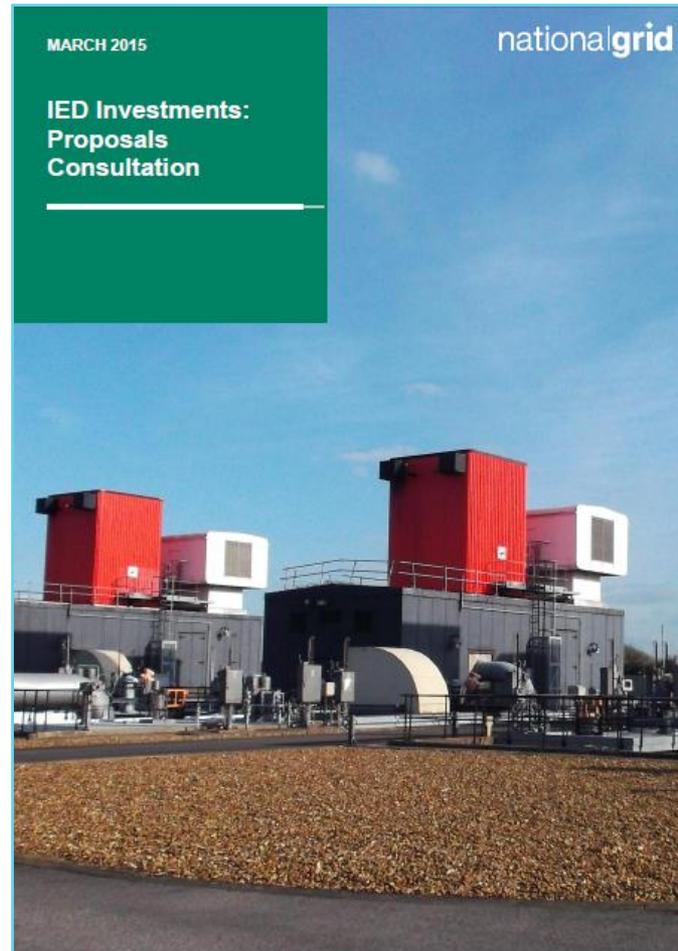


Industrial Emissions Directive Stakeholder Workshop

Grand Connaught Rooms, Covent Garden, London
19th March 2015

Introduction

- Mike Calviou, Director of Transmission Network Service

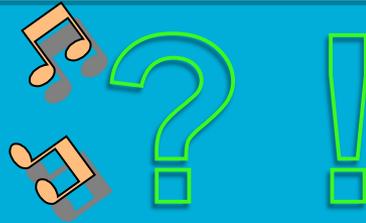


Agenda

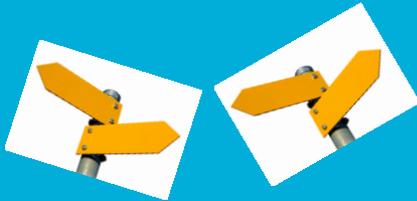
- 10.00am Introduction (Mike Calviou)
Introduction to the workshop, scene setting and objectives of the day
- 10.10am Safety Moment (Craig Dyke)
- 10.15am Introduction to the Proposals Consultation
How have we used your feedback to develop the Initial Consultation into the Proposals
- 10.20am Walk through Proposals on a site by site basis
Including how MCP and BREF may affect our decisions; and impact on bills
- 11.45am Coffee**
- 12.00pm Introduction to System Flexibility
What is it and why is it important?
- 12.45pm System Flexibility engagement strategy
- 1.00pm Lunch**

Safety Moment: Emergency

Evacuation – experience at another’s site



**Alarm sounding:
Test or real?**

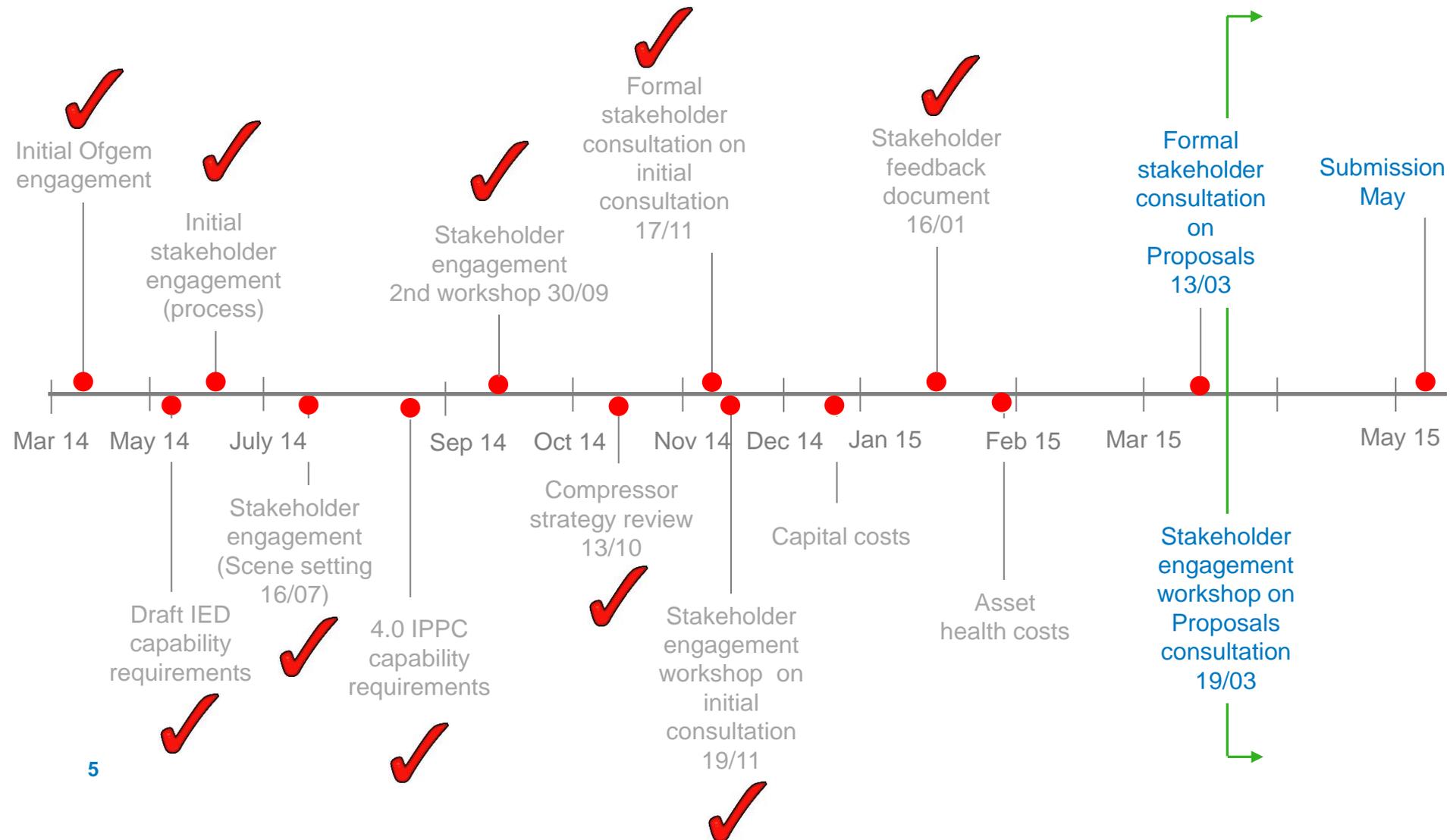


**Evacuation Route:
Signposted / unsigned
Confusion**



**Muster point:
unclear, poorly controlled**

High Level Plan



Initial Consultation Feedback: Key Themes

Stakeholder Engagement Process	Complimentary of stakeholder engagement process Suggestion to attend Transmission workgroup – session at the February meeting.
Legislation	Provided sufficient information on IPPC and LCP elements of IED More information on MCP and BREF – <i>published more in Proposal consultation</i> 1,500 running hours derogation for an emissions limit of 150mg/Nm ³ NO _x – <i>did not include as units still not able to meet NO_x limits, included in Proposals consultation</i>
Assessment of options	LCP – Given upcoming MCP and BREF we should use derogations to delay final decisions – <i>at some sites we don't believe there will be an impact, taken impact into account at others will make clearer, to delay would create outage problems.</i> IPPC – Option proposed seems appropriate given running hours, require further information on how proposed option fits with existing works – <i>provided clarification in Proposals consultation</i>
System Flexibility	More consideration to system flexibility when developing options, current levels of within day flexibility should be maintained. Need better understanding of investment decisions on system flexibility – <i>have taken this into account when assessing options, drawn this out in Proposals consultation</i>
Costs	Decisions affect transportation charges – <i>analysis included in Proposals consultation</i>

Proposals

- We'll present to you the options available at each site
- Discussion around the recommended option
- Ask you to complete the cards in your packs to say whether you agree or disagree with the recommendation or whether you cannot say at this stage and the reasons why.
- If we can answer any more questions or resolve any issues today then we will, if not then we can look at what extra information might be useful

St Fergus

St Fergus	Option 1: 17,500 hours derogation on both units until 2023 then decommission	Option 2: 500 hours derogation on both units	Option 3: 17,500 hours derogation on both units, then decommission both units & install 1 replacement unit	Option 4: 17,500 hours derogation on both units then replace both units
Does this option allow National Grid to meet future flexibility requirements?				
Does this option remove barrier for encouraging new investment?				
Does this option have a negligible impact on customer charges?				
Is this option future proof? (flexibility is covered above so this deals with legislation i.e. BREF and MCP)				
Can National Grid meet Exit Capacity obligations considering this option?	n/a	n/a	n/a	n/a
Does this option allow National Grid to retain current capability?				
Does this option represent an appropriate level of resilience on the network?				
Can National Grid meet Entry Capacity obligations considering this option?				
Does this option allow the network to be operated in sensitivities beyond FES?				

Recommendation

Based on this assessment, we propose to adopt **option 1**.

Rationale

The main downside with adopting option 1 is resilience, as we will need to rely more on using the aging Avon units, however we will revisit this as part of the Holistic assessment section. Options 3 and 4 are also credible, but we believe the additional costs for the increased level of resilience are not justified.

Kirriemuir

Kirriemuir	Option 1: 17,500 hours derogation then decommission unit D	Option 2: 17,500 hours derogation then decommission unit D, de- rate/re-wheel unit E	Option 3: Unit D on 500 hours derogation; de-rate / re- wheel unit E	Option 4: 17,500 hours derogation on unit D then decommission and install 1 replacement unit; de-rate and re-wheel unit E	Option 5: 17,500 hours derogation on unit D then decommission; de-rate and re- wheel unit E; decommission and replace unit C
Does this option allow National Grid to meet future flexibility requirements?	Yellow	Light Green	Light Green	Light Green	Light Green
Does this option remove barrier for encouraging new investment?	Light Green	Light Green	Light Green	Light Green	Light Green
Does this option have a negligible impact on customer charges?	Dark Green	Dark Green	Dark Green	Yellow	Yellow
Is this option future proof? (flexibility is covered above so this deals with legislation i.e. BREF and MCP)	Light Green	Light Green	Dark Green	Light Green	Dark Green
Can National Grid meet Exit Capacity obligations considering this option?	Light Green	Light Green	Light Green	Light Green	Light Green
Does this option allow National Grid to retain current capability (excluding flexibility)?	Light Green	Light Green	Light Green	Light Green	Light Green
Does this option represent an appropriate level of resilience on the network?	Red	Light Green	Red	Light Green	Light Green
Can National Grid meet Entry Capacity obligations considering this option?	Light Green	Light Green	Light Green	Light Green	Light Green
Does this option allow the network to be operated in sensitivities beyond FES?	Light Green	Light Green	Light Green	Light Green	Light Green

Recommendation

Based on this assessment we propose to adopt **option 5**.

Rationale

It is evident from the assessment above that Options 1 and 3 for differing reasons are not preferred solutions. Option 2 is a significantly lower cost solution than option 4 and if we only look at the IED LCP obligations would be our recommended option. However, due to the condition of the Avons, particularly unit C, we think that it would be more advantageous to install one new unit as well as de-rate and re-wheel unit E.

In the future, we envisage the end state for this station will be a de-rated and re-wheeled Unit E and two smaller units, most likely similar in size to the Avons. Therefore decommissioning and replacing Unit C at this point would provide an easier transition to manage the impact of the MCP legislation and would maintain levels of resilience.

Moffat

Moffat	Option 1: 17,500 hours derogation on both units then decommission	Option 2: 500 hours on one unit; 17,500 hours derogation on other unit then decommission	Option 3: 500 hours on both units	Option 4: 17,500 hours derogation on both units; install 2 new units, decommission both units
Does this option allow National Grid to meet future flexibility requirements?	Yellow	Light Green	Light Green	Dark Green
Does this option remove barrier for encouraging new investment?	Yellow	Light Green	Yellow	Dark Green
Does this option have a negligible impact on customer charges?	Dark Green	Light Green	Light Green	Orange
Is this option future proof? (flexibility is covered above so this deals with legislation i.e. BREF and MCP)	Dark Green	Dark Green	Dark Green	Dark Green
Can National Grid meet Exit Capacity obligations considering this option?	Light Green	Light Green	Light Green	Dark Green
Does this option allow National Grid to retain current capability (excluding flexibility)?	Light Green	Light Green	Light Green	Dark Green
Does this option represent an appropriate level of resilience on the network?	Yellow	Light Green	Light Green	Light Green
Can National Grid meet Entry Capacity obligations considering this option?	Yellow	Light Green	Yellow	Dark Green
Does this option allow the network to be operated in sensitivities beyond FES?	Light Green	Light Green	Light Green	Dark Green

Recommendation

Based on this assessment we propose to adopt **option 3** and retain both units on 500 hours and review the decision at the May 2018 reopener.

Rationale

The main advantage of retaining capability at Moffat is network resilience and secondly to support very high St Fergus flows beyond FES sensitivities. However, at Moffat the asset health costs are not inconsiderable, therefore the decision to retain both units on 500 hours for resilience purposes needs to be balanced against this cost. In addition, retaining the units on 500 hours reduces our capability on a prolonged basis to meet the St Fergus baselines by approximately 5-10 mcm/d. Therefore if we maintain these units on 500 hours then as part of RIIO-T2 development we will seek to reduce the baseline at St Fergus or alternatively include the increased network risk in any subsequent constraint management scheme. We will discuss this further within the holistic assessment section.

Carnforth & Nether Kellet

Carnforth	Option 1: Decommission units A & B	Option 2: Decommission units A & B; site reconfiguration	Option 3: Units A & B on 500 hours derogation; site reconfiguration	Option 4: 17,500 hours derogation on unit A then decommission; 500 hours on unit B; site reconfiguration	Option 5: 17,500 hours derogation on both units then decommission; one replacement unit; site reconfiguration
Does this option allow National Grid to meet future flexibility requirements?	Yellow	Green	Green	Green	Green
Does this option remove barrier for encouraging new investment?	Light Green	Light Green	Light Green	Light Green	Light Green
Does this option have a negligible impact on customer charges?	Green	Green	Yellow	Light Green	Yellow
Is this option future proof? (flexibility is covered above so this deals with legislation i.e. BREF and MCP)	Light Green	Light Green	Green	Green	Light Green
Can National Grid meet Exit Capacity obligations considering this option?	Light Green	Green	Green	Green	Green
Does this option allow National Grid to retain current capability (excluding flexibility)?	Light Green	Light Green	Light Green	Light Green	Green
Does this option represent an appropriate level of resilience on the network?	Red	Light Green	Light Green	Light Green	Light Green
Can National Grid meet Entry Capacity obligations considering this option?	Light Green	Light Green	Light Green	Light Green	Light Green
Does this option allow the network to be operated in sensitivities beyond FES?	Light Green	Light Green	Light Green	Light Green	Light Green

Recommendation

Based on this assessment we propose to adopt **option 4** of retaining Unit B on 500 hours, decommissioning unit A and undertaking the site reconfiguration. Our intention would be then to revisit the position on Unit B during the 2018 reopener window or RIIO-T2 negotiations, at which point we would consider retaining the unit on 500 hours, decommissioning or replacing with a new unit.

Rationale

Options 2-5 are generally preferred as a result of the benefits provided by the site reconfiguration. Due to the current condition of Unit A, Option 3 of retaining both units on 500 hours is not favoured, but there is merit in retaining unit B on 500 hours. We would not envisage needing to run the unit for more than 500 hours, but it would provide resilience while the other works at the station are being undertaken.

Hatton

Hatton	Option 1: 17,500 hours derogation and then decommission all 3 units	Option 2: 500 hours derogation on all 3 units	Option 3: 17,500 hours derogation until electric drive proven; install 2 large new units then decommission existing 3 units	Option 4: 17,500 hours derogation until electric drive proven; install 3 medium new units then decommission existing 3 units
Does this option allow National Grid to meet future flexibility requirements?	Red	Red	Light Green	Dark Green
Does this option remove barrier for encouraging new investment?	Red	Red	Light Green	Light Green
Does this option have a negligible impact on customer charges?	Dark Green	Light Green	Orange	Orange
Is this option future proof? (flexibility is covered above so this deals with legislation i.e. BREF and MCP)	Light Green	Dark Green	Light Green	Light Green
Can National Grid meet Exit Capacity obligations considering this option?	Red	Yellow	Light Green	Light Green
Does this option allow National Grid to retain current capability (excluding flexibility)?	Red	Red	Light Green	Light Green
Does this option represent an appropriate level of resilience on the network?	Red	Red	Light Green	Light Green
Can National Grid meet Entry Capacity obligations considering this option?	Red	Red	Light Green	Light Green
Does this option allow the network to be operated in sensitivities beyond FES?	Red	Yellow	Light Green	Light Green

Recommendation

Based on this assessment, we propose to adopt **option 4**.

Rationale

Flexibility is a key concern for both you and us. This option enables us to better address current and future flexibility needs at a similar cost to option 3.

Warrington

Warrington	Option 1: 17,500 hours derogation on both units then decommission	Option 2: 500 hours derogation on one unit; 17,500 hours derogation on other units then decommission	Option 3: 500 hours derogation on both units	Option 4: 17,500 hours derogation on both RB211s; install 2 New units + reverse flow; decommission both RB211s
Does this option allow National Grid to meet future flexibility requirements?	Light Green	Light Green	Light Green	Dark Green
Does this option remove barrier for encouraging new investment?	Yellow	Yellow	Yellow	Dark Green
Does this option have a negligible impact on customer charges?	Dark Green	Dark Green	Dark Green	Orange
Is this option future proof? (flexibility is covered above so this deals with legislation i.e. BREF and MCP)	Light Green	Dark Green	Dark Green	Light Green
Can National Grid meet Exit Capacity obligations considering this option?	Light Green	Light Green	Light Green	Dark Green
Does this option allow National Grid to retain current capability (excluding flexibility)?	Light Green	Light Green	Light Green	Dark Green
Does this option represent an appropriate level of resilience on the network?	Light Green	Light Green	Light Green	Dark Green
Can National Grid meet Entry Capacity obligations considering this option?	Yellow	Yellow	Yellow	Dark Green
Does this option allow the network to be operated in sensitivities beyond FES?	Light Green	Light Green	Light Green	Dark Green

Recommendation

Based on the above assessment, we propose to adopt **option 3** where both units are retained on 500 hours and this decision is reviewed at the May 2018 reopener.

Rationale

The main advantage of retaining capability at Warrington is to support very high northern gas flows, beyond FES sensitivities, and to a lesser extent to facilitate maintenance.

Adopting option 3 and reviewing that decision at the May 2018 reopener reduces our capability on a prolonged basis to meet the combined St Fergus and Barrow baselines by approximately 10-15 mcm/d. Therefore, if we maintain this option into the future, as part of RIIO-T2 development, we will seek to reduce the baseline at St Fergus and/or Barrow or alternatively include the increased network risk in any subsequent constraint management scheme. We will discuss this further within the holistic assessment.

Wisbech

Wisbech	Option 1: 17,500 hours derogation on both units then decommission	Option 2: 500 hours on both units	Option 3: 500 hour derogation on unit A; replace maxi Avon with Avon	Option 4: 17,500 hours derogation on unit A then decommission; replace maxi Avon with Avon	Option 5: 17,500 hours derogation on both units then decommission; install 2 new units
Does this option allow National Grid to meet future flexibility requirements?	Yellow	Light Green	Light Green	Light Green	Dark Green
Does this option remove barrier for encouraging new investment?	Yellow	Yellow	Light Green	Light Green	Dark Green
Does this option have a negligible impact on customer charges?	Dark Green	Dark Green	Dark Green	Dark Green	Orange
Is this option future proof? (flexibility is covered above so this deals with legislation i.e. BREF and MCP)	Light Green	Dark Green	Dark Green	Light Green	Yellow
Can National Grid meet Exit Capacity obligations considering this option?	Yellow	Light Green	Light Green	Light Green	Dark Green
Does this option allow National Grid to retain current capability (excluding flexibility)?	Light Green	Light Green	Light Green	Light Green	Dark Green
Does this option represent an appropriate level of resilience on the network?	Orange	Orange	Light Green	Light Green	Light Green
Can National Grid meet Entry Capacity obligations considering this option?	Yellow	Yellow	Light Green	Light Green	Dark Green
Does this option allow the network to be operated in sensitivities beyond FES?	Yellow	Light Green	Light Green	Light Green	Dark Green

Recommendation

Based on the above assessment, we recommend **option 3** of retaining the RB211 unit on the 500 hours derogation and converting the maxi Avon to an Avon. We would then propose to revisit the decision on the Avon and the RB211 when we have clarity on the implications of MCP.

Rationale

We do not recommend Option 1 as this does not provide suitable resilience post 2023. The benefits provided by Option 5 we believe are outweighed by the costs. We see merit in Option 2 in the longer term and Option 4 in the shorter term whilst the works at Peterborough and Huntingdon are ongoing hence option 3 represents a good compromise.

IPPC Phase 4

Compressor station	Units	Running Hours					
		2010	2011	2012	2013	2014	5 year average
Alrewas	A and B (Avon 1533s)	1061	305	258	146	66	367
	C (Solar Titan DLE)	1091	1209	28	120	50	500
Cambridge	A and B (Avon 1533s)	117	18	40	42	49	53
	C (Cyclone DLE)	4	21	44	26	27	24
Chelmsford	A and B (Avon 1533s)	28	15	27	553	10	127
Diss	A, B and C (Avon 1533s)	432	15	19	918	45	285
Kings Lynn	A and B (Avon 1533s)	14	8	21	66	7	23
	C and D (Siemens SGT400)	1392	505	69	1723	42	746
Kirriemuir	A, B and C (Avon 1533s)	891	499	997	457	169	603
	D (RB211)	3127	795	1756	157	176	1202
	E (Electric VSD)	N/A	N/A	N/A	N/A	N/A	N/A
St. Fergus	5 Avon 1533 Units	6346	8816	6987	6902	6647	7140
	2 RB211 Units	8645	2916	4255	5893	2605	4863
	Electric VSD Unit	N/A	N/A	N/A	N/A	N/A	N/A
Wormington	A and B (Avon 1533s)	3746	5053	541	81	62	1897
	C (Electric VSD)	1098	2021	961	926	1455	1292
*Peterborough	A, B and C (Avon 1533s)	8268	4958	6621	7448	5785	6616
*Huntingdon	A, B and C (Avon 1533s)	6201	1444	842	4586	2503	3115

- Sites which are likely to provide the greatest emission reduction are St Fergus, Peterborough and Huntingdon

* One new unit to be installed as part of IPPC Phase 3

Holistic Assessment

Station	Recommended option	Recommended option - anticipated allowance (outturn prices)
St Fergus (LCP)	17,500 hour derogation on units 2A and 2D and then decommission by 31st December 2023	<£10m
Kirriemuir	Unit D - 17,500 hour derogation and then decommission. Unit E – de-rate and re-wheel (electric unit) Unit C – Decommission and install one new unit (MCP unit)	£20-50m
Moffat	500 hour derogation both units	£10-20m
Camforth	Unit A - 17,500 hour derogation and then decommission. Unit B – 500 hour derogation Site reconfiguration	<£10m
Hatton	17,500 hour derogation on 3 affected units and then decommission by 31st December 2023. Install three medium sized units.	£50-100m
Warrington	500 hour derogation both units	<£10m
Wisbech	Unit A - Maxi Avon conversion to Avon Unit B – 500 hour derogation	<£10m
St Fergus (IPPC)	Two replacement units and decommission two units.	£50-100m
Peterborough (IPPC)	Two replacement units and decommission three units.	£50-100m
Huntingdon (IPPC)	Two replacement units and decommission three units.	£50-100m

Impact on Charges

- Total allowance associated with our proposals is approx. £440m of which circa £375m is within RIIO-T1
- Impact on customer bills, compared to our forecast published in September 2014 (£290m outturn), which was lower than the provisional allowance (£374m outturn), is a maximum absolute increase in any year of RIIO-T1 of 25p.
- Maximum absolute increase in transportation charges between the forecast published in September and our proposals shown below;

	Units	Maximum absolute difference between the September 2014 forecast ¹⁰ and proposals
NTS TO Entry Capacity charge	p/kWh/d	No Change
NTS TO Entry Commodity charge	p/kWh	0.0011
NTS TO Exit Capacity charge	p/kWh/d	0.0002
NTS TO Exit Commodity charge	p/kWh	0.0003

Network Investment Storyboard tool

- We have commissioned OCC to produce a tool which allows us to explain our investment decisions in a visual manner
- We have created a video to show how the tool works and have used Moffat as an example
- Before we continue to develop this tool, we are interested in getting your feedback.

NTS System Flexibility

Eddie Blackburn
19th March 2015

Introduction & Content

- The following slides provide an overview of our thoughts on NTS System Flex stakeholder engagement;
 - What do we mean by System Flexibility
 - System Flex Objectives and Deliverables
 - Stakeholder Engagement Approach
 - Timeline

What do we mean by System Flexibility?

The ability of the system to cater for....

“Within-day Linepack variation”

... varying daily supply and demand profiles and imbalances through variations in system linepack and pressures.

“Geographic Supply & Demand Distribution”

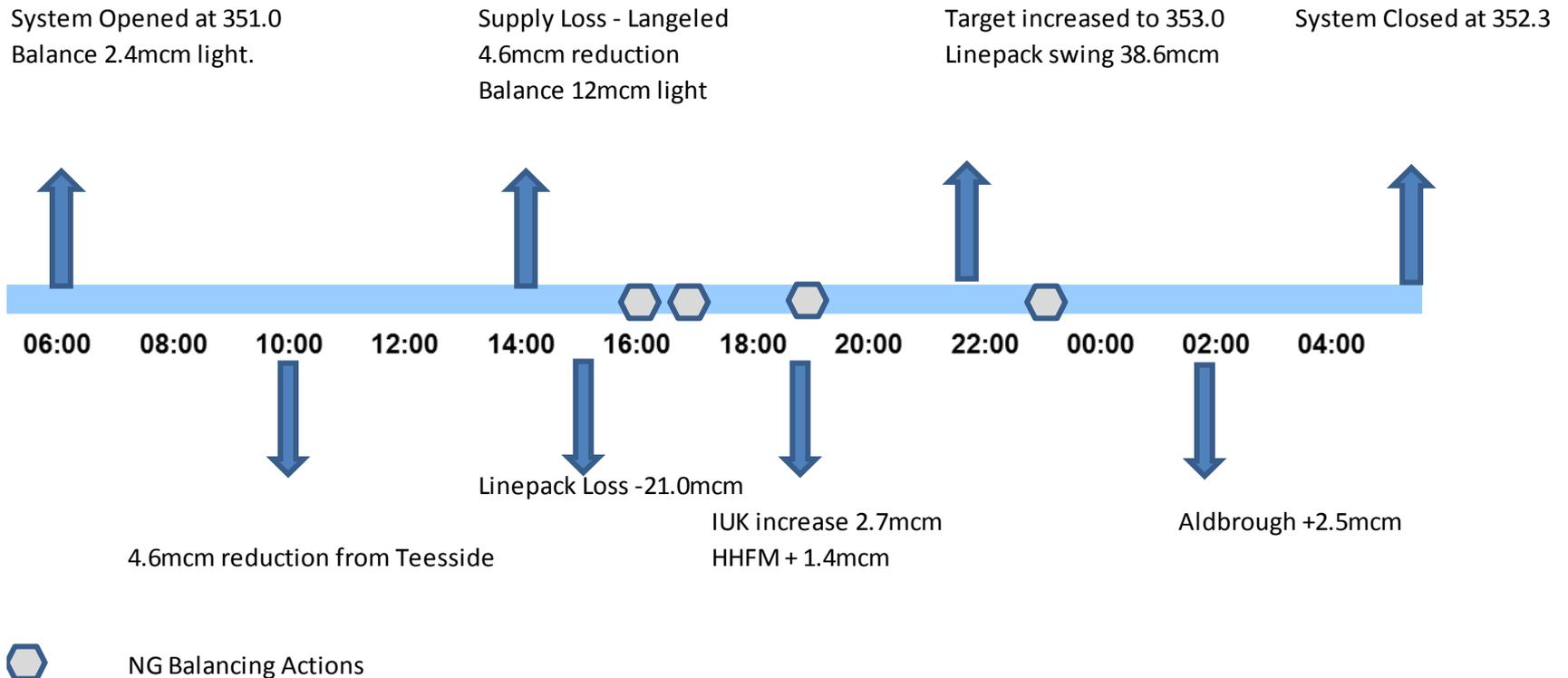
... supply and demand scenarios which occur away from the 1-in-20 peak demand and maximum supply levels .

“Adaptability/ Configurability”

... changes in the geographic distribution of supply and demand which result in changes in the direction of gas flow.

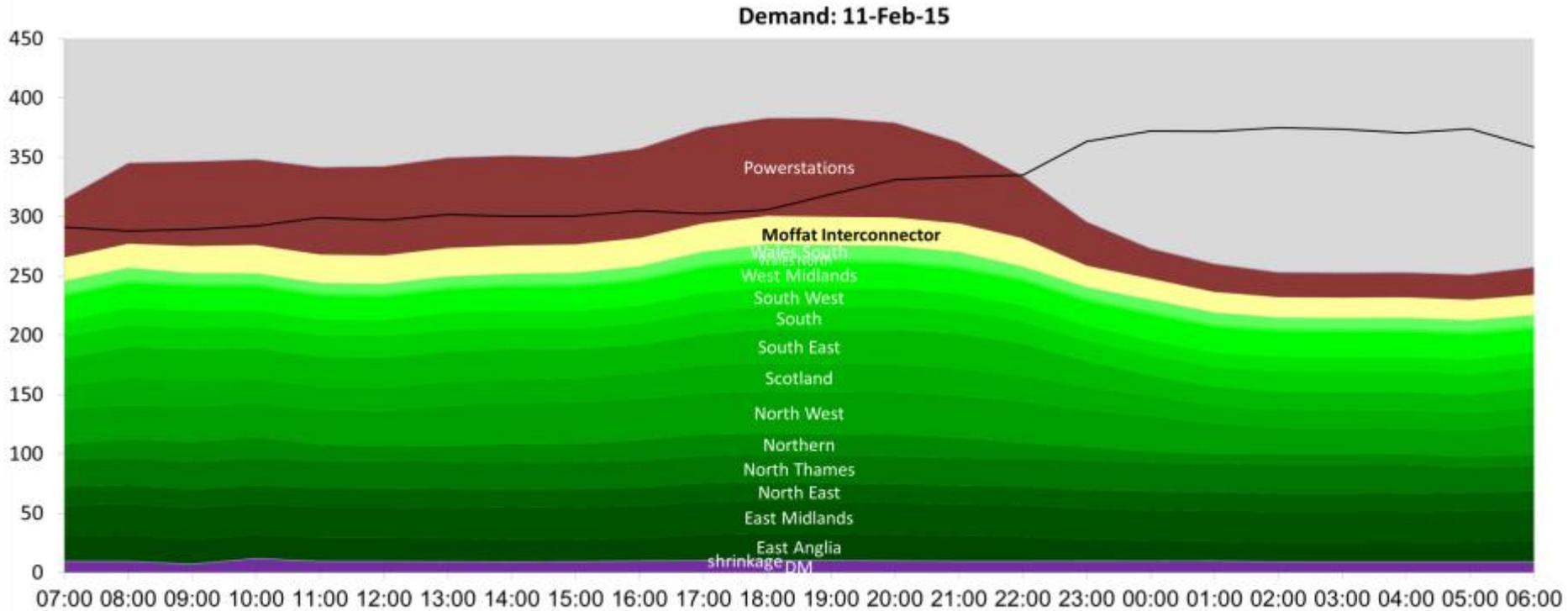
Issue	NG View
<i>Network Capability Implications</i>	<p>This work is aimed at investigating changes to the planning processes rather than the commercial processes.</p> <p>This work will not necessarily lead to a list of required network development projects but is aimed more at Identification of flex output measures.</p>
<i>Commercial Implications</i>	<p>This work will not necessarily lead to the introduction of commercial flex products unless seen as essential for justifying the identification and removal of constraints and restrictions.</p> <p>A product may not be appropriate as the aggregate ‘booking’ from all Users is unlikely to provide a meaningful signal; as this might lead to maximum flexibility being ‘booked’ at a site level which could never be used simultaneously.</p> <p>This work may lead to a requirement to investigate commercial changes but this will be carried out via UNC processes.</p>
<i>Commercial flex services</i>	<p>This work is not necessarily about identifying network solution and there may be potential for other parties to offer additional commercial services.</p>
<i>Access to flex - ramp rates & notice periods.</i>	<p>Customers are increasingly requesting access to additional flex, higher ramp rates and also relaxation of nomination rules, which are seen as restrictive.</p>

Gas Day: 11th February Timeline



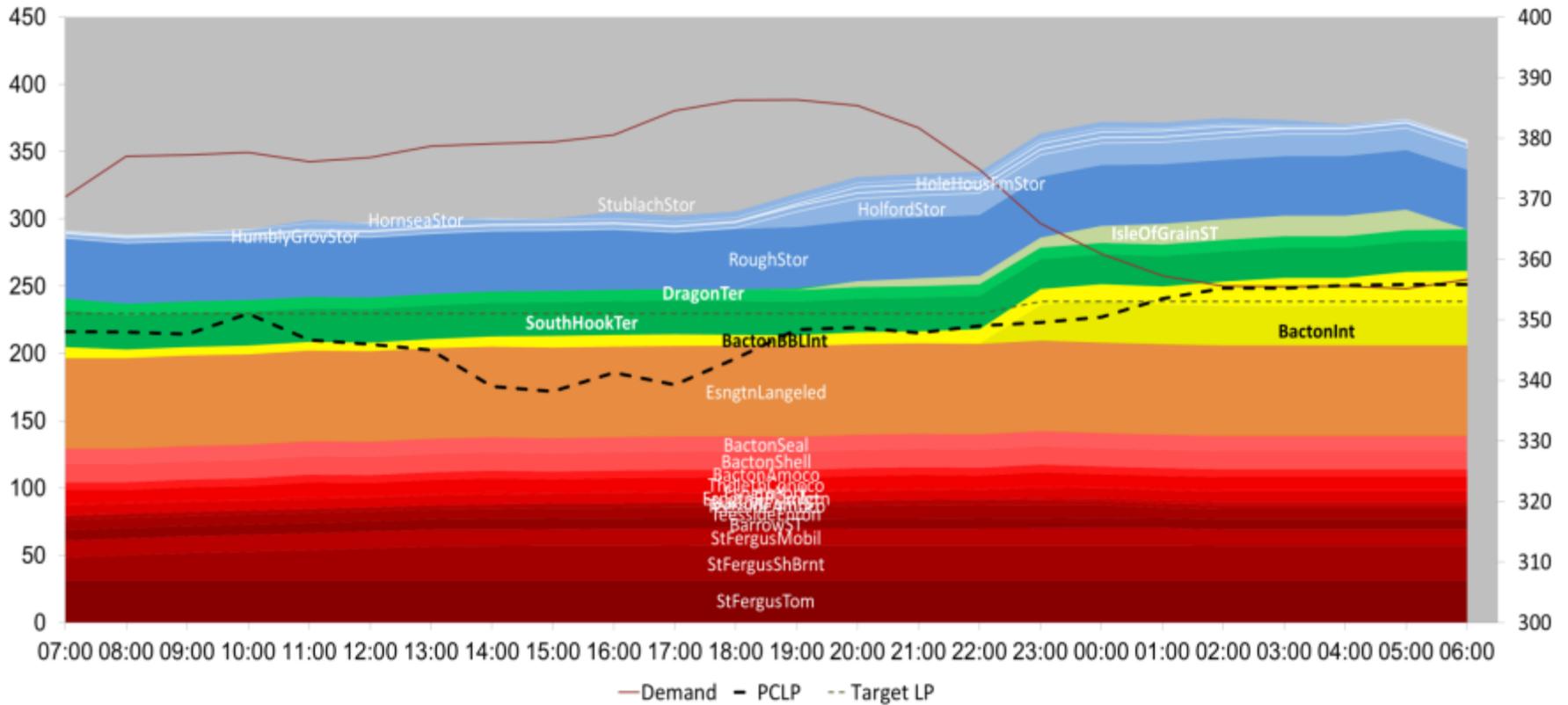
NB: Linepack losses were generally as a result of within day profiling. The supply reductions, whilst not insignificant, were not the primary reason for the record within day loss subsequently seen on the Network.

Gas Day Demand



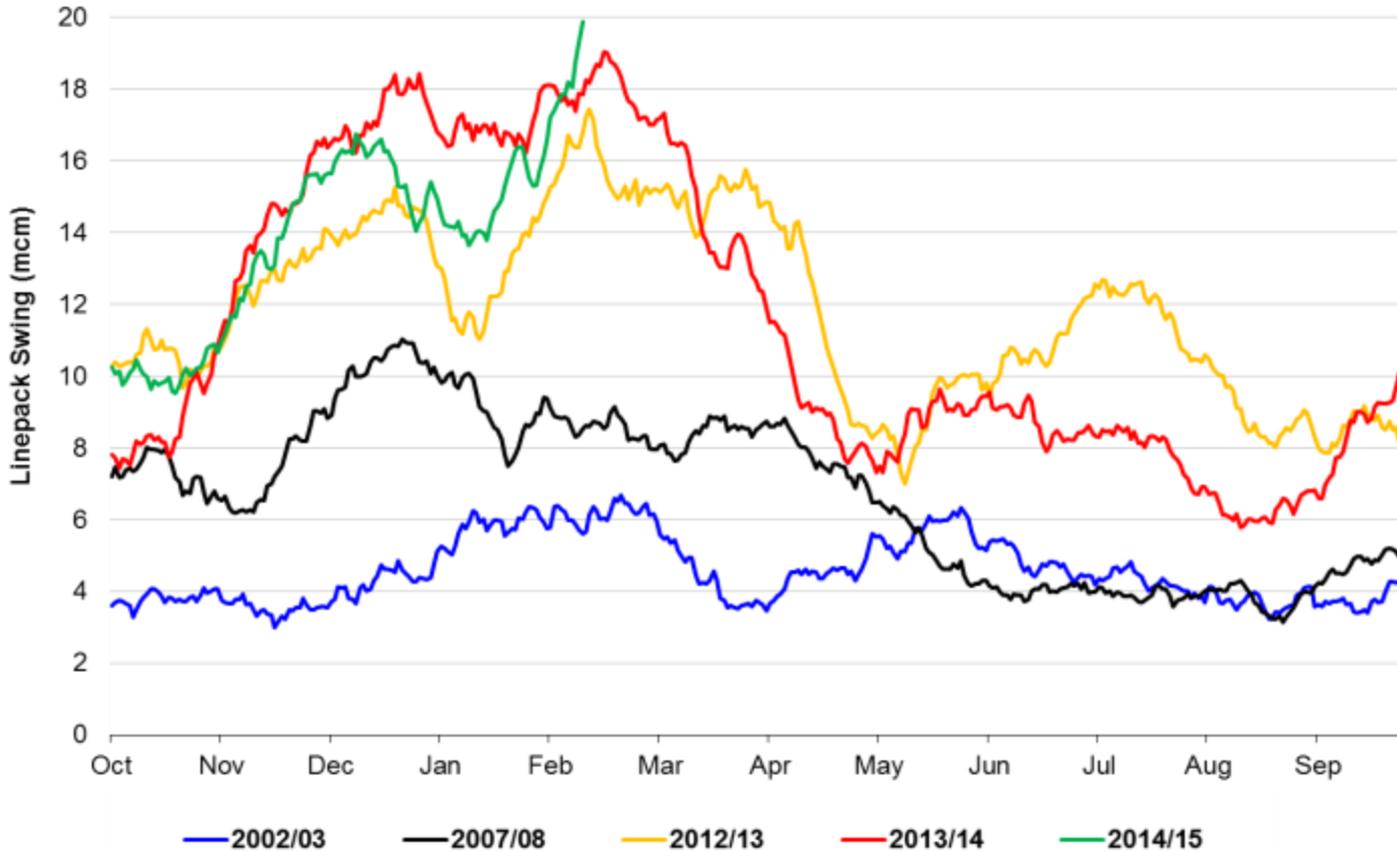
Gas Day Supply

Supply vs Demand (D+1): 11-Feb-15



Linepack Swing

Comparison of Swing of NTS Linepack (mcm) - 30 Day Rolling Average



Top 10 Actual LP Swing

Gas Day	LP Swing
11/02/2015	38.57
02/02/2015	32.51
16/01/2013	29.86
10/02/2015	29.59
09/02/2015	29.04
09/12/2014	28.96
14/02/2014	28.69
12/02/2014	28.49
06/10/2011	28.18
12/01/2014	27.35

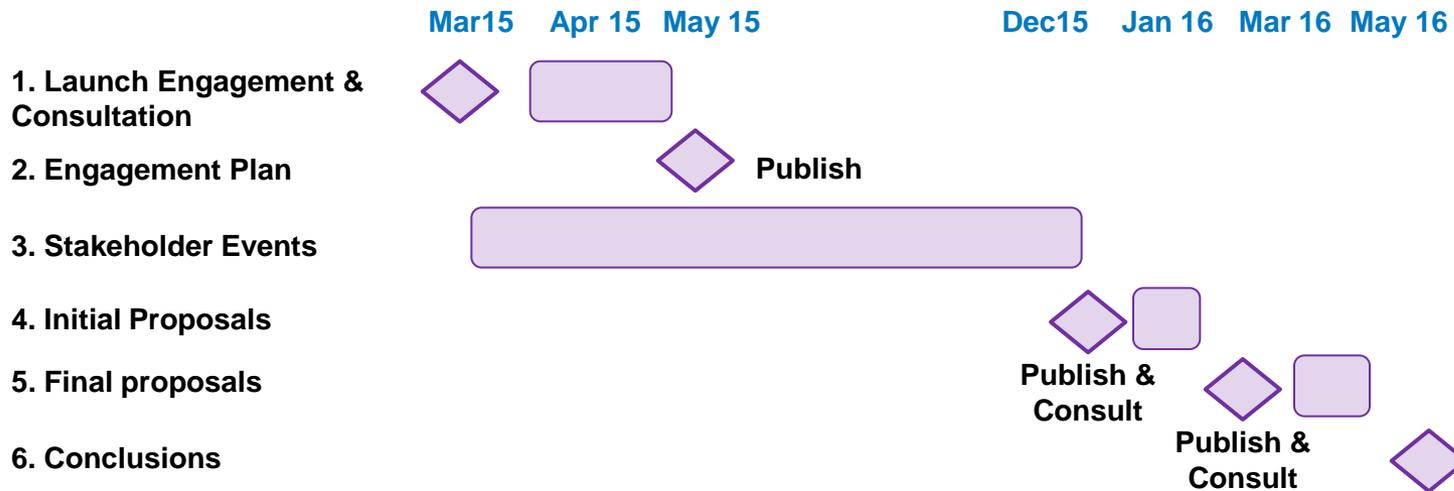
Stakeholder Engagement Objectives & Deliverables

- Areas to cover, agree and capture
 - Agreement of an industry definition of System Flex
 - User requirements & scorecard
 - Analysis approach and data requirements
 - Scope, plan & timeline
- Outputs
 - System Flex - Network Output Measures agreed with stakeholders
 - Agreed system capability requirements
 - Potential RIIO mid-period review submission
 - Identification of any commercial development areas

Potential Stakeholder Engagement Activities

- We would like your input in the development of the system flexibility plans.
- This could follow all or part of the IED engagement programme or include different methods
- In your packs there is a “engagement tools and techniques” sheet with all the engagement activities we carried out as part of IED, please can you rate each one and tell us what you would like to see as part the engagement on system flexibility

Timeline



	Activity	Overview
1	Launch Stakeholder Engagement	Initiate Flex Engagement – 19 th March IED event followed by UNC Transmission Workgroup, Talking Networks website and Consultation (survey)
2	Stakeholder Engagement Consultation & Plan	Publish Stakeholder Plan
3	Stakeholder Events including bespoke, UNC Transmission Workgroup & bi lateral meetings	Setting the scene – Definitions, Scope & User Requirements Deliverables: Analysis & Outputs Measures Capability Requirements & Proposals
4	Initial Proposals	Initial proposals based on stakeholder input
5	Final Proposals	Final proposals based on stakeholder feedback to initial proposals
6	Conclusions & Ofgem submission	