordination of all the gas transport

## Capacity Administration:

- Regulated in Norwegian law
- Services are available to gas companies or customers with a qualified need for capacity
- Primary market for capacity, re-booking service, secondary market for capacity

## Dispatching:

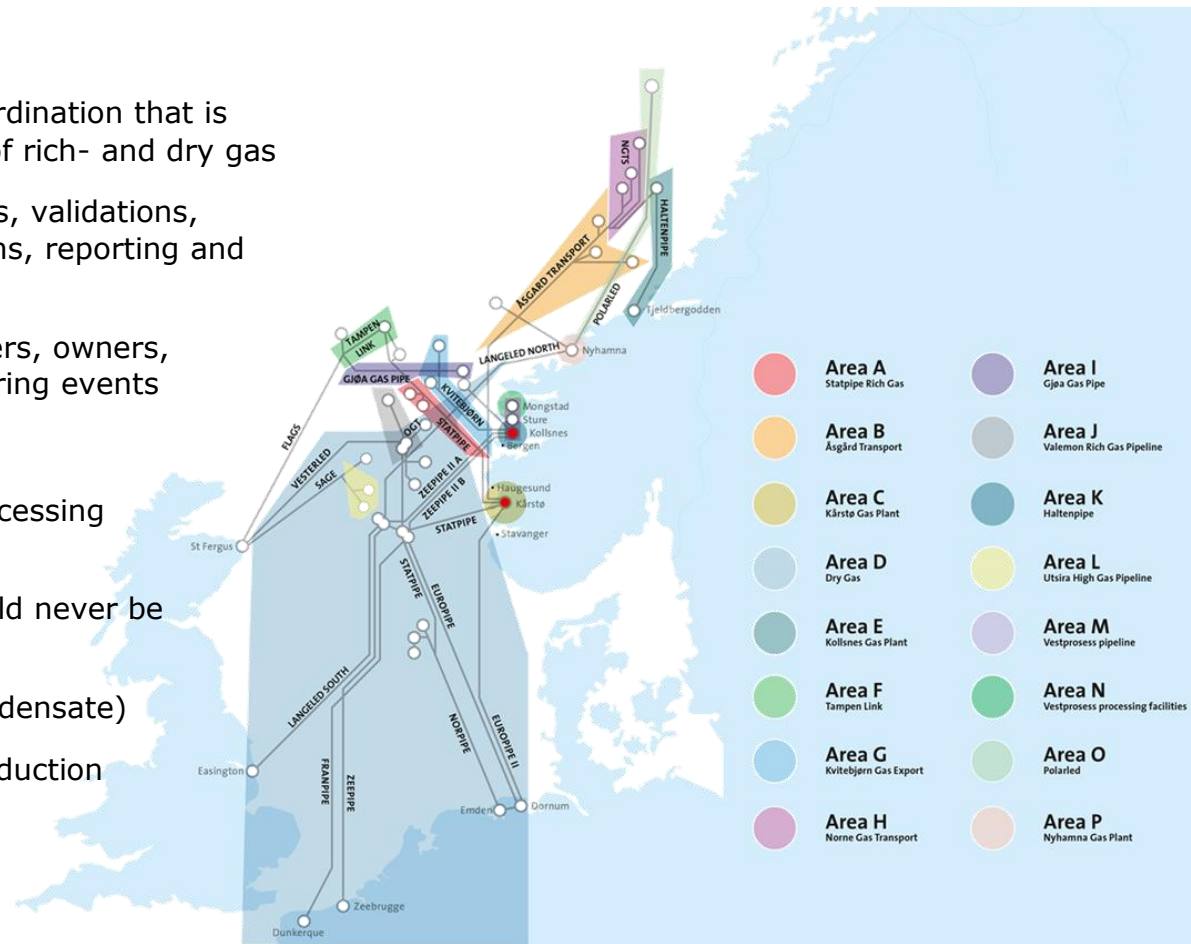
- Exchange of information and co-ordination that is necessary for planning transport of rich- and dry gas
- Includes availabilities, nominations, validations, matching, instructions, transactions, reporting and imbalances
- Exchange of information to Shippers, owners, authorities, public and internal during events

## Gas Transport:

- Online monitoring of all fields, processing facilities and terminals
- The integrity of the pipelines should never be jeopardized, leak detection
- Avoid production cuts (oil and condensate)
- Coordinated maintenance and production planning

## Area C - Services

EXT:	Extraction
ETSL:	Ethane Treatment, Storage and Loading
CSL:	Condensate Storage and Loading
FSL:	Fractionation, Storage and Loading
CO <sub>2</sub> R:	Carbon Dioxide removal
CO <sub>2</sub> D/B:	Carbon Dioxide Blending
H <sub>2</sub> SR:	Hydrogen Sulphure Removal



# Real-time gas flow and information of events

<http://flow.gassco.no/>



PAST EVENTS

HISTORICAL FLOW

PRINCIPLES FOR PUBLICATION



## REAL-TIME FLOW INFORMATION

LAST UPDATED 2018-11-12 12:14:06

Dornum	Emden	Dunkerque	Zeebrugge	Easington	St. Fergus	Fields Delivering into SEGAL	Other Exit Flows	Aggregated Entry Flow	Aggregated Exit Flow	System Flow Balance
<b>48,43</b> MSm <sup>3</sup> /d	<b>73,11</b> MSm <sup>3</sup> /d	<b>50,92</b> MSm <sup>3</sup> /d	<b>40,71</b> MSm <sup>3</sup> /d	<b>66,29</b> MSm <sup>3</sup> /d	<b>7,38</b> MSm <sup>3</sup> /d	<b>25,99</b> MSm <sup>3</sup> /d	<b>9,21</b> MSm <sup>3</sup> /d	<b>321,74</b> MSm <sup>3</sup> /d	<b>322,04</b> MSm <sup>3</sup> /d	<b>-0,30</b> MSm <sup>3</sup> /d

## UNPLANNED EVENTS - EXIT TERMINALS

Event id	Asset affected	Status	Published	Start of event	End of event	Volume impact (MSm <sup>3</sup> /d)		Changed availability (MSm <sup>3</sup> /d)		Expected duration	Comments
						Within-day	Day-ahead	Within-day	Day-ahead		
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## UNPLANNED EVENTS - FIELDS AND PROCESSING PLANTS

Event id	Asset affected	Status	Published	Start of event	End of event	Volume impact (MSm <sup>3</sup> /d)		Changed availability (MSm <sup>3</sup> /d)		Expected duration	Comments
						Within-day	Day-ahead	Within-day	Day-ahead		
2018-336	Kollsnes	Rev. 3	2018-11-12 06:09	2018-11-11 08:04		-12.0	0.0	-12.0	0.0		Compressor failure

## PLANNED EVENTS - EXIT TERMINALS

Event id	Asset affected	Status	Published	Start of event	End of event	Changed availability (MSm <sup>3</sup> /d)	Comments
2019-1	Fields Delivering int...	New	2017-12-15 12:30	2019-02-18 06:00	2019-02-19 06:00	-17.0	Yearly maintenance
2019-25	Dornum	New	2018-10-12 12:00	2019-05-01 06:00	2019-05-15 06:00	-6.0	Yearly maintenance
2019-9	Emden	New	2018-10-12 12:00	2019-06-02 06:00	2019-06-23 06:00	-32.7	Yearly maintenance
2019-45	Zeebrugge	New	2018-10-12 12:00	2019-06-16 06:00	2019-06-23 06:00	-41.4	Yearly maintenance
2019-59	Fields Delivering int...	New	2018-10-12 12:00	2019-08-09 06:00	2019-08-24 06:00	-18.0	Yearly maintenance

# Providing flexibility for fields delivering off.spec gas

- Approx. 80 fields/licences deliver gas into the system. Approx. 50 % of these continuously deliver gas above the entry specifications (typical H<sub>2</sub>S, CO<sub>2</sub>, WI or ICF)
- The system provides opportunity for removal and blending services of such gas
- Shippers must book quality services for off.spec gas entering the system – well function system
- Blending service is reasonable endeavour, pending on available blending gas. Income to shippers providing blending gas
- Dry gas product quality of ~ 99.98 % the last 5 years. Specifications is harmonised with market standards (Easee-gas)

Fields in Halten Area – CO<sub>2</sub> challenges

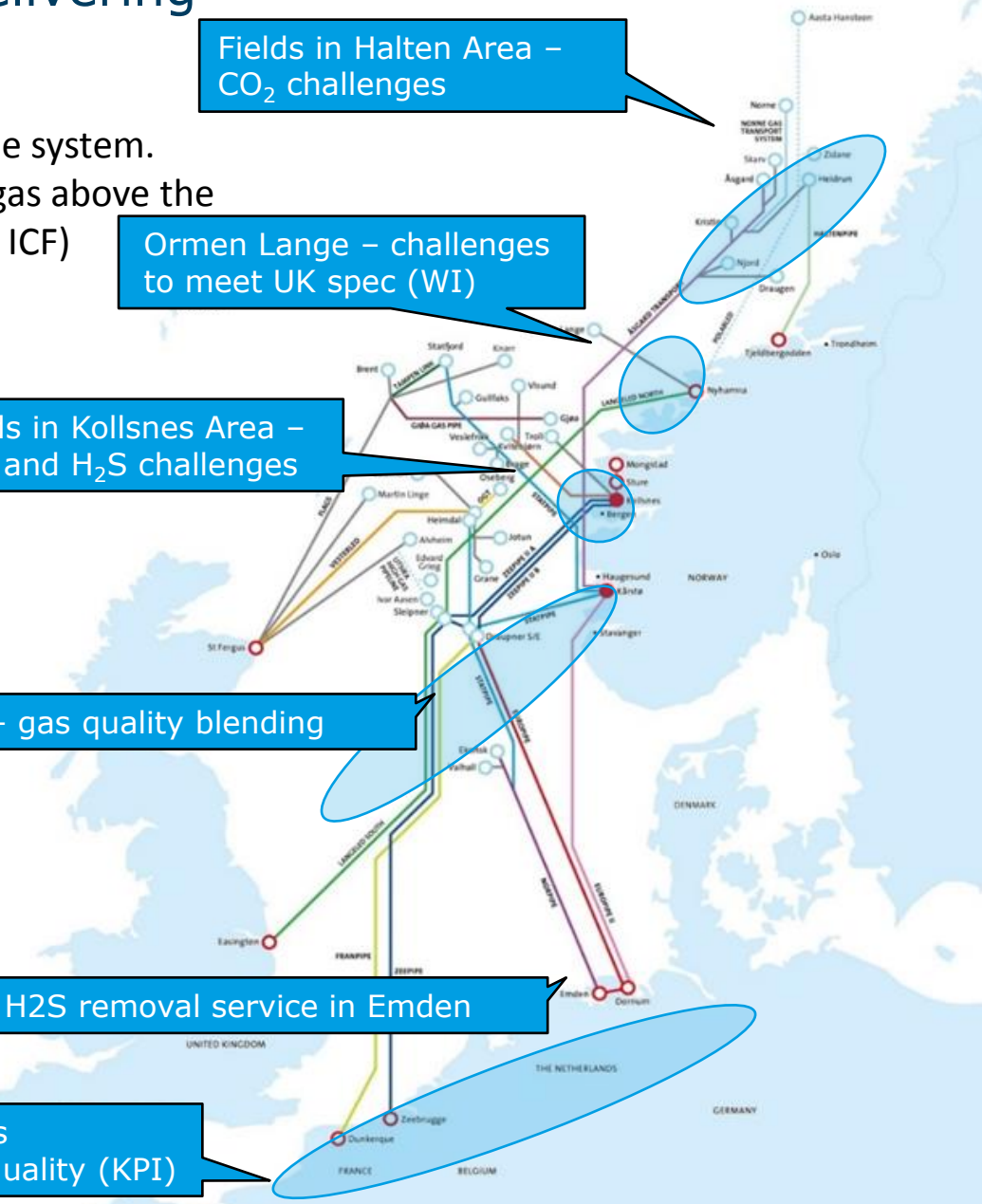
Ormen Lange – challenges to meet UK spec (WI)

Fields in Kollsnes Area – CO<sub>2</sub> and H<sub>2</sub>S challenges

Area D – gas quality blending

H<sub>2</sub>S removal service in Emden

Exit point deliveries – dry gas product quality (KPI)

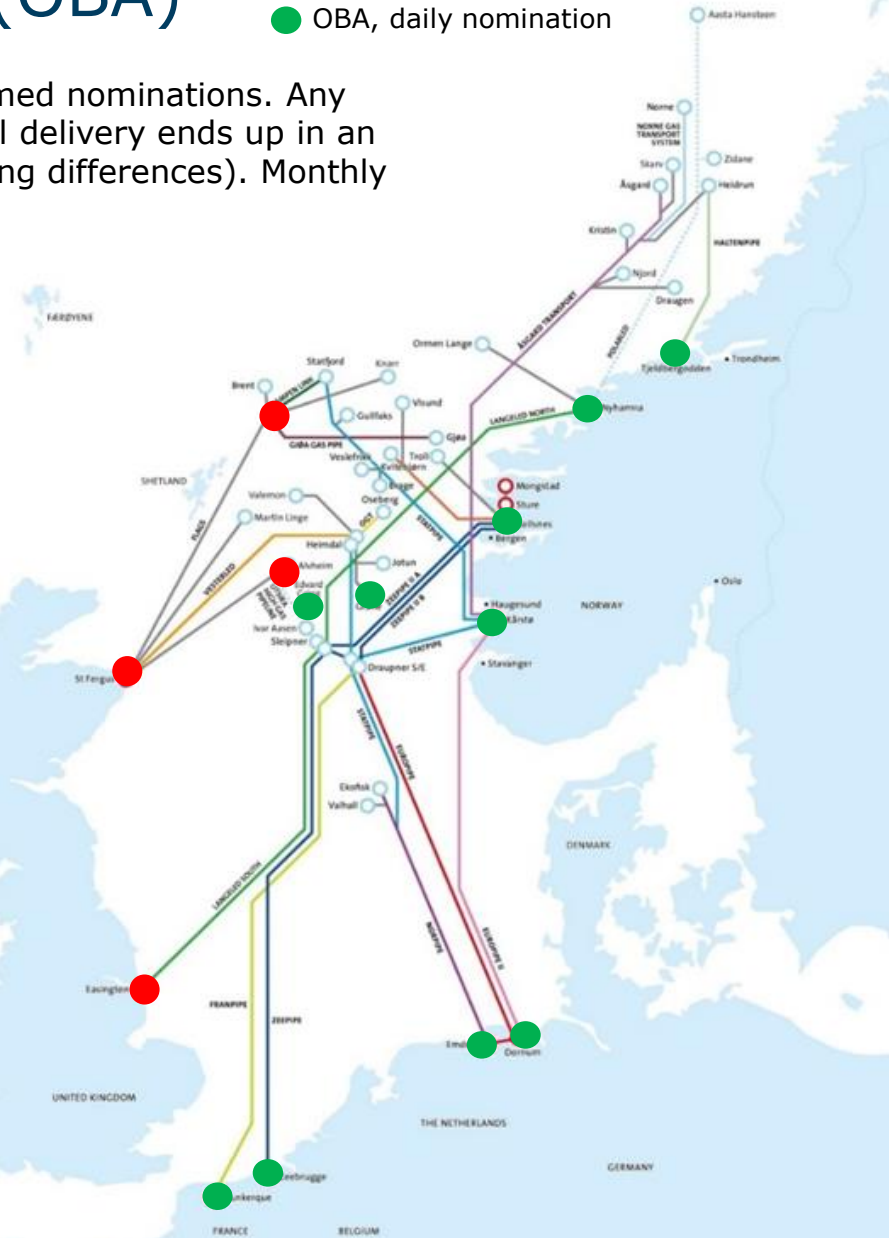


# Operational Balance Account (OBA)

● Daily attribution process

● OBA, daily nomination

- OBA - shippers quantities are equal to their last confirmed nominations. Any deviation between the nominated quantity and physical delivery ends up in an OBA between the two Operators (normally small steering differences). Monthly allocation.
- Gassco has many years of experience using both daily nomination using balancing accounts (OBA) and daily allocation based on attribution
- OBA is the preferred method;
  - OBA gives more operational possibilities without involving the shippers. The additional operational flexibilities is an advantage for shippers.
  - Daily attribution process is more costly and time consuming for both shippers and field operators. The daily attribution process is far more complicated and requires additional resources in our dispatching, allocation, metering and IT personnel
  - Daily allocation are also more time and resource consuming for the field operators since the report figures from the fields must be correct when reported first time.
  - We have received feedback from shippers that they prefer nomination using OBA. No retroactive balancing (penalties).

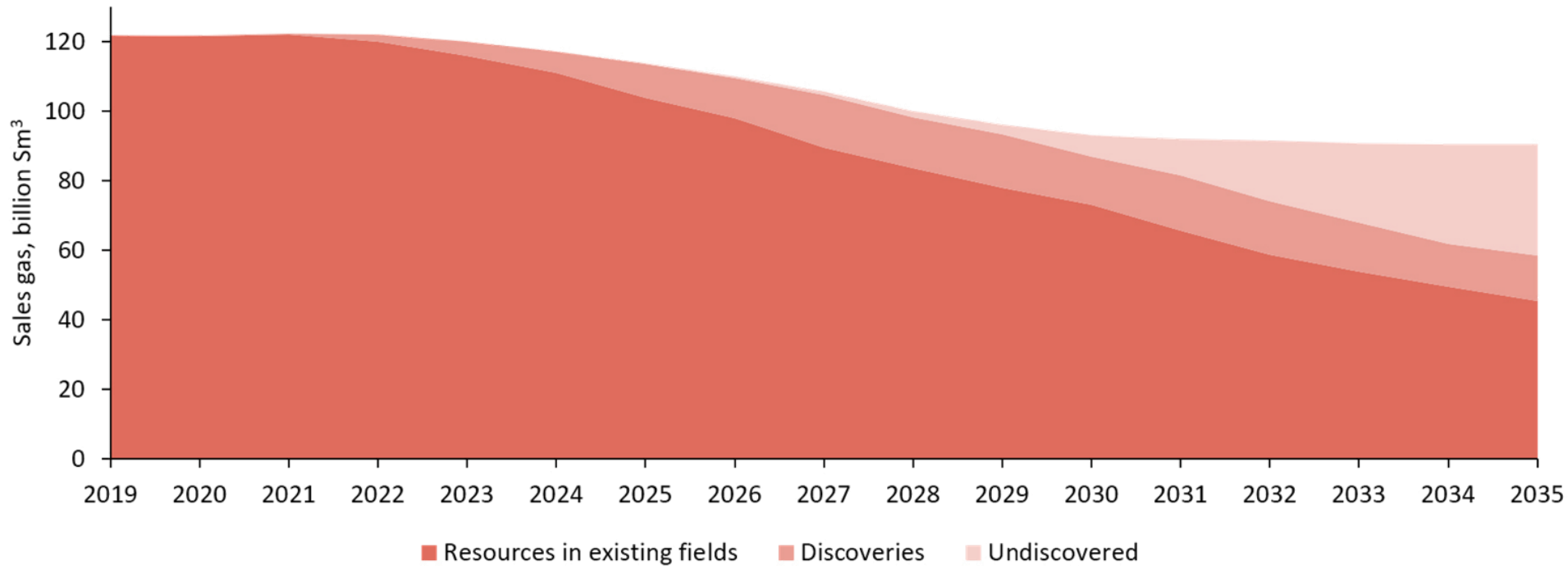
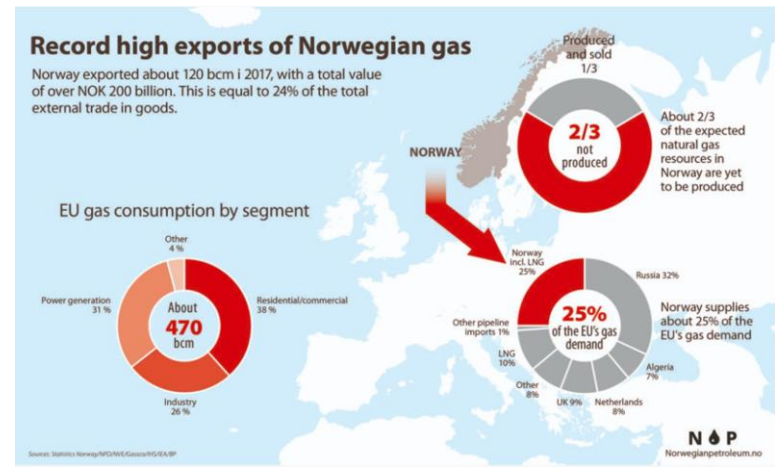


# Extending the gas infrastructure further north

- Aasta Hansten and Polarled - one of Europe's largest industrial projects the next years
- First subsea pipeline crossing of the Arctic circle
- 1300m water depth
- Start-up November/December 2018



# NCS long term deliveries



Source: NPD

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04

Operational  
Overview

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# **Gas Prices, Transporter Actions and Neutrality**

**nationalgrid**



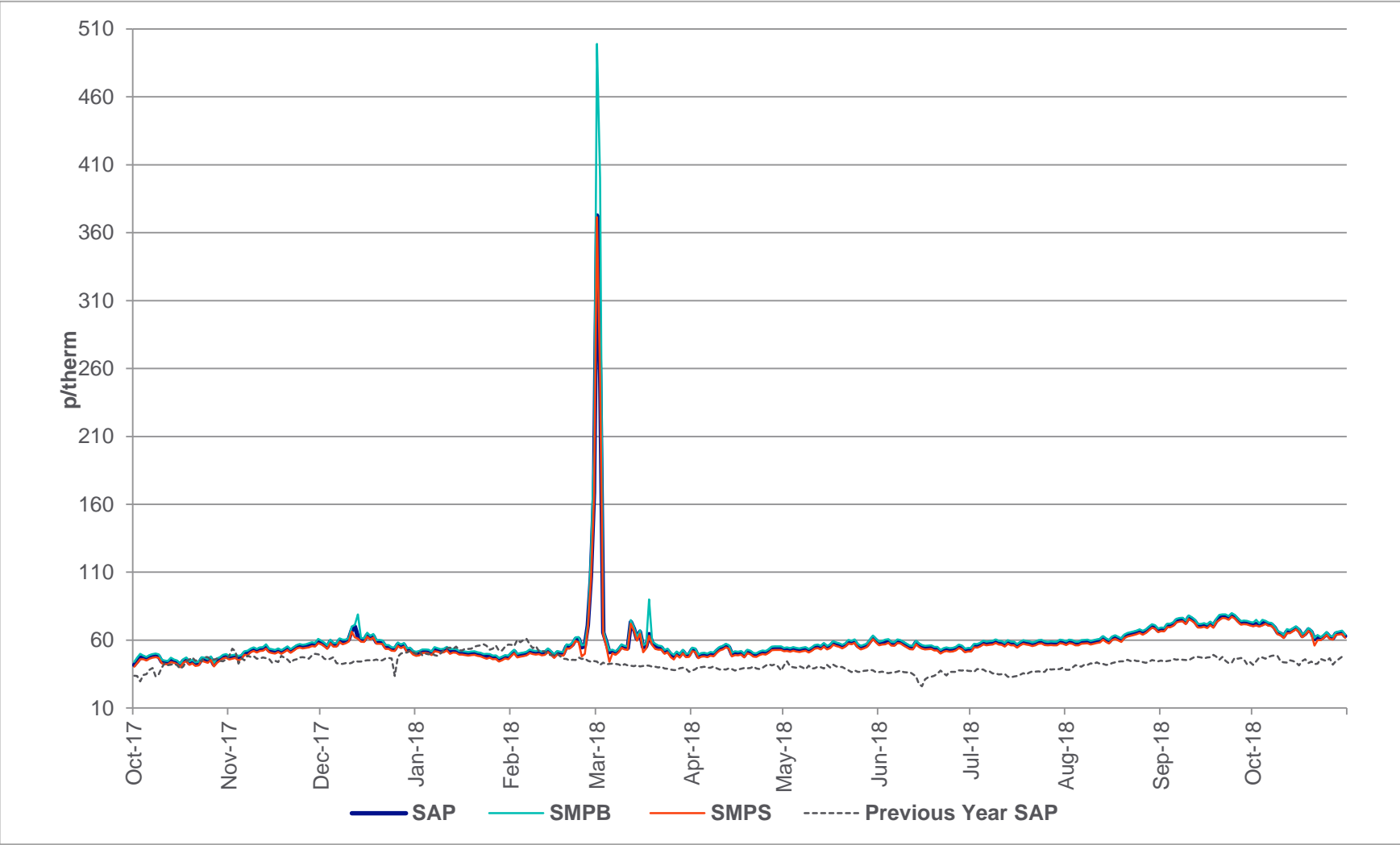
# Summary Report

## YEAR TO DATE PERCENTAGES AGAINST BUYS AND SELLS FOR OCTOBER (2017 - 2018)

Oct-17			Oct-18		
No. of Balancing Actions YTD	<b>162</b>	Percentage	No. of Balancing Actions YTD	<b>209</b>	Percentage
Buys	126	78%	Buys	97	46%
Sells	36	22%	Sells	112	54%

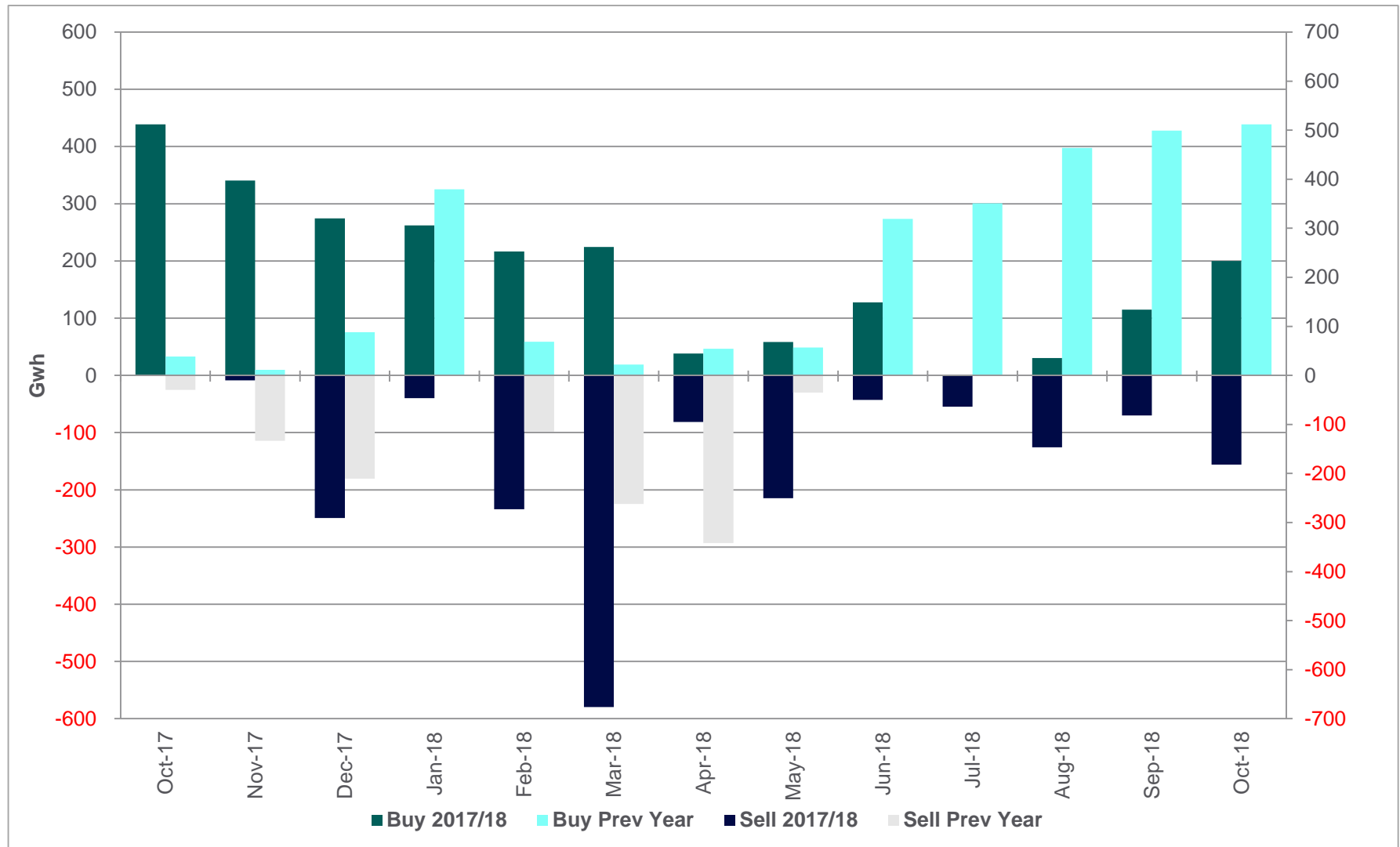
# UK Gas Prices

1<sup>st</sup> October 2017 to 31<sup>st</sup> October 2018 vs Previous Year



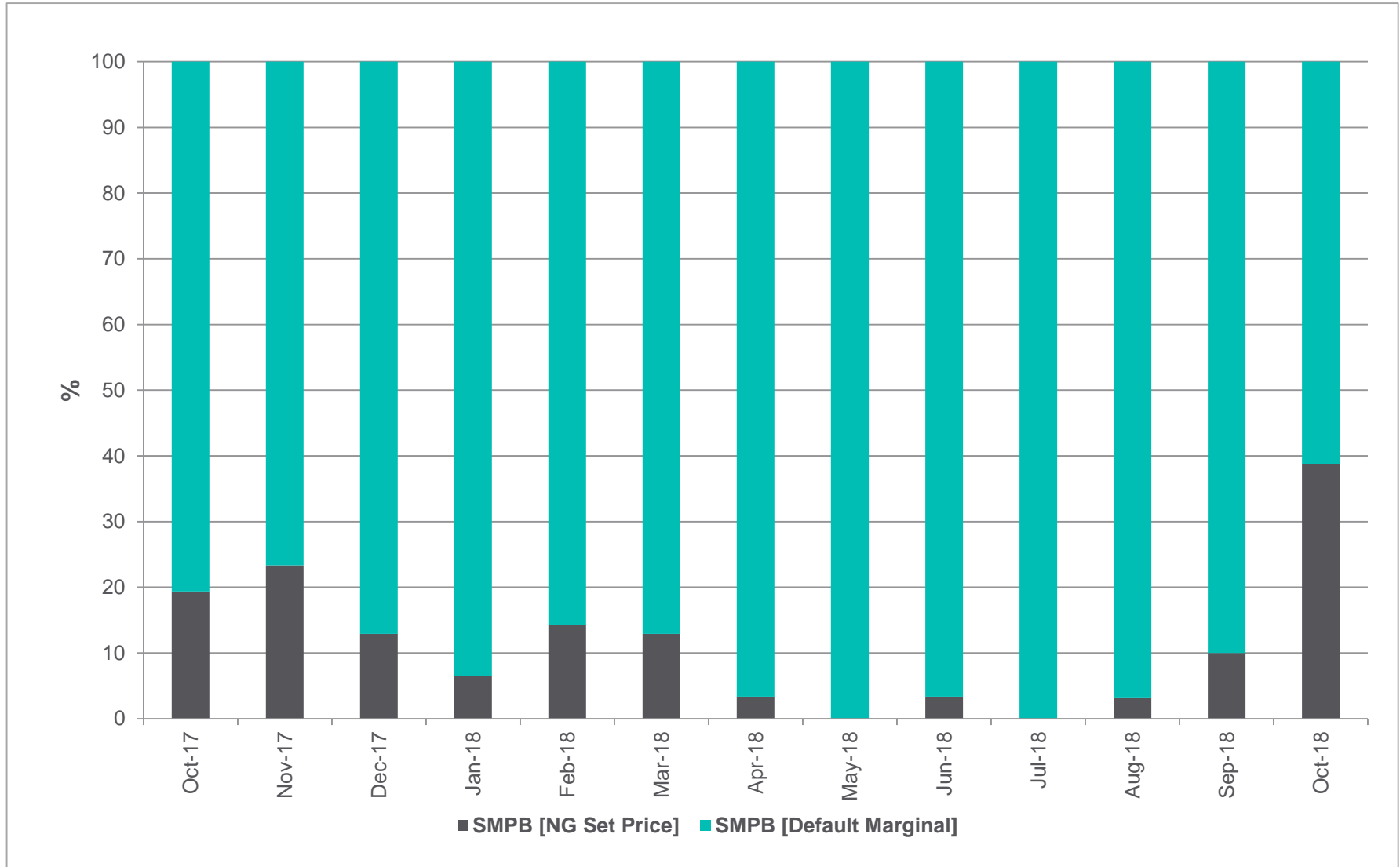
# Transporter Energy Traded on the OCM

NGG Monthly Buys and Sells 1<sup>st</sup> October 2017 to 31st October 2018 vs Previous Year



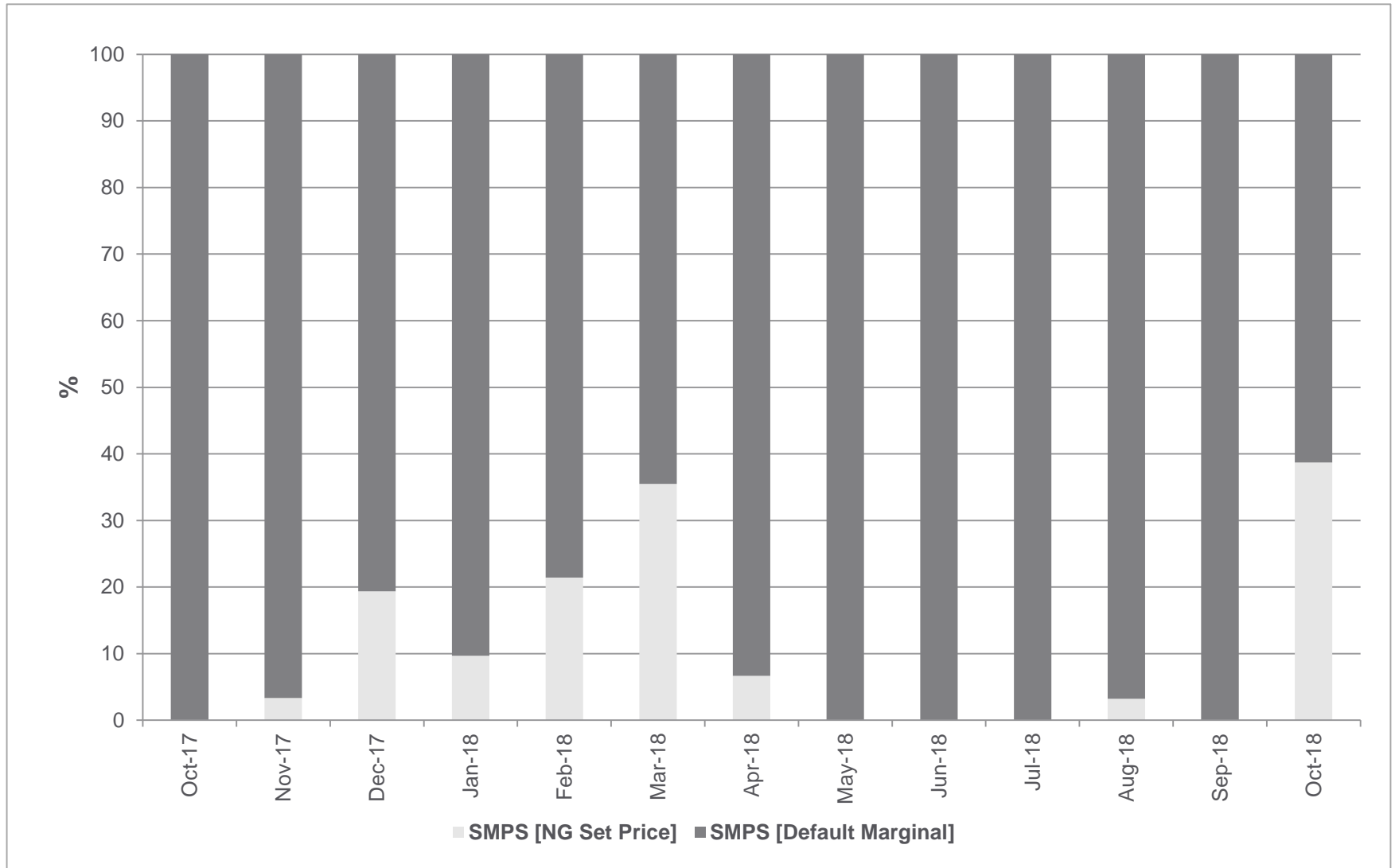
# Days of Default SMP Prices (SMPB)

October 2017 to October 2018



# Days of Default SMP Prices (SMPS)

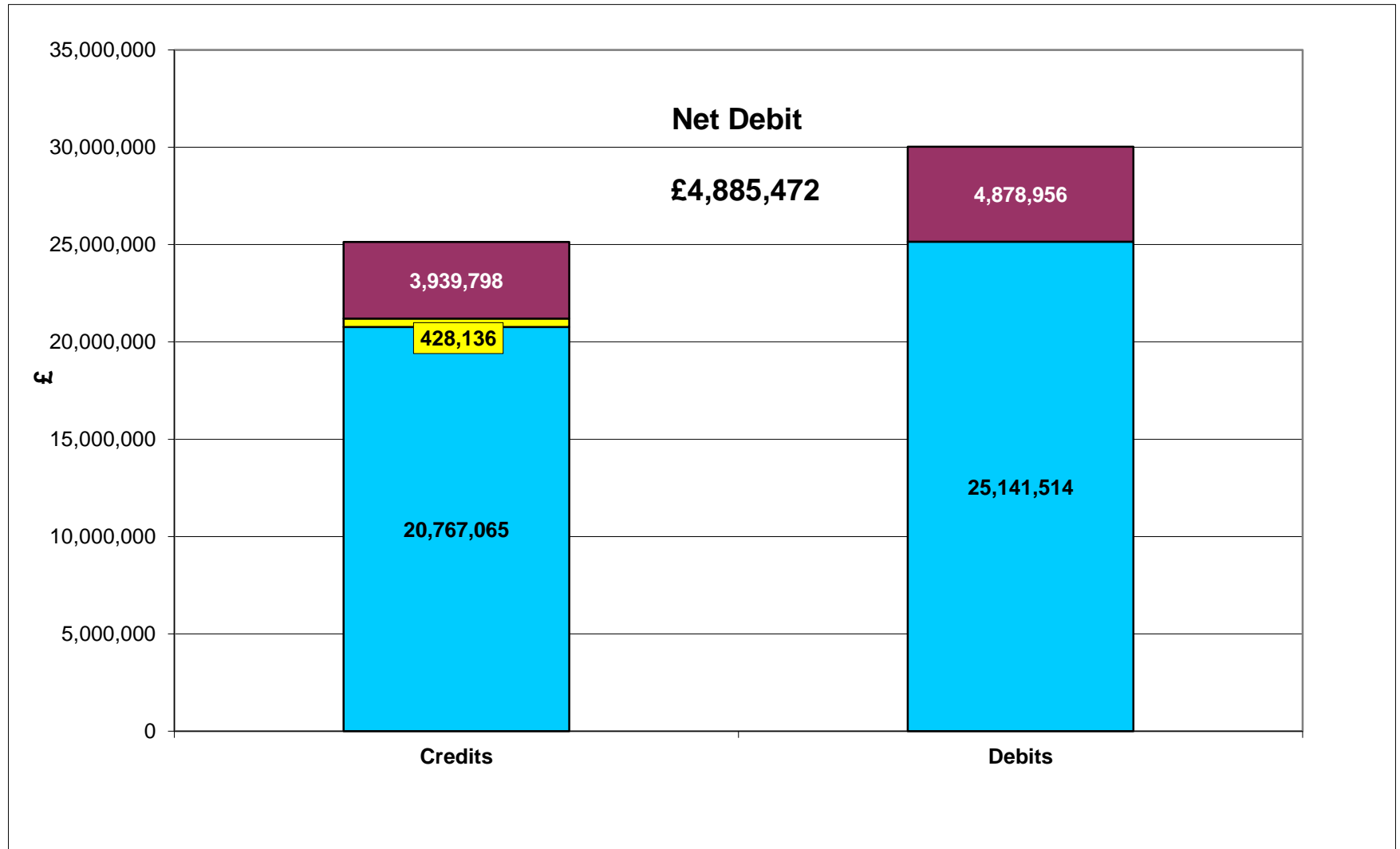
October 2017 to October 2018



# Energy Balancing – Balancing Costs

Payments / Charges / Net Credit / Debit (Imbalance / Scheduling / OCM)

October 2018



# Energy Balancing – Balancing Costs

Payments / Charges / Net Credit / Debit (Imbalance / Scheduling / OCM)

October 2018

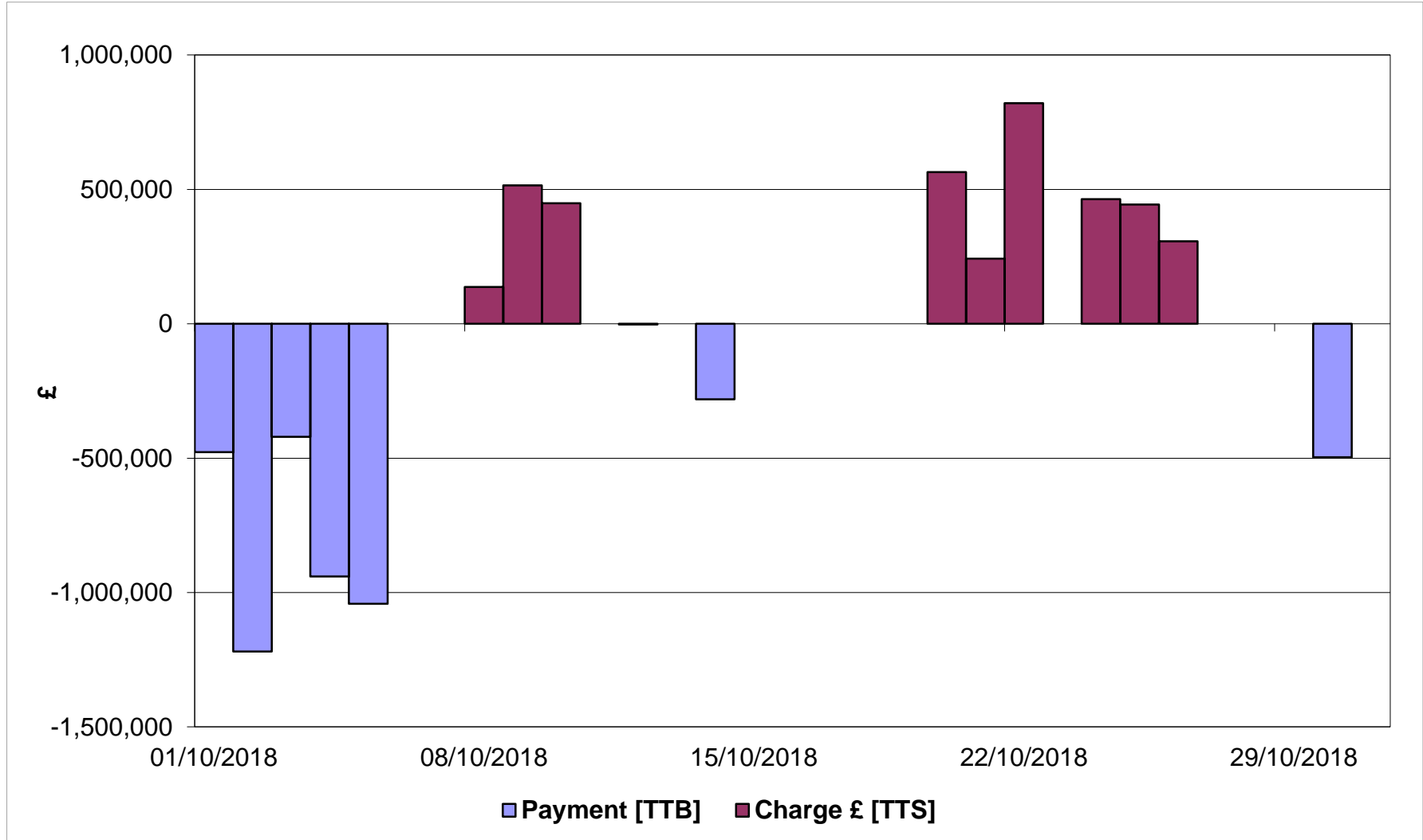
		<b>Oct-18</b>
<b>Imbalance</b>	Payment £ [DCS]	-25,141,514
	Charge £ [DCT]	20,767,065
<b>Scheduling</b>	Exit Charge £ [DXS]	10,412
	Exit Charge £ [EXS]	103,439
	Entry Charge £ [ESC]	314,285
<b>OCM</b>	Payment £ [TTB]	-4,878,956
	Charge £ [TTS]	3,939,798
<b>Balancing Costs</b>		<b>-4,885,472</b>



# Energy Balancing – Balancing Costs

OCM Payments / Charges

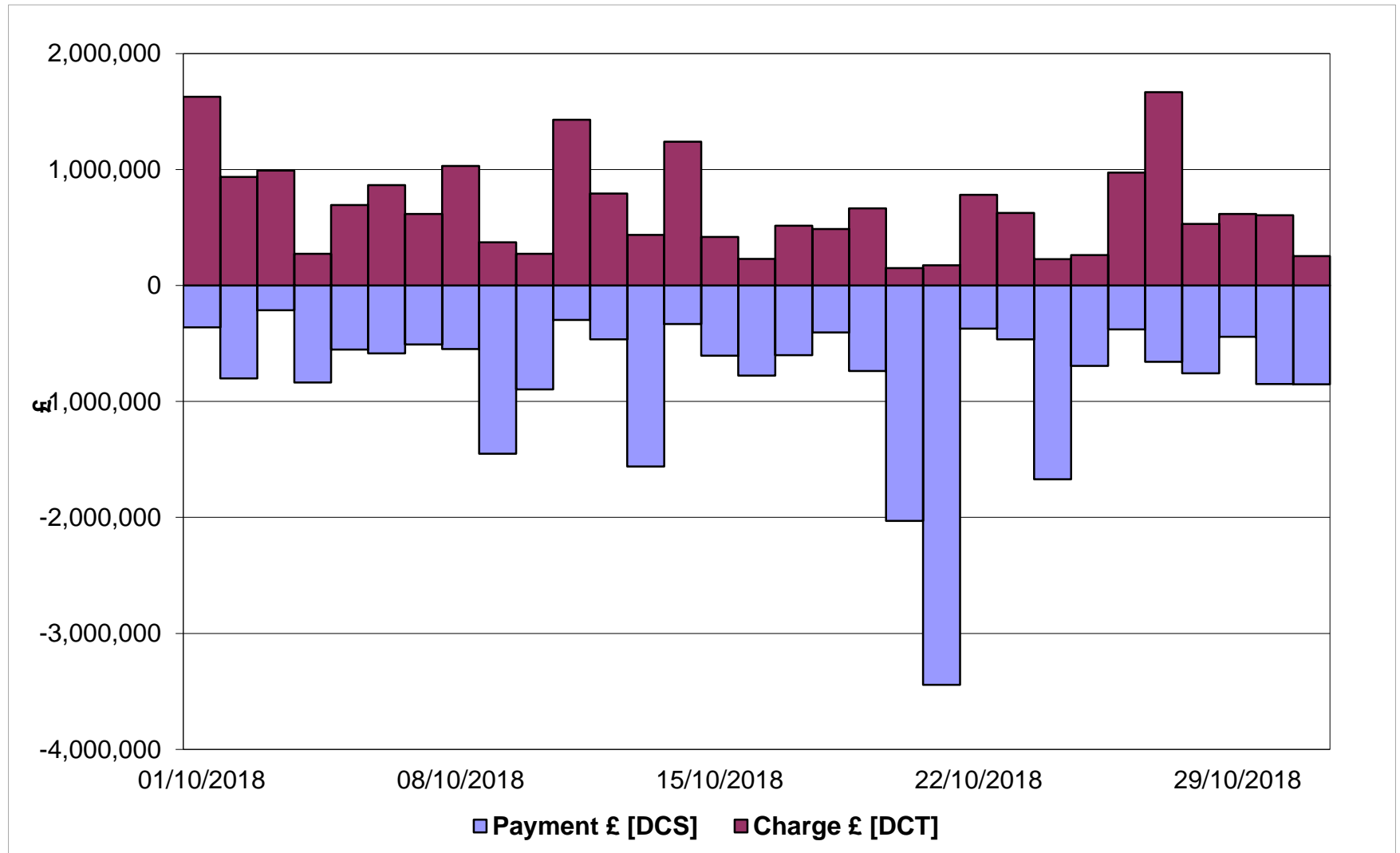
October 2018



# Energy Balancing – Balancing Costs

Imbalance Payments / Charges

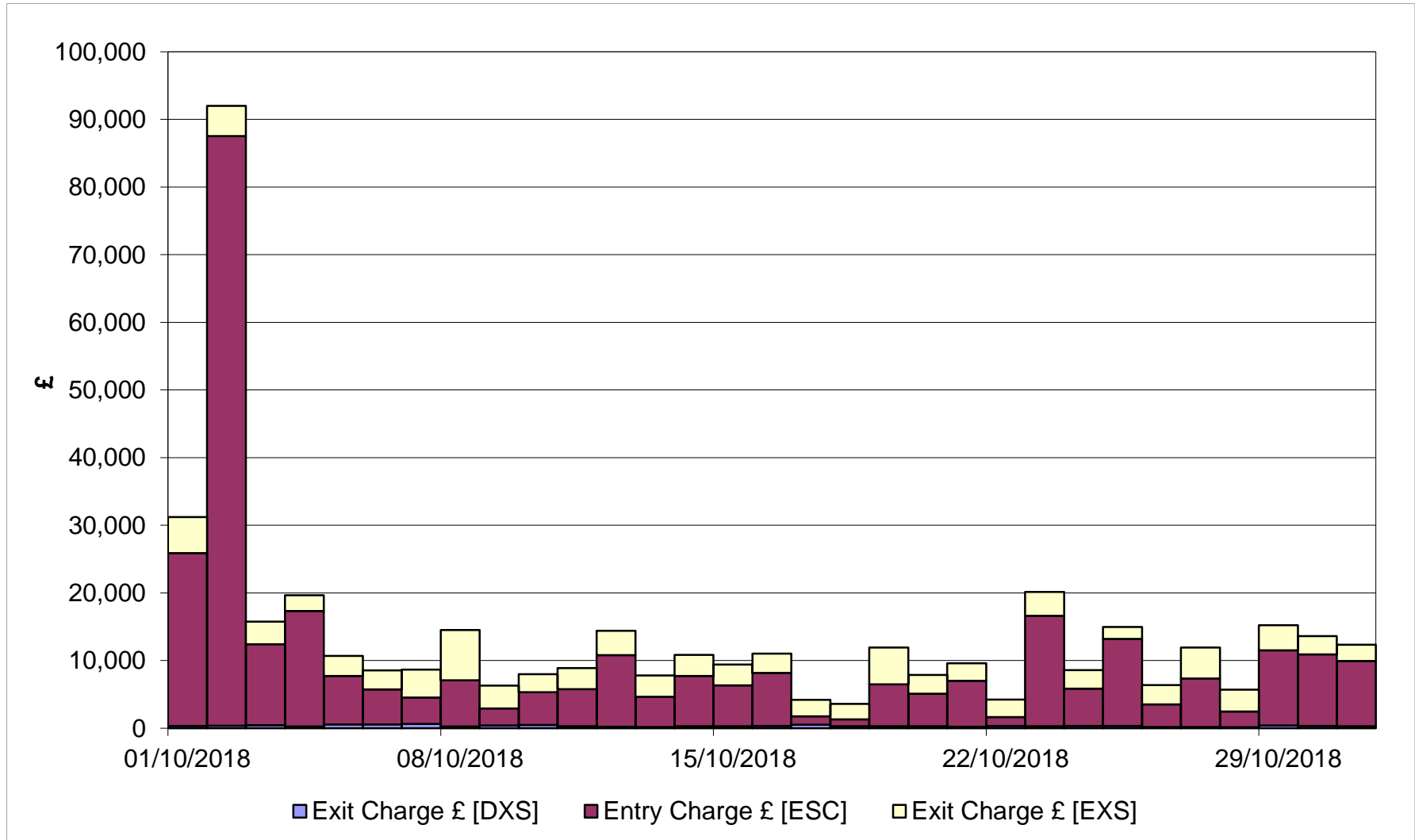
October 2018



# Energy Balancing – Balancing Costs

## Scheduling Charges

October 2018



# Capacity Neutrality Net Cost / Revenue

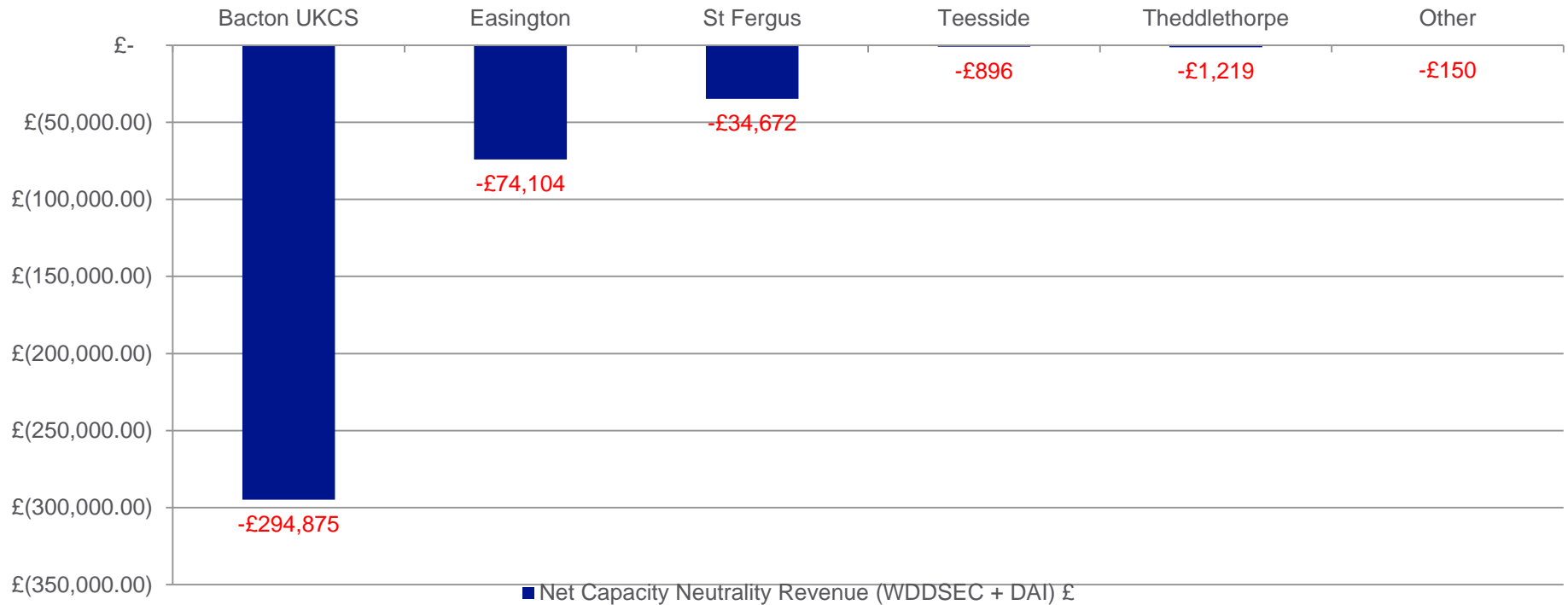
1<sup>st</sup> April 2018 to 31<sup>st</sup> October 2018

	Revenue/Costs
WDDSEC/DAI Entry Capacity Revenue	-£405,916
Total Entry Constraint Management Operational Costs	£-1,120,911
Entry Capacity Overrun Revenue*	-£252,959
Non-Obligated Sales Revenue (Entry only)	-£ 16,782
Revenue from Locational Sells and PRI Charges	£0
<b>Net Revenue</b>	£445,254

# Capacity Neutrality Revenue

1st April 2018 to 31st October 2018

## Net Capacity Neutrality Revenue (WDDSEC + DAI) £



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# **Operational Overview – Supply, Demand & Storage**

**nationalgrid**

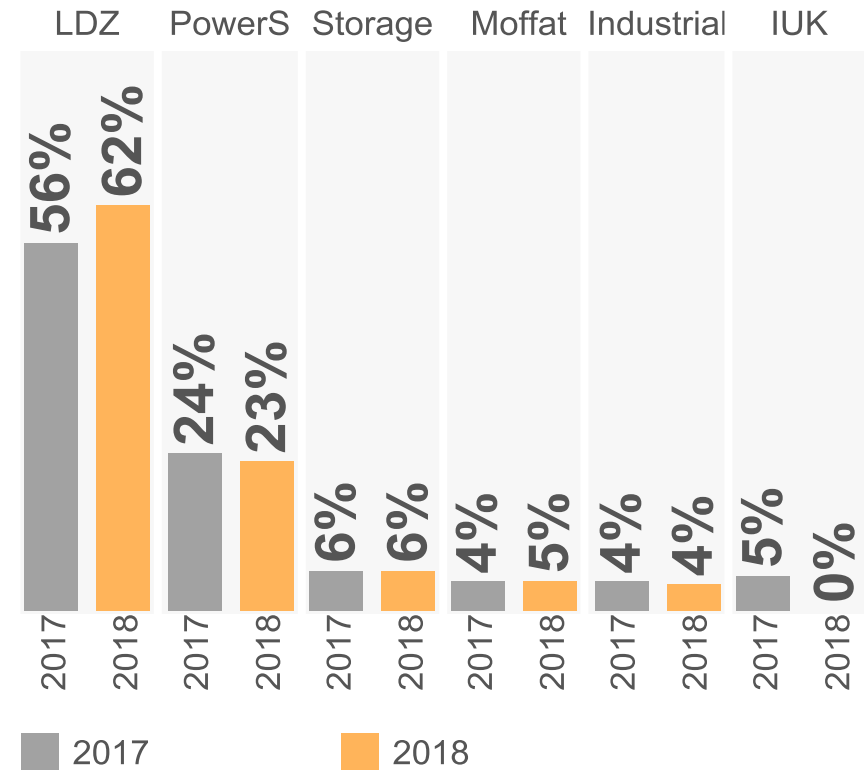


# Demand profile

The profile of demand seen so far this Winter is broadly similar to that of the same period last year.

The two significant changes observed so far this Winter are an increase in LDZ demand and a decrease in the volume of IUK exports.

Demand Profile



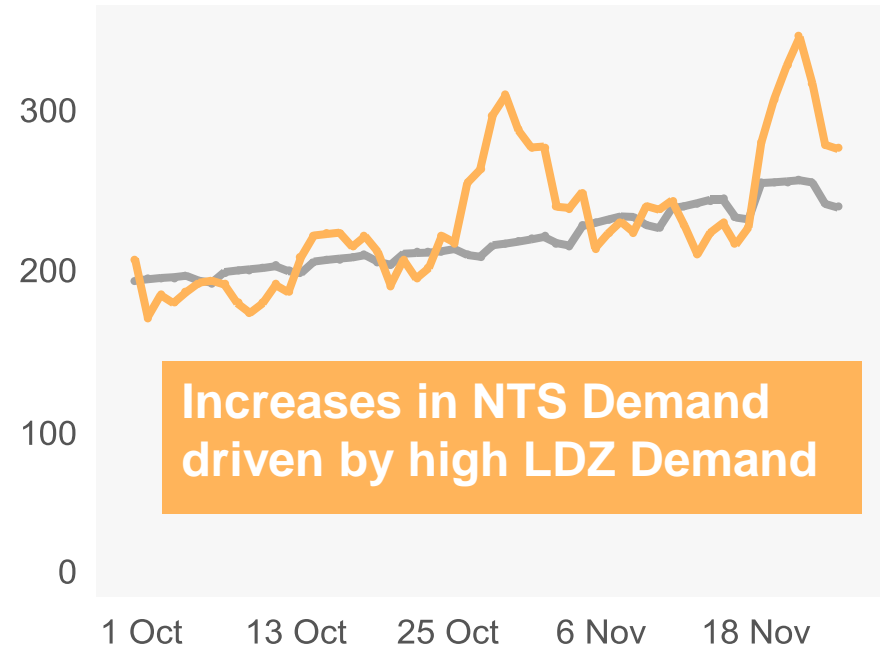
Data from 1st October until 25th November

# NTS Demand at the beginning of Winter

As we moved into Winter, levels of NTS Demand were largely as expected.

However there have been significant increases in NTS Demand during the periods 26<sup>th</sup> Oct to 3<sup>rd</sup> Nov and 19<sup>th</sup> to 25<sup>th</sup> Nov

NTS Demand versus Seasonal Normal Demand (mcm/d)



■ NTS Demand  
■ Seasonal Normal NTS Demand

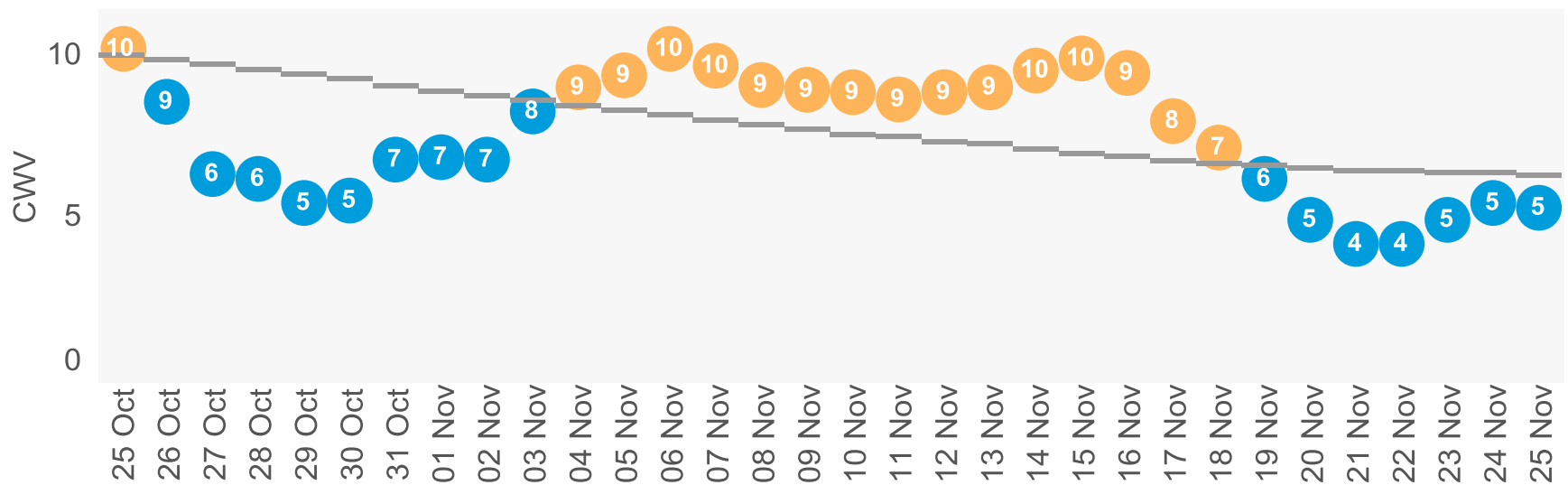
Data from 1st October until 25th November



# Cold weather drives up LDZ Demand

The peaks in Demand were driven by significantly colder than normal weather for the time of year.

CWV versus Seasonal Normal CWV

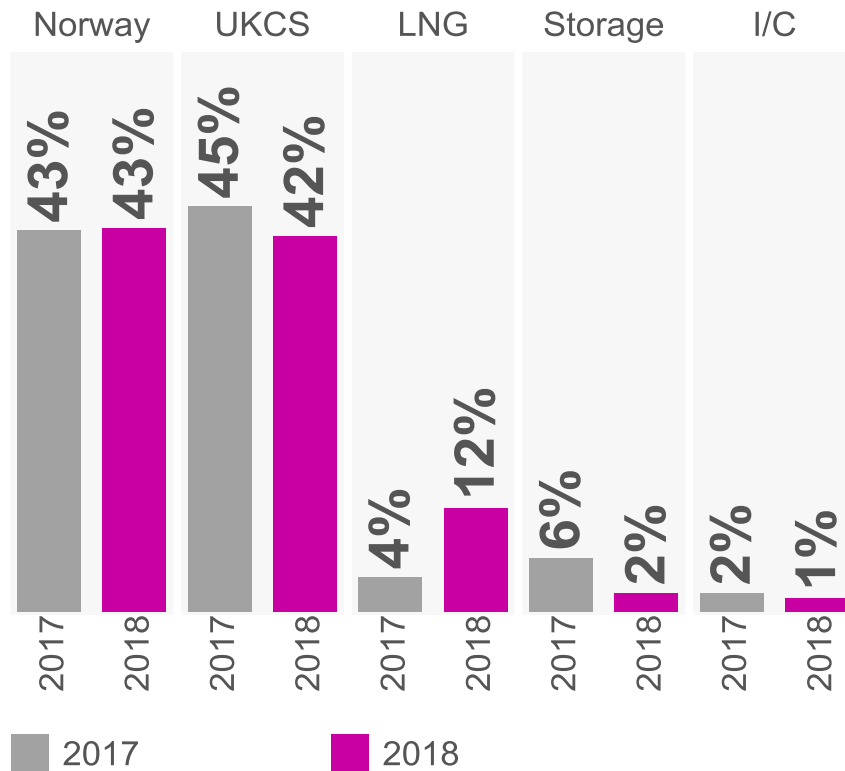


# Supply profile

So far this Winter, the supply profile has been broadly similar to that of the same period last year.

The biggest change so far this year is a pronounced increase in supply from LNG.

Supply Profile



Data from 1st October until 25th November

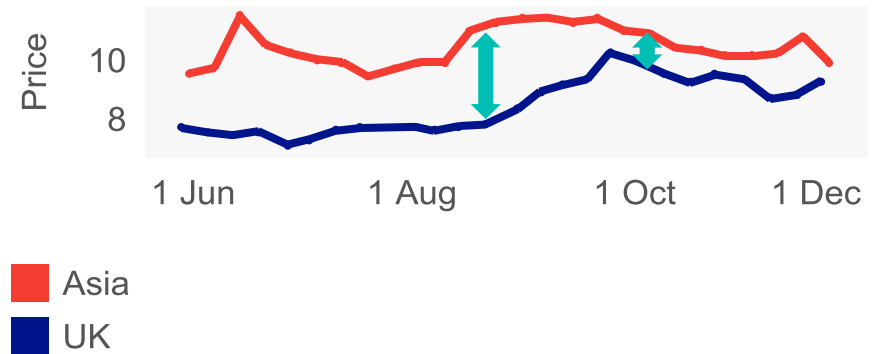
# Lower price differential between the UK and Asia

After a long period during which Asian prices were significantly higher than the UK, moving into Winter this price differential has reduced.

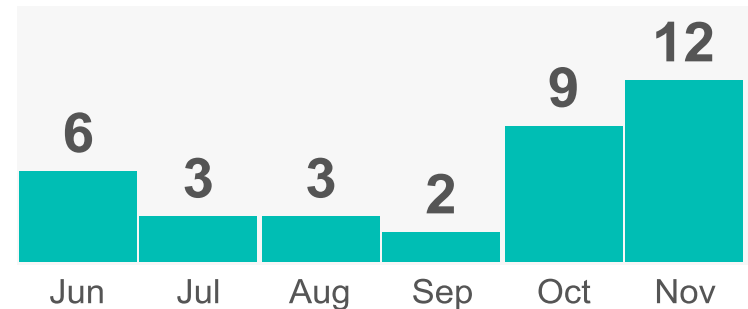
Since the decrease in price differential, the number of LNG tankers arriving in the UK has increased significantly.

LNG Landed Price

(\$ per million British thermal units)



LNG Tanker Arrivals

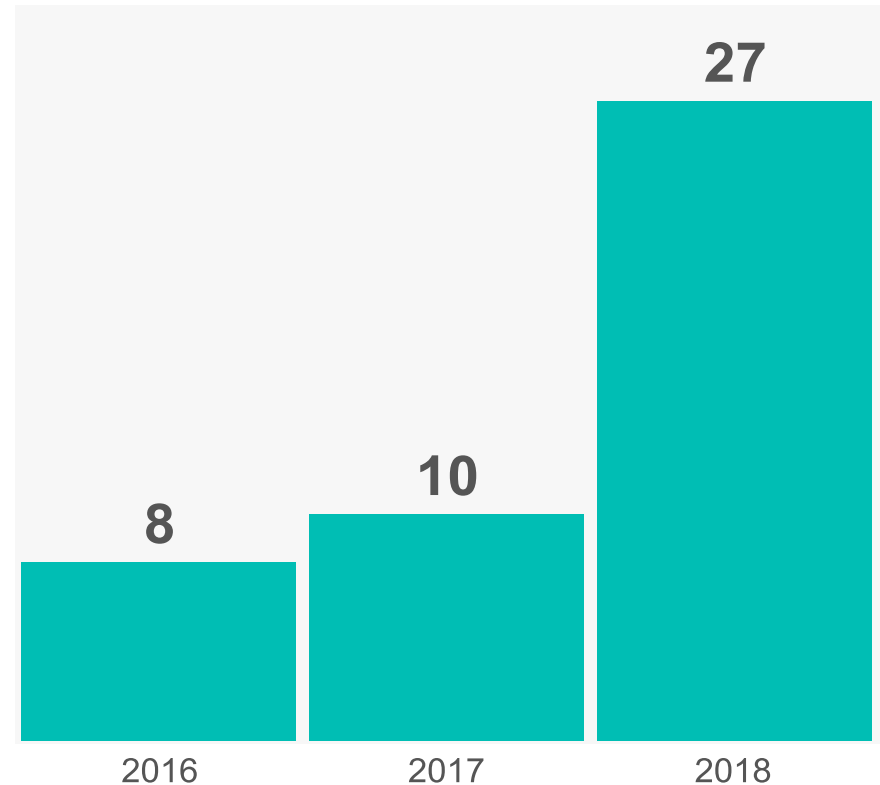


Data from 1st June until 25th November

# Large increase in supplies from LNG

As a result of the increased number of LNG tankers making their way to the UK, the supply of gas into the NTS from LNG is much higher than we have experienced for the same time period in the previous two years.

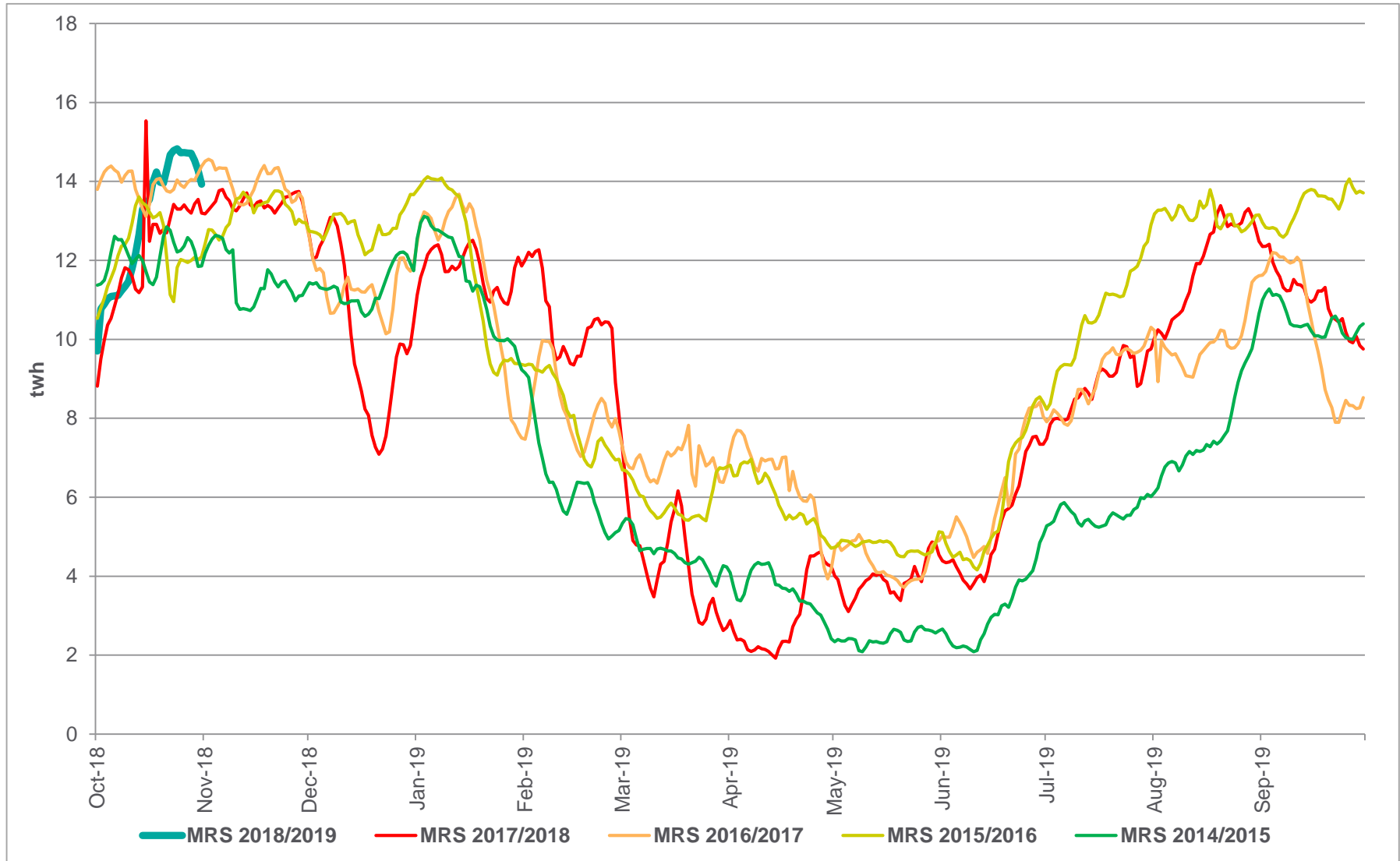
Average Supply from LNG (mcm/d)



Data from 1st October until 25th November

# Medium Range Storage Stocks (MRS)

October-End September for last 5 years



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05

Linepack Strategy

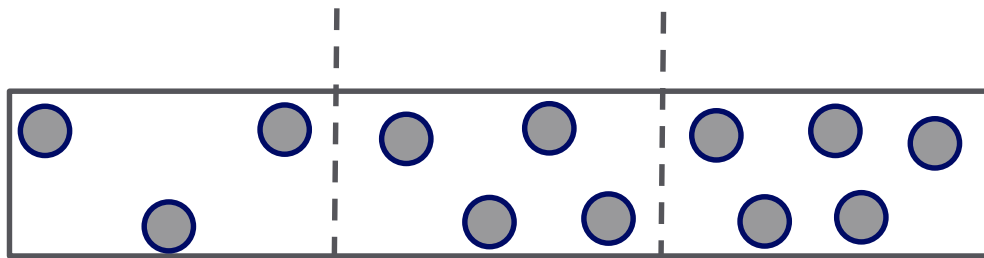
nationalgrid



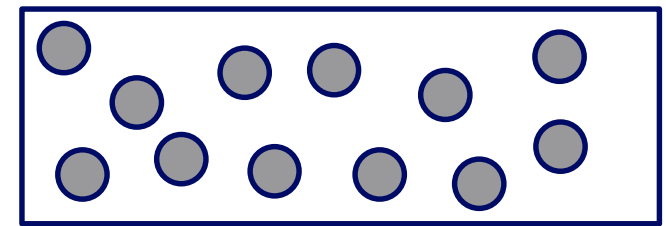
# What is Linepack?

Linepack describes the total of **volume of gas** contained within the system. The methodology for calculating actual linepack is set out in our **Transporters License** and is publicly available.

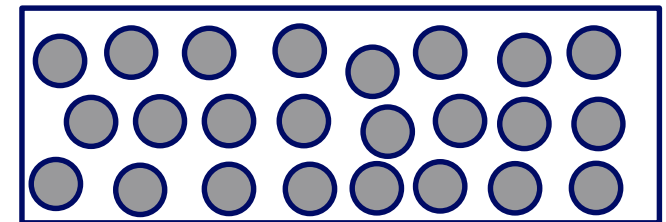
Linepack considers only volume and is measured in **millions of cubic meters**, which is the volume the gas would cover at standard atmospheric pressure.



Same pressure but increasing compressibility



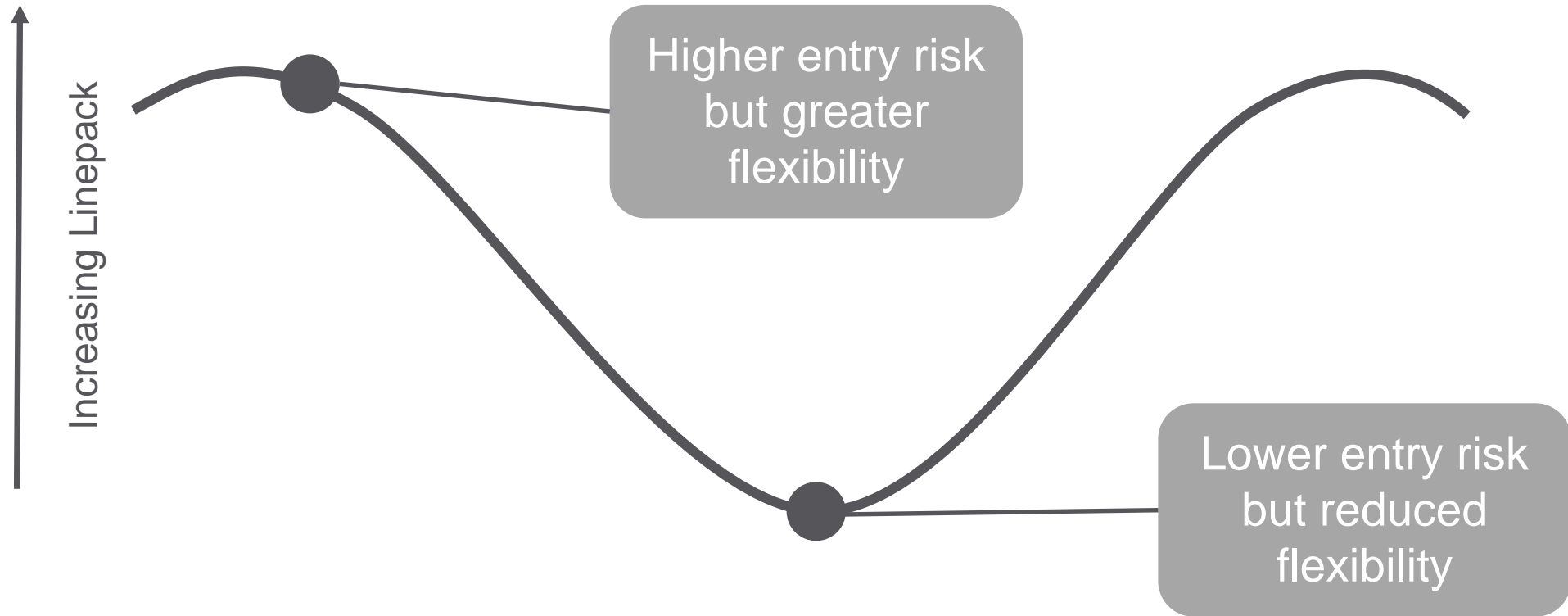
Higher pressure  
and/or higher  
compressibility =  
higher linepack



More molecules in the same space

# Physical considerations for Linepack

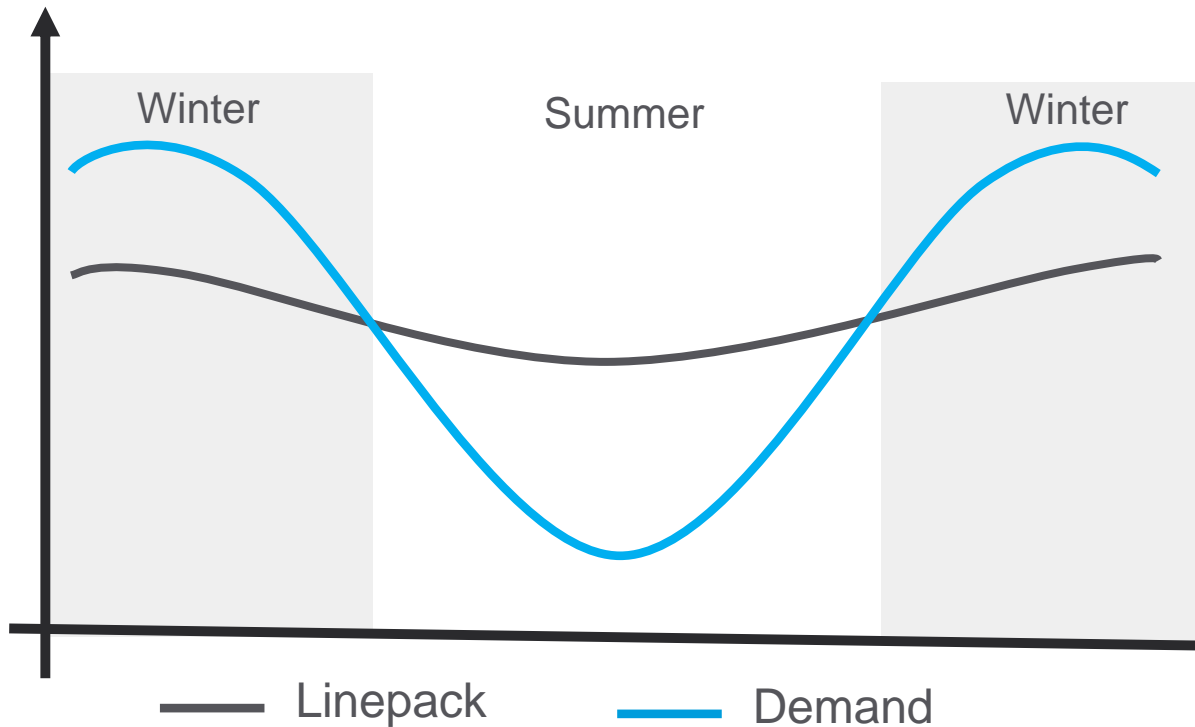
As linepack is analogous to average pressure across the network, it is key to the physical operation of the network.





# Seasonal Variation in Linepack

Lower in the summer, higher in the winter

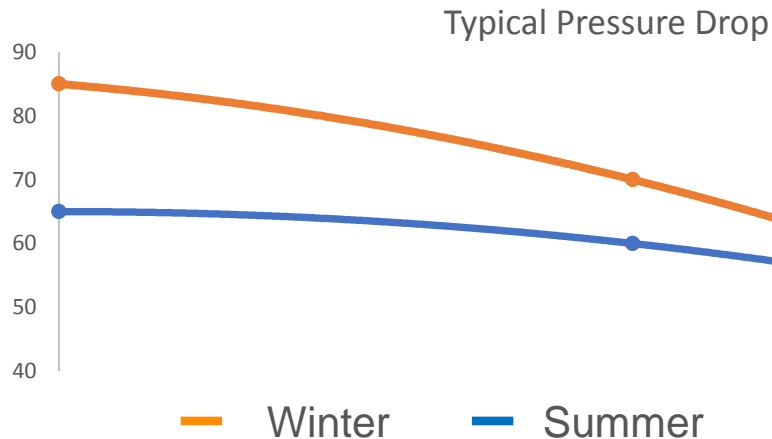


## With winter comes:

- Higher demands
- Changing diurnal demand profiles
- Increased pressure drops
- Larger daily linepack swings

**To protect exit pressures we must maximise flexibility of the NTS**

# Summer Linepack



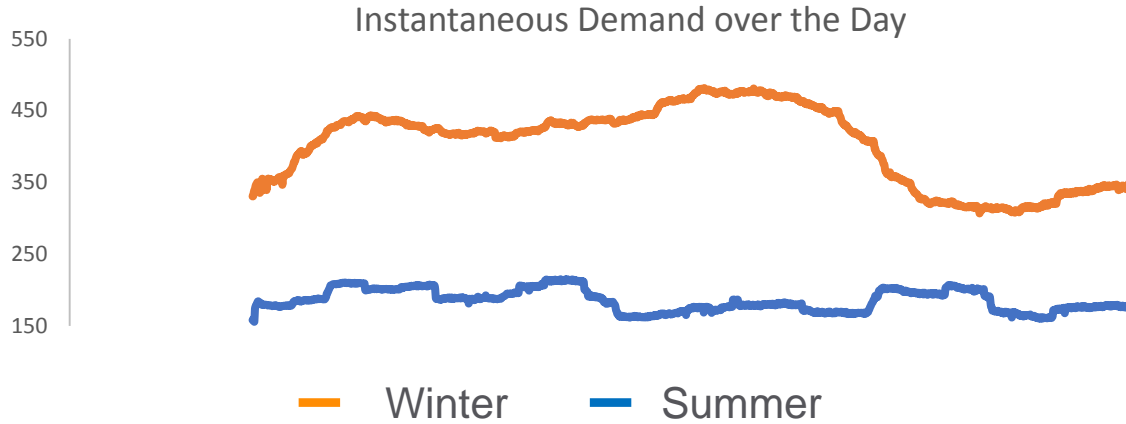
**Lower demands result in:**  
**Lower pressure drops**  
**Lower natural flow rates**  
**Compression to manage high entry flows**

## Context?

Maximum flow is achieved when one end of a pipe is at its max pressure and the other end is at its minimum.

The range of maximum to minimum pressures can be as high as 45 bar in the winter but only around 20 bar in the summer.

# Winter Linepack



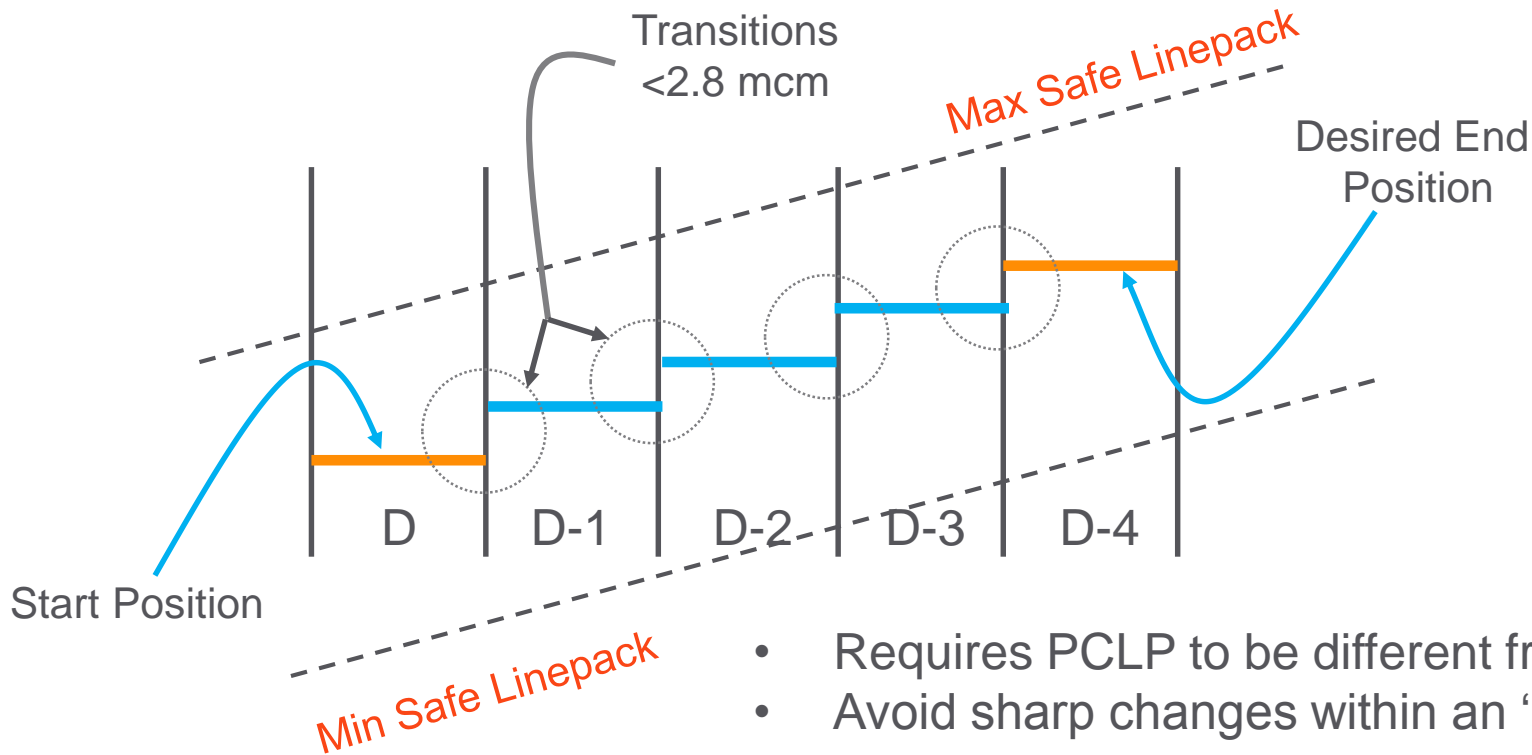
High demands and strong diurnal profile results in:

- Large pressure drops
- Large linepack swings
- Lower extremity pressure due to frictional losses
- Requirement to maintain higher pressures in the middle of the network

## Context?

The differential between supply and demand at tea time on a cold winters can result in as much as 5 mcm being lost from linepack every hour. This is enough gas to supply 4000 households for a year!

# Manging the transition



- Requires PCLP to be different from OLP
- Avoid sharp changes within an 'efficiency' zone
- Large transitions could be required if stock level has drifted over a period of days
- Balance safety, efficiency and minimise entry into market

# Transparency

## Trading behaviour

Very simply when we **buy gas** we need **more linepack**, when we **sell gas** we need **less linepack**. This is normally because we are **transitioning** between desired linepack regions (for efficiency) or need to arrest a steady increase or decline in linepack.

## But how much more/less gas do you need?

We don't publish 'target' as to minimise our influence in the market but....

- Trends on **OLP, PLCP and Demand** can give an indication
- Just because PCLP is largely different to OLP doesn't indicate a trade

System Status		
	Today 21/11/2018	Tomorrow 22/11/2018
⌘ GDW	NONE	
⌘ MN Trigger	451.00	
Forecast <span>Graph</span>		
Demand (mscm)		
⌘ Forecast Demand	316.3 (10:08)	
⌘ Seasonal Normal Demand	256.0	257.0
Supply (mscm)		
⌘ Forecast Flow	336.8 (10:00)	
⌘ Physical Flow	323.3 (10:00)	
Linepack (mscm)		
⌘ PCLP	377.6 (10:08)	
Long Term Demand		
System Entry Point Flow Data		
Linepack (mscm) <span>Graph</span>		21/11/2018
⌘ Opening		357.2

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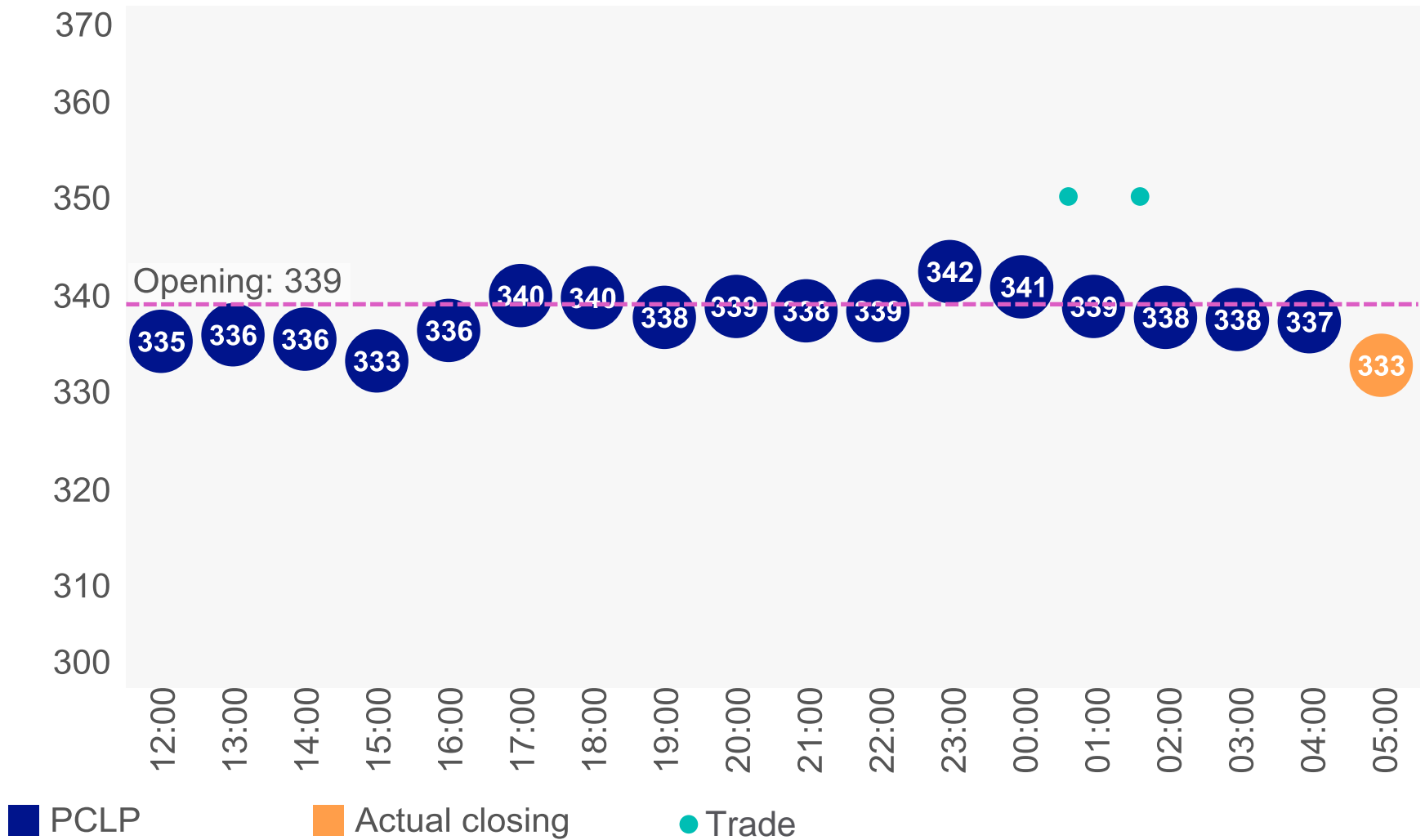
06

Interesting Days

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# 1<sup>st</sup> October



# 1<sup>st</sup> October

## Why does Predicted closing Linepack sometimes differ from Actual Linepack?

### Predicted Closing Linepack (PCLP)

PCLP is based on the opening 'Actual' Linepack for each gas day.

It then adds the total predicted supply, from the total supply Notifications, converted to volume in millions of cubic meters. (mcm)

And subtracts the total predicted Demand notifications. (in mcm)

It is calculated every hour from the latest received notifications.

### So why are there Differences?

PCLP takes no account of the variables in the actual Linepack calculation, and the main components are pressure, temperature and compressibility of the gas.

These components vary throughout the day. Because of this, 1.0mcm of notified flow may not be equal to a corresponding +/- 1.0mcm of Actual Linepack.

Differences in the calculations compound during the day to cause a difference in the PCLP and Actual Linepack.

### Actual Linepack Calculation

The physical linepack system is broken down into hundreds of 'pipes' of known location, length and diameter. This then forms a Pipe Free Volume (PFV) which is the basis of Linepack.

The Calculation is very dynamic and includes components such as Pressure (P), Temperature (T) and Compressibility (Z) which are constantly measured because they are variable.

The calculation is performed for the whole system every 6 minutes based on the telemetered values P, T & Z.

The calculation for Linepack in millions of cubic metres is:-

$$\text{Line Pack Volume} = \frac{T\_STD}{T\_Kelvin} \times \frac{Z\_STD}{Z} \times \frac{P\_Average}{P\_STD} \times PFV$$

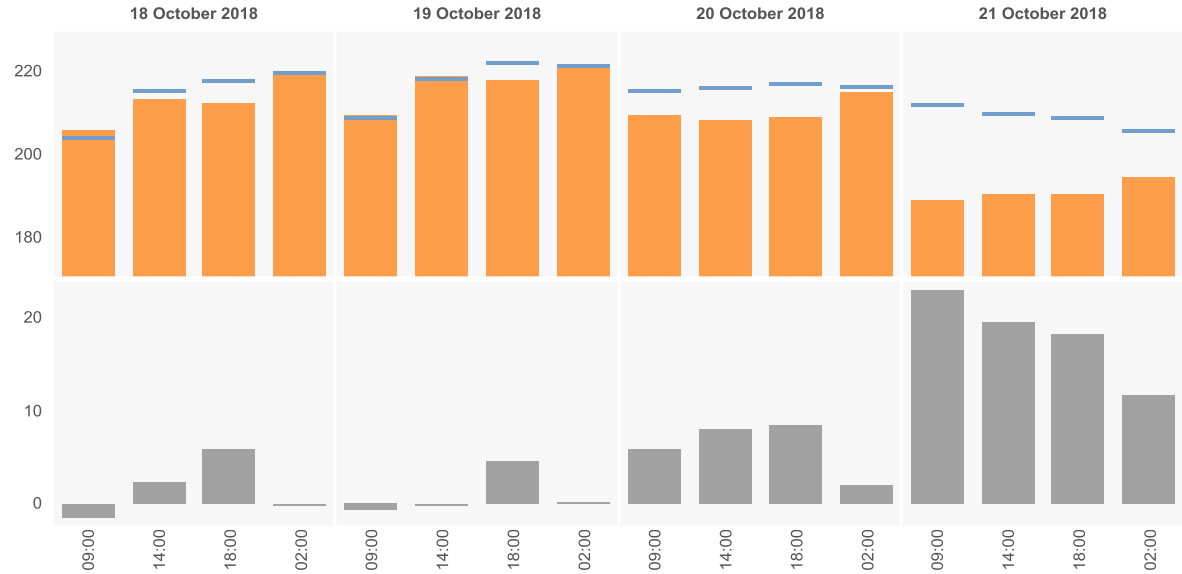
Where average pressure for each 'pipe' is:-

$$P\_Average = \frac{2}{3} \times \frac{P1^2 + P1 \times P2 + P2^2}{P1 + P2}$$

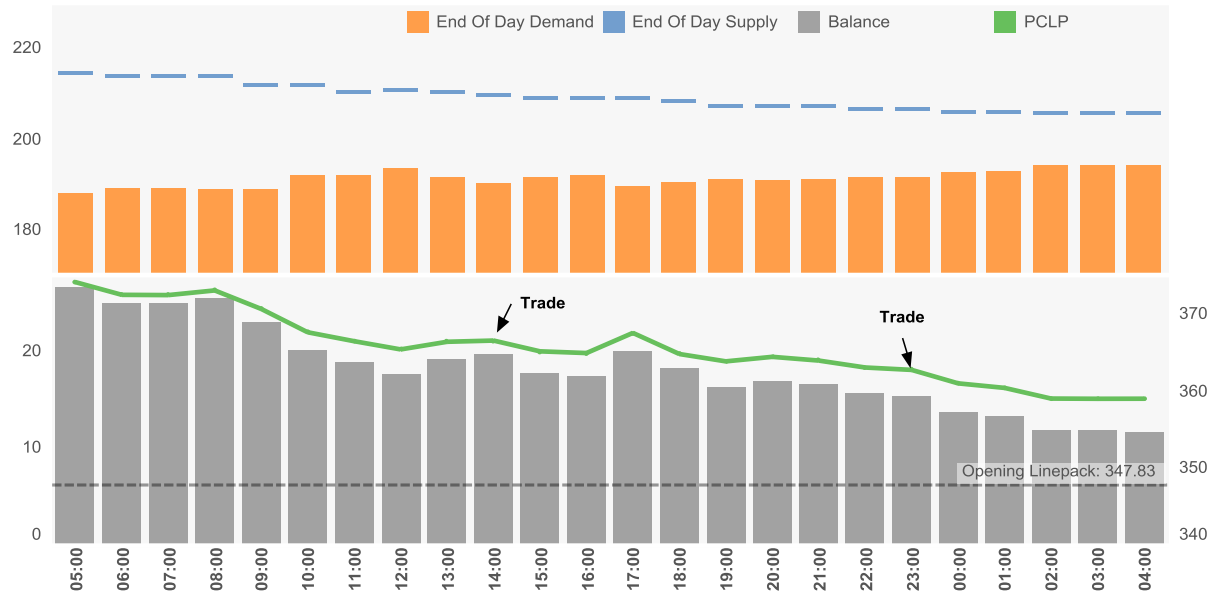


# 21<sup>st</sup> October

Unseasonably warm day across the UK. Approximately **5C warmer than forecast** midweek resulted in a step change in LDZ demand.



Profile on the day was steady but high Linepack due to over delivery risked manifestation of entry constraints on the network.



Storage was full but little market response to trade. First trade conducted at 14:17 with PCLP at 366.

# 21<sup>st</sup> October

Difficulty in eliciting a market response on the weekend. National Grid have no visibility of hand over parameters.

Second trade conducted at 23:42 when PCLP was 13m heavy.

38% of Shipper over delivered to the NTS

The **top 5 heavy Shippers** alone account for approximately **82%** of the end of day imbalance.

Linepack closed the day at 363m creating the requirement to lose stock over the following days.

Allocated Imbalance 21/10/18



■ Light ■ Balanced ■ Heavy

	Kwh	Mcm	15.25
1	61,062,226	5.55	36%
2	42,511,183	3.86	25%
3	13,773,579	1.25	8%
4	11,057,753	1.01	7%
5	8,599,233	0.78	5%

\* Approximate CV used for conversion

Total	82%
-------	-----

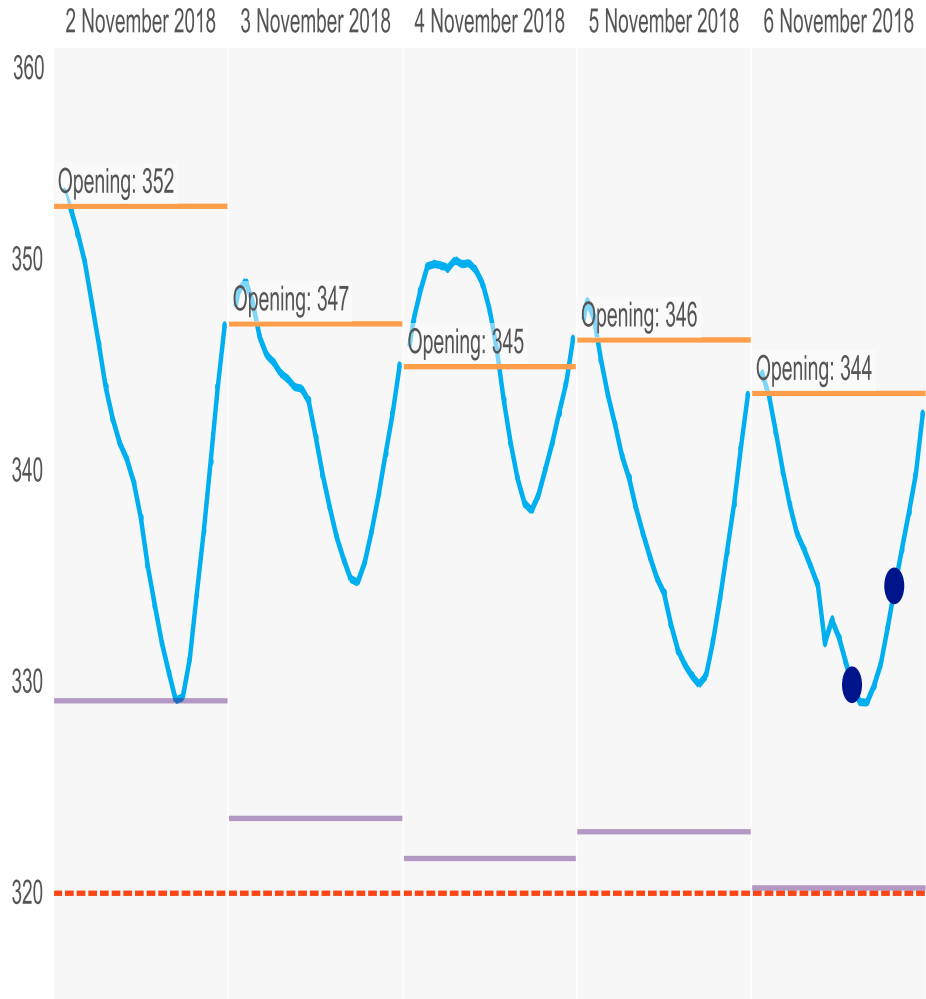
# 6<sup>th</sup> November

Consecutive light imbalances on the previous days had eroded Linepack.

First trade conducted at 19:00 when PCLP was at 344m. Little response was observed from the market. A second trade at 01:00 when PCLP was at 344m.

Linepack closed the day at 342.7. Even with trades the trend to light imbalances continued.

Creating the requirement to gain stock over the following days.



## 6<sup>th</sup> November – Transparency of drivers

Consecutive light imbalances on the previous days had eroded Linepack. This is published. As well as PCLP we publish our other main drivers.

Consideration	Observed by	Data location
Cumulative stock gain / loss	Comparing Consecutive OLP	MIPI>Data Item explorer>Linepack>Opening linepack
Forward Demand profile	Efficiently preparing the system for the days ahead	MIPI>Data Item explorer>Demand>NTS forecast
Calculated Linepack utilisation (in day)	Lowest level Linepack is predicted to reach due to non linear delivery profiles	<a href="https://www.nationalgridgas.com/data-and-operations/transmission-operational-data">https://www.nationalgridgas.com/data-and-operations/transmission-operational-data</a>  Under supplementary reports section
Max and Min Operating parameters (in day instantaneous levels)	Statement following 1 <sup>st</sup> March 2018	Static – No link Min = 320 max =370
Seasonal Requirement	Requirement to manage seasonal risk and transition efficiently between them.	Static – No link Winter higher stock levels Summer lower stock levels

Gas System  
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07

# Preparedness for Winter

Discussion

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# Feedback - Communications

## Worked Well

ANS worked well

Industry wide communications accurate

GNCC helpful

## Didn't Work Well

Prevailing view not user friendly

Tips and Tools not easy to find on website

Shift staff can't always take part in emergency exercise

## Suggestions

Introduce more ways to communicate, not all aware of ANS

Include in ANS when next update will be available, and differentiate critical messages

Introduce moving average for instantaneous supply

Give earlier signals to market through trades

Include shippers more in emergency exercise to test tools

# Feedback – Data and Systems

## Worked Well

Systems worked on the day

ICE system

## Didn't Work Well

2<sup>nd</sup> Stage access password reset in GEMINI takes too long

Not aware PCLP based on physical notifications

## Suggestions

Improve Visibility of allocations per shipper in GEMINI

# Feedback – Tools on the day

## Worked Well

Tools avoided an emergency during GDW

## Didn't Work Well

Scale back of off peak capacity too late

DSR – hard to understand how to get involved

## Suggestions

Publish a target linepack

All tools and useful winter material all in one place



# New Website area

## Useful Information website area created where all useful tools and information for winter preparedness can be found

### Useful Operational Information

On this page you will find links to various sources of useful Gas Operational Information.

National Grid values its Customer and Stakeholder feedback very much and in response is constantly looking to improve its service offerings.

As part of this, we have embarked on an initiative that helps bring together a wealth of useful, Gas operational information.

The following page includes links to all kinds of information, most of which can actually be found elsewhere on our National Grid website.

We hope that the signposted information is of use to you and your colleagues, and urge you to get in contact if there is anything else that you would like us to include.

**Gas Operations Contact Directory**

**Transmission Operational Data**

**NTS Operational Overview**

**Pre-Emergency Commercial Tools / GDW**

**Gemini**

### NTS Operational Overview

National Grid owns and operates Britain's Gas National Transmission System (NTS).

The following presentation has been developed to help explain how the NTS is managed and the kinds of challenges that are faced in response.

Other topics covered include:

- Customer Flexibility
- Supply & Demand
- Transparency of Operation

### Enquiries

If you have any enquiries, please contact the Operational Liaison Team Monday - Friday, 09:00-16:30

☎ 01926 656 474

✉ [box.operationalliaison@nationalgrid.com](mailto:box.operationalliaison@nationalgrid.com)

# Offtake Rules

Feedback from the October Ops Forum is that you would like more information on what “**Rules on**” is; what is the comms route, what does it mean, what are Shippers expected to do, what are the implications if you don’t comply...

National Grid assesses the prevailing and forecast operational conditions when determining whether requests outside the UNC parameters may be accommodated. Where feasible, National Grid will aim to work with Users to accommodate such requests. However, under some system conditions, we may not be able to be so flexible.

National Grid’s “Rules” are aligned with UNC and individual Network Agreements. A table to show the UNC parameters and where they are referenced in the UNC is shown on the next slide. These Rules will be applied when we forecast concerns for acceptance of request(s). *Please bear in mind that there will also be Network Agreement-related Rules which individuals Sites/Shippers will be obliged to adhere to.*

*UNC TPD J 3.10.5 - this section states that National Grid are not obliged to provide gas at an offtake which is above the Maximum Permitted Rate or exceeding the Flat capacity entitlements. This applies to LDZ offtakes as well.*

# UNC Parameters

Rule	Category	UNC Reference Please note; OAD references apply to DN Offtakes <u>only</u> . However, each non-DN offtake has similar rules as part of TPD and/or individual Network Exit Agreements
NTS Exit (Flat) Capacity Overrun	Capacity	J 3.10 - User offtake obligations: NTS Exit Points and Inter-System Offtakes
Daily NTS Exit (Flexibility) Capacity	Capacity	J 7.3 - Short-term increase in NTS Exit (Flexibility) Capacity
Maximum NTS Exit Point Offtake Rate (MNEPOR)	Offtake Rates	J 3.10 - User offtake obligations: NTS Exit Points and Inter-System Offtakes
Maximum Permitted Rate (MPR)	Offtake Rates	J 3.10 - User offtake obligations: NTS Exit Points and Inter-System Offtakes
Maximum percentage rate change	Offtake Rates	OADI 2.3 - Revisions to Offtake Profile Notices
Change lead-time % of Supply Point Offtake Rate (SPOR)	OPN Notice Periods	J 3.8 - User offtake obligations: LDZ DM Supply Points
The lead time >25% <50% of Maximum Flat Offtake Rate (MFOR)	OPN Notice Periods	OADI 2.3 - Revisions to Offtake Profile Notices
The lead time 25% of Maximum Flat Offtake Rate (MFOR)	OPN Notice Periods	OADI 2.3 - Revisions to Offtake Profile Notices
The lead time >50% of Maximum Flat Offtake Rate (MFOR)	OPN Notice Periods	OADI 2.3 - Revisions to Offtake Profile Notices
Lead Time LDZ Aggregated Rate Change	OPN Notice Periods	OADI 2.3 - Revisions to Offtake Profile Notices
Notice Period - Decrease	OPN Notice Periods	OADI 2.3 - Revisions to Offtake Profile Notices

**The Rules listed in this table are not automatically switched on. This allows National Grid to accept breaches. However, the MNEPOR Rule is always**

# Consequences to Users of not Complying

Read text in UNC TPD J7.4.1 – Liability of Users

For a quick summary, in plain English...

If:

Due to a User having an Exit Overrun at an NTS Exit Point, National Grid are unable to make gas available at any other NTS Exit Point; and

National Grid have done what they can to limit the effects of the Exit Overrun;

Then the User at that Overrunning Exit Point shall be liable to National Grid for **all amounts incurred** by National Grid as a result of any Exit Constraint Managements actions that were taken at any other Exit Point as a consequence.

## More Information

We will be bringing this topic to the January 2019 Ops Forum.

In the meantime, if you would like more information on this topic then please ask one of the Ops Forum Representatives and more information can be sent out to you ahead of the next meeting.

Gas System  
Operator

08

# Winter Outlook Questions

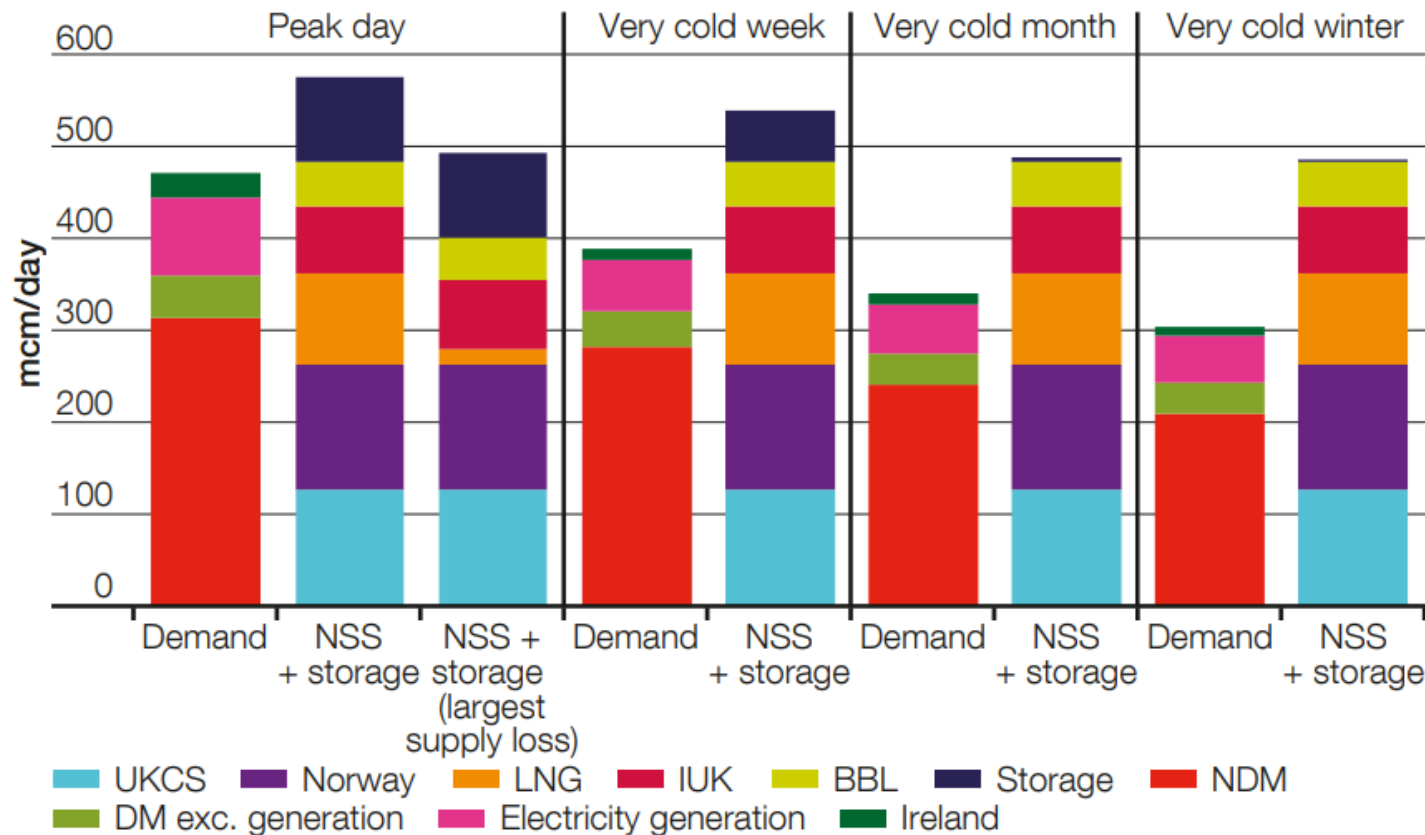
Project Update

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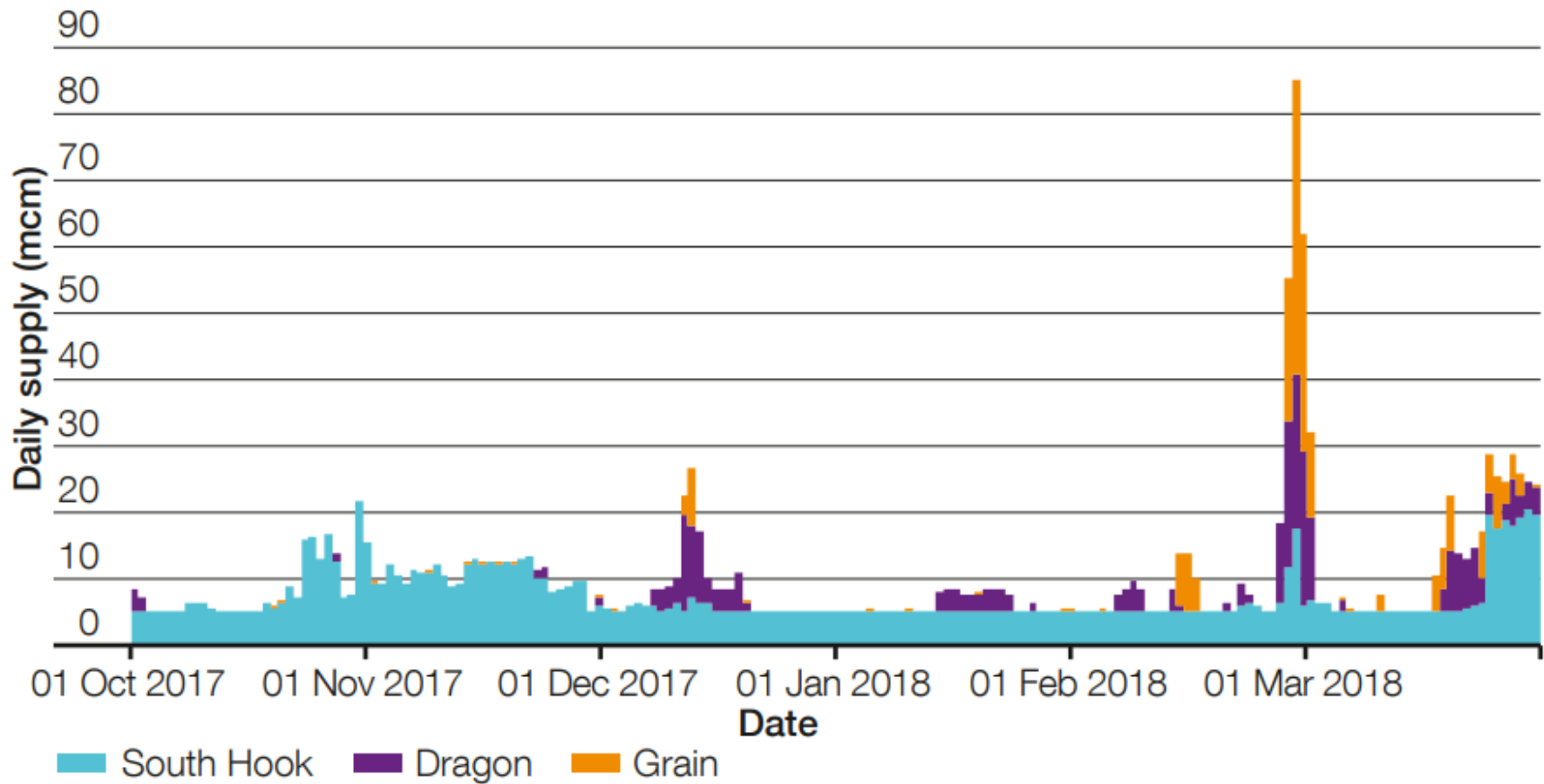
# Question 1: What is the impact of an extended cold snap?

- Longer cold snaps modelled as part of the winter outlook



## Question 2: Will LNG deliver if required?

- Historical data shows LNG reacting when price rises





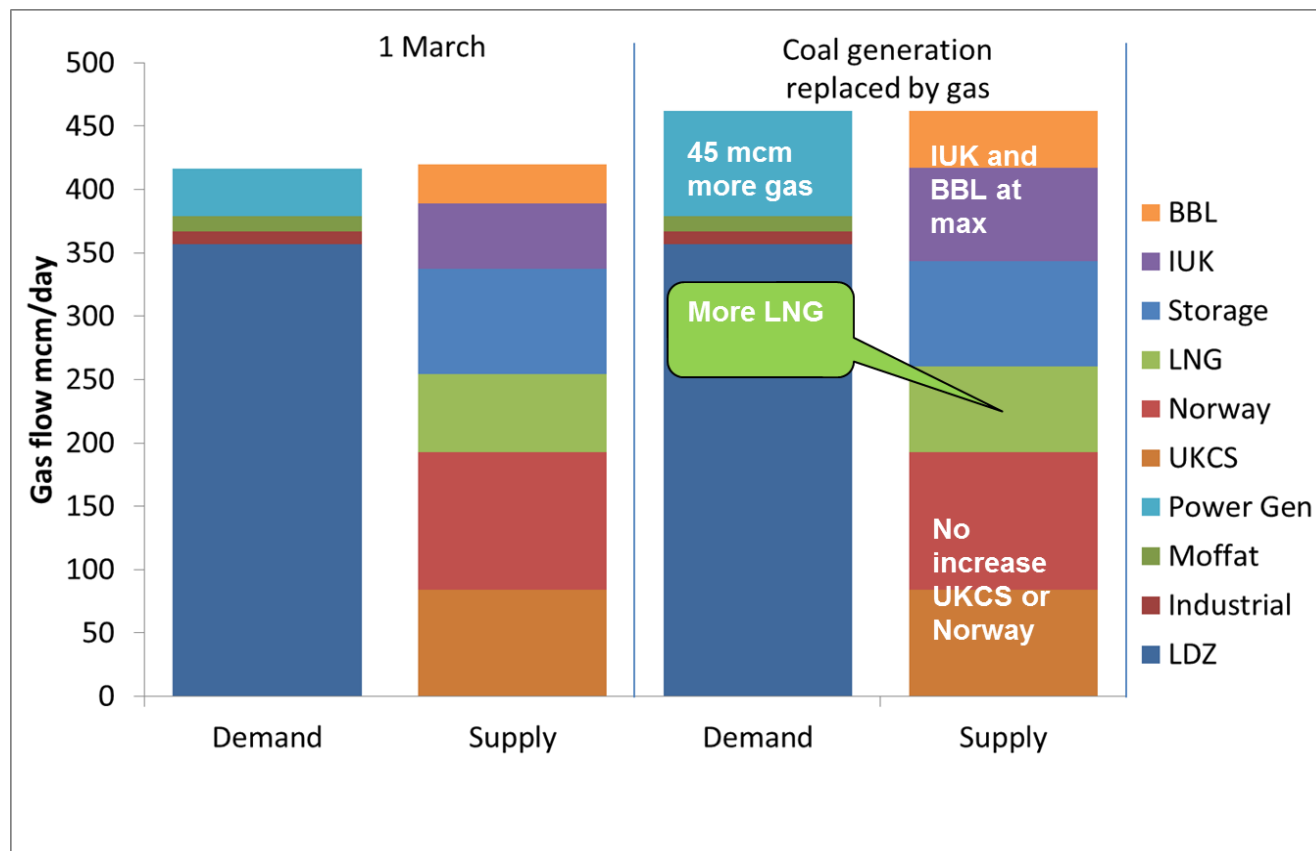
## Question 2: Will LNG deliver if required?

- Higher flows than forecast during GDW

Daily flows (mcm)	NSS forecast applicable on	01 Mar actual flow	Above forecast?
	28 Feb		
UKCS	122	84	X
Norway	130	108	X
BBL	30	31	✓
IUK	50	52	✓
LNG	50	62	✓
Total NSS	382	337	
Qualifying Storage	79	83	✓
Total supply	461		
Forecast demand for 01 March	405	417.6	
Forecast supply greater than demand?	✓		

# Question 3: What if we had no wind generation?

- 1<sup>st</sup> of March was modelled with no Coal Generation – with more gas generation required



## **Question 3: What if we had no wind generation?**

- **A lower wind speed at which wind generation is not possible will also mean there is less of a wind chill effect**
- **Temperature will feel higher, with associated demand dropping**
- **Wind speed is included in the CWV calculation which feeds into the data published on our website**

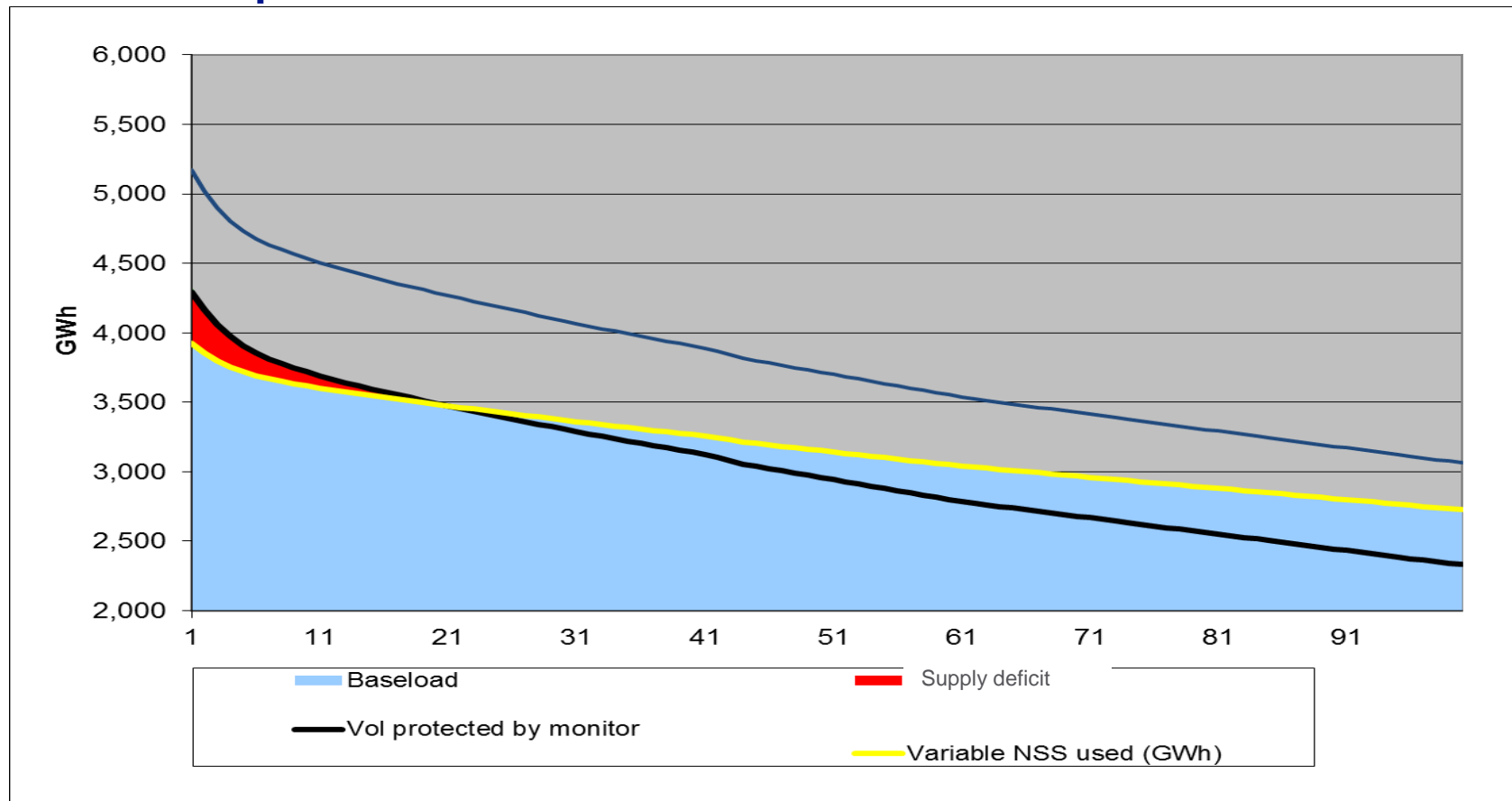
## Question 4: Why is Storage Monitor Lower?

- Higher Non Storage Supply (NSS) than last year
- This means less storage required in reserve to meet whole winter requirements

Gas				
	2017/18 Forecast	2017/18 weather corrected	2017/18 actual	2018/19 Forecast
Total demand	51.4 bcm	53.4 bcm	54.8 bcm	46.6 bcm
1-in-20 peak day demand	502 mcm/d	–	–	472 mcm/d
Cold day demand	419 mcm/d	–	–	407 mcm/d
Cold day non-storage supply forecast	354 mcm/d	–	–	360 mcm/d
Demand for electricity generation	12.4 bcm	12.7 bcm	12.7 bcm	7.0 bcm
Safety Monitor level	647 GWh space 512 GWh/d deliverability	–	–	429 GWh space 387 GWh/d deliverability <sup>2</sup>

## Question 4: Why is Storage Monitor Lower?

- **Storage Monitors are proportionately a small amount of total storage**
- **Small drop in demand curve can create large proportionate change in safety monitor requirement**



Gas System  
Operator

09

# Emergency Exercise Findings

Project Update

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## Zeus Overview

- **Aims and Objectives met**
- **Industry wide response with over 300 participants**
- **Improvements have been imbedded since March 1<sup>st</sup> and Yield**

**“To provide a vehicle to test NEC communications to the UK Gas Industry, in order to demonstrate the industry’s ability to effectively respond to a Network Gas Supply Emergency.”**

# Background Scenario

- Instability in Algeria brings uncertainty to European gas prices
- Severe weather brings cold temps and snow leading to a spike in gas demand
- Storage deliverability compromised
- Series of supply losses caused
- Supply issues with LNG cargo
- NG Asset Failure

**NEWS LIVE** Monday 1<sup>st</sup> November EXERCISE 'ZEUS'

**BREAKING NEWS**

**Nuisance from the North:**  
Red weather warnings for snow declared in Central Scotland and the South West

EXERCISE ZEUS | | Instability in Algeria: Rebel forces have taken control of



# Simulated Response

## Pre Emergency

- A series of buy actions
- Instigation of response communications across the industry
  - GAS report
  - NG and DN Contact with connected customers
- Issue of a Gas Deficit Warning
- Terminal Flow Advisory issued

## Emergency

- Declaration of a Stage 1 - 2 Emergency
  - Terminal flow direction
  - NTS Load Shedding
  - LDZ load shedding
  - Allocation and Isolation (25% reduction)



# Focus areas

## Exercise highlighted areas to be developed this includes

- Further enhancement of communications with the electricity industry
- Enhancement of the tools and process for the NEMT briefing of the NEC
- Investigate further use of the G.A.S Report
- Investigate how to exercise commercial response to incidents



# Your feedback

- **Verbally, now**
- **Individual calls / meetings**
- **Email**
- **Reporting**



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# 10

## Margins Notice and GDW Review

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# Live Transmission-related UNC Mods

- **0621 (plus alternatives) Amendments to Gas Transmission Charging Regime**
- **0661R – Reconciliation and Imbalance Cashout Prices**
- **0662 – Revenue Recovery at Combined ASEPs**
- **0667 – Inclusion and Amendment of Entry Incremental Capacity Release NPV Test in UNC**
- **0669R – Review of the Gas Deficit Warning and Margins Notice Arrangements (deeper dive follows)**
- **0670R – Review of the Charging Methodology to avoid inefficient bypass of the NTS**
- **0671 – Relief from User Commitment obligation when NTS Exit Capacity substitution is permitted**

# The UNC Request

- UNC Request raised 20th Sept 2018:

*To review the processes, timeliness, and information provision associated with National Grid's gas security of supply notices and to review the name of the Gas Deficit Warning notice.*

- Completed Workgroups:
  - 4<sup>th</sup> October
  - 1<sup>st</sup> November
- Next Workgroup – 6<sup>th</sup> December.

# Covered at Transmission Workgroup

- 1<sup>st</sup> March GDW and the days leading up to it
  - Including NG actions, I/C flows, supply losses late on 28<sup>th</sup> Feb, linepack depletion
- Margins Notice Trigger
  - How this is calculated using the 'Expected Available Supply'
- GDW overview
  - Including accepting offers, DSR and withdrawal
- Improvements made since 1<sup>st</sup> March
  - Guidance for pre-emergency commercial tools, procedure reviews, improving grid simulations
- Data Available
  - Supply data available to GNCC, Remit Notifications, 'A day in the life of the Control Room' scenario
- Non-Storage Supply figure
  - How calculated, update frequency, communication of changes, and carried out Risk Bow Tie to assess at November Workgroup
- GDW Name Change
  - Proposed options
- G.A.S. Report
  - Discussed with OGA, BEIS & Ofgem, opportunity to increase frequency, and improve NSS figure

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11

## Review of Gas Balancing

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# Introduction

- **There are a number of factors that might warrant a fundamental review of gas balancing arrangements**
  - Increased within-day and intra-day volatility in NTS flows
  - Greater levels of linepack swing / depletion
  - Greater challenges for NG in operational balancing
  - Shipper requirements to vary nominations late in the day (NIFR)
  - Need to secure imports / market attractiveness
  - In light of 1<sup>st</sup> March 2018 events:
    - Are shipper incentives to balance still appropriate?
    - Are NG's within day balancing tools sufficient / adequate?
    - Are NG's balancing incentives and SMPS still appropriate?
      - when to trade vs when to leave the market to balance
    - Is there sufficient / appropriate information provision by NG to enable the market to balance?

# National Grid Views

- **We do not currently see urgent operability drivers for such a review**
  - 1<sup>st</sup> March events saw the first ever GDW but the circumstances were exceptional and the market responded to resolve the situation
  - For winter 2018/19, we are confident that we would be able to deal with another similar event through the tools at our disposal and that continued flexibility and diversity in supply options will continue to maintain GB security of supply
- **However, we should not be complacent**
- **Our preferred way forward in the short/med term is to gather evidence via existing workstreams to inform the scope of such a review**
  - Gas Future Operability Planning (GFOP)
  - RIIO-T2 engagement / business plan development
  - Gas Industry Change Plan (GICP)
  - Operational Data Working Group

# How will the issues be addressed in these other workstreams?

- **GFOP**

- Recent editions of GFOP have looked at issues surrounding variability in supply and demand and the impact this has on linepack and network operation
- We are currently constructing a narrative of what changes we've seen in the recent past and their impact
  - qualitative and quantitative analysis
- We will then engage with stakeholders to validate the challenges at a high level, understand the impact on stakeholders and establish priorities
- We then go to the next level on the prioritised challenges, do more detailed analysis (of numbers or the network) to try to establish and quantify drivers and future impacts, having validated assumptions with stakeholders at the start
- Share findings, potentially iterate round again

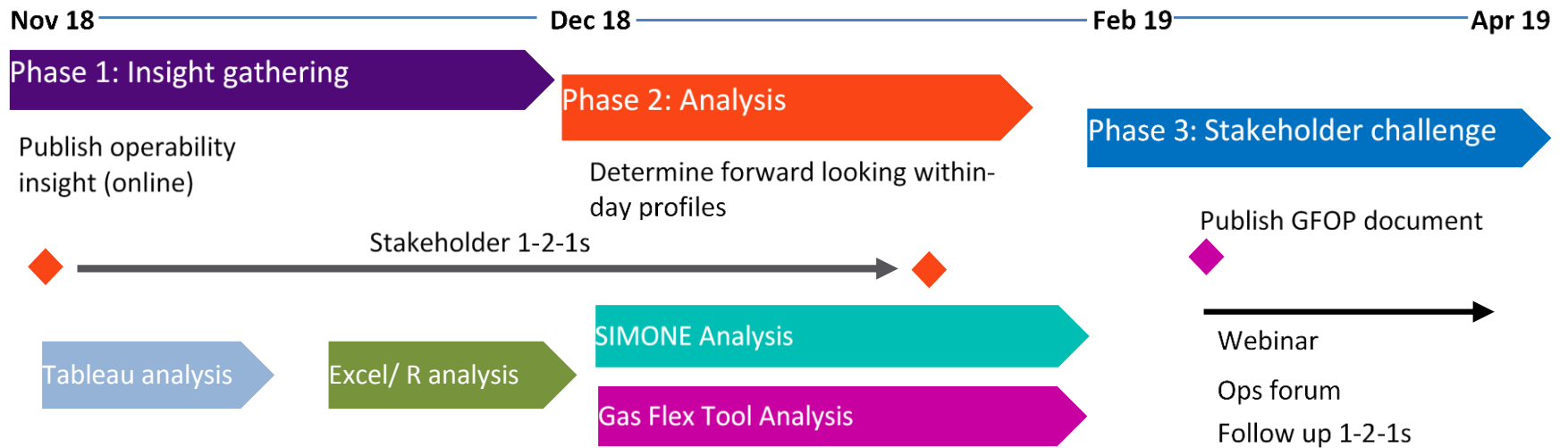


Is there a problem we need to solve?

# How will the issues be addressed in these other workstreams?

- **If so, we would move to the next stage of developing solutions collaboratively with industry and Ofgem**
  - We have not yet established how this would work in detail but currently envisage an iterative cycle:
    - developing proposals
    - testing their effectiveness,
    - developing a business case and CBA
  - Taking linepack management as an example:
    - Potential solutions could include:
      - Rules (e.g. shorter balancing periods)
      - Tools (e.g. storage services)
      - Assets (e.g. compressors)

# GFOP Indicative Timeline



# How will the issues be addressed in these other workstreams?

- **RIIO-T2**
  - Our intention is that the GFOP engagement will inform RIIO-T2 plans
  - The two teams will be working very closely to ensure we don't duplicate and that the engagement outcomes feed into our T2 business plans
- **GICP**
  - Our vision is a 2-10 year ahead stakeholder-backed plan of key areas of the regime that we will work on with the industry, including timescales
  - We would want a project as large and wide-ranging as a fundamental review of gas balancing to appear on such a plan, with its relative priority appropriately justified against other areas of the regime where change may be beneficial
- **Information Provision / Transparency**
  - We have very recently consulted on what additional information we might make available within RIIO-T1 (pre 2021)
  - The topic is also a workstream within our T2 engagement

**Gas System  
Operator**

**ISO 6976:2016**

**Operational Forum**  
29<sup>th</sup> November 2018

**nationalgrid**



# Introduction

- **ISO 6976 (Natural gas – calculation of calorific values, density, relative density, and Wobbe indices from composition) is an extensively employed measurement standard**
- **It is widely used to determine CV of natural gas and hence to calculate energy**
- **The third and latest edition of ISO 6976 was published in 2016 after an extensive period of revision by a working group of international experts**
- **An impact assessment of the change for gross CV determination in the UK has been completed, showing an average change of -0.0016% compared to the second edition**
- **Metering systems would therefore measure a slightly lower CV than is currently the case, hence slightly less energy would be recorded as entering and exiting the NTS**



# Implementation

- **Whilst the change in CV determination is very small, we believe we should implement the latest version**
  - We own the metering at 44 of the 201 NTS entry/exit points
- **Given the low materiality, we plan to upgrade our metering as part of our existing maintenance schedules rather than a dedicated programme with a common ‘switchover date’**
- **We have engaged with Ofgem and the Oil and Gas Authority who support this approach and expect other operators to follow suit**

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Operator

# 12

Operational Data  
Enhancements  
Working Group

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# Feedback to date

- **Interest in joining working group from a few shippers and stakeholders.**
- **Suggestions in feedback to date include**
  - Restricting API/polling attempts on data once updated data is available (e.g. instantaneous supply).
  - Removing data that hasn't been used over a period of time.
  - Proposal for outage timing to be aligned to Gemini outages e.g. ~03:00-05:00 but general agreement that 18:00 is also acceptable.
  - Agreement that a User Guide in plain English prioritised around most frequently used data items and reports with FAQ's would be very useful.
  - Suggestion that it would be useful to share statistics on most frequently used report/data items.
  - Proposal to share more DN within day data to the market.

**Please discuss your thoughts in person/email or via phone with Karen Thompson.**

# Working Group

- **Official deadline for responses to paper has passed, but we would still like to hear any of your views**
- **Looking for more participants for the working group**
- **First working group to take place after the January Ops Forum**
- **This will be finished by 2pm at the latest**

# Query Surgery and Next Forum

**Final Operational Forum of the year will take place on Thursday 17<sup>th</sup> January**

**Please send any requested topics to:**

**[Karen.Thompson@nationalgrid.com](mailto:Karen.Thompson@nationalgrid.com)**

**or**

**[.Box.OperationalLiaison@nationalgrid.com](mailto:.Box.OperationalLiaison@nationalgrid.com)**

**Opportunity now for 121 discussion with NG and Xoserve attendees.**

**Lunch Available**



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