Charging and Settlements Forum

Generation-focused day
17 October 2018

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Welcome

Paul Wakeley

Revenue Manager

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Housekeeping

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ESO Introduction

Richard Smith

Head of Commercial

Electricity System Operator

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Overview of the day's Agenda

1	Welcome and ESO Introduction	10:00 – 10:10
2	Update on "Managing Profitability" programme	10:10 – 10:20
3	TNUoS Overview	10:20 – **12:15**
	TNUoS Tariffs and Forecasting	
	TNUoS Charging and Billing	
	Lunch	**12:15 – 13:00**
4	BSUoS Overview	**13:00 – 14:30**
	BSUoS Forecasting and Reporting	
	BSUoS Billing	
	Ancillary Services and Trades	

Afternoon Agenda

	Break	**14:30 – 14:45**
5	Related area updates	**14:45 – 15:30**
	ESO Incentive Performance YTD	
	RIIO2 and the Future of Charging	
	Charging Methodology Developments	
6	Q & A and close	**15:30 – 16:00**

Managing Profitability

Paul Wakeley

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What is the “Managing Profitability customer journey”

A **customer journey**, where we are listening and responding to you in a **different** way.

We know that you want to have **better** access to information, and to understand how our charges **affect** your business.

This will make you more successful, and ultimately drives benefit for all **consumers** by having an **efficient** energy market.

What you have told us…

I need to understand information and data	• Content to give information on what charges we will face, with relevant updates • Content to explain how charges are calculated • Forecasting data that is transparent and clearer on accuracy • Experts who can support with finding relevant information
I need better access to information and data	• Improvements to digital access to information • Improvements to how we can interact with data • Access to relevant experts and knowledge of how to reach the right people
I need to understand the onboarding and exit process	• Knowledge of who to contact • Knowledge of what to do to join and leave the market

What we have already done

We've started to make improvements, but we recognised there is much more we can do

- We have improved our process to make sure we bill right every time
- We've started enhancing the website
- We are improving our TNUoS tariff reports
- Redesigned our forums around you
- We consulted and improved our TNUoS five-year report
- New email newsletter with latest developments from TNUoS and BSUoS
- Record our webinars and publish these afterwards

What happens next

We will publish our action plan:

- Improve our website, documents, letter and emails. Making them easier to understand, and at the right level for your business.
- Publishing data in a timely and useful way. Designing a new holistic onboarding process.
- Continuing to listen to our customers – making sure we understand we are in tune with their evolving needs, as the industry continues to change.

Feedback

Please keep engaging with us through formal and informal opportunities

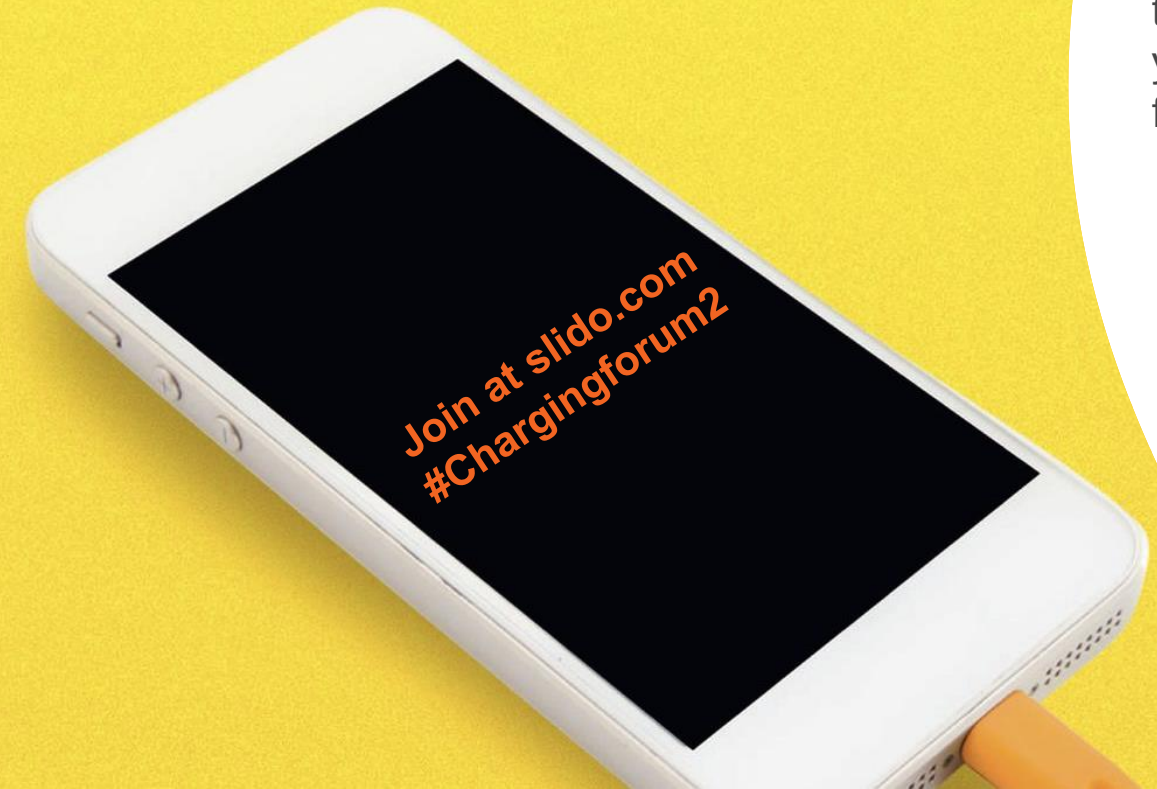
Your feedback helps us to:

- validate our proposal,
- understand if our changes are working for you, and
- make sure we are always responding to your changing needs

We commit to improving our whole network charging processes, to help you understand things

Sli.do

We'll be using sli.do throughout the day to gather your questions and feedback



Join at slido.com

#Chargingforum2

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TNUoS Overview

Paul Wakeley

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Revenue team

Paul Wakeley

Forecasting, setting and billing TNUoS to recover £2.7bn of TO revenue per year from generators, demand and suppliers

Tom Selby	Jo Zhou	Alice Grayson	Jennie Groome	Andrew Havvas	Jessica Rivalland	Paul Hitchcock	Anthony Tichivangana	Luke Craddock
								

TNUoS Tariff forecasting and setting | **TNUoS Billing** | **Connection charging**

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What is TNUoS and who pays

Paul Wakeley

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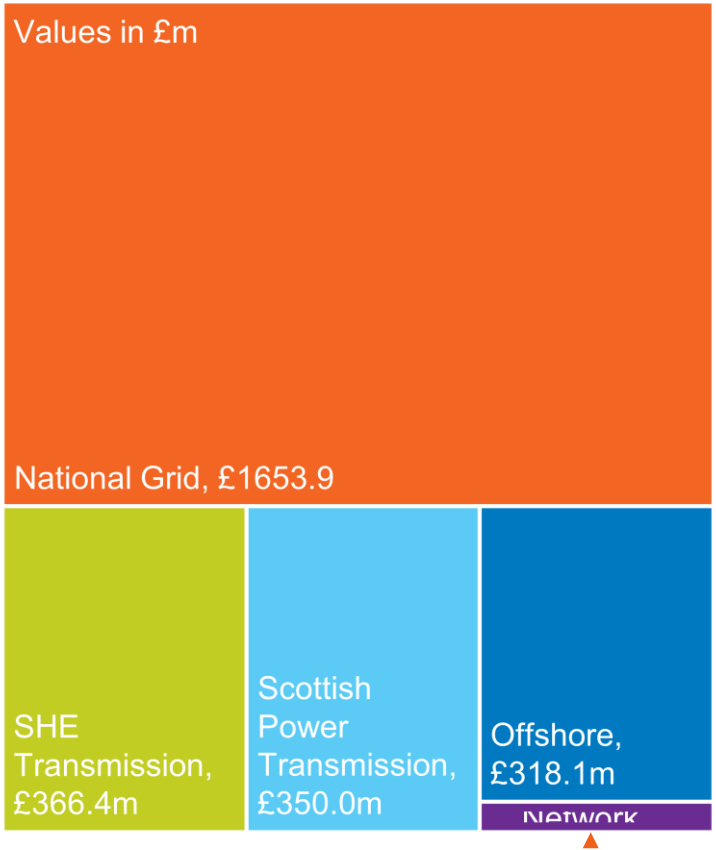
What is TNUoS?

TNUoS
Transmission Network Use of System Charges
£2.7bn TO Revenue

BSUoS
Balancing Services Use of System Charges
~ £1.3bn SO Revenue

Connection Charges
£200m TO Revenue

What is TNUoS?



Recovers Revenue for:

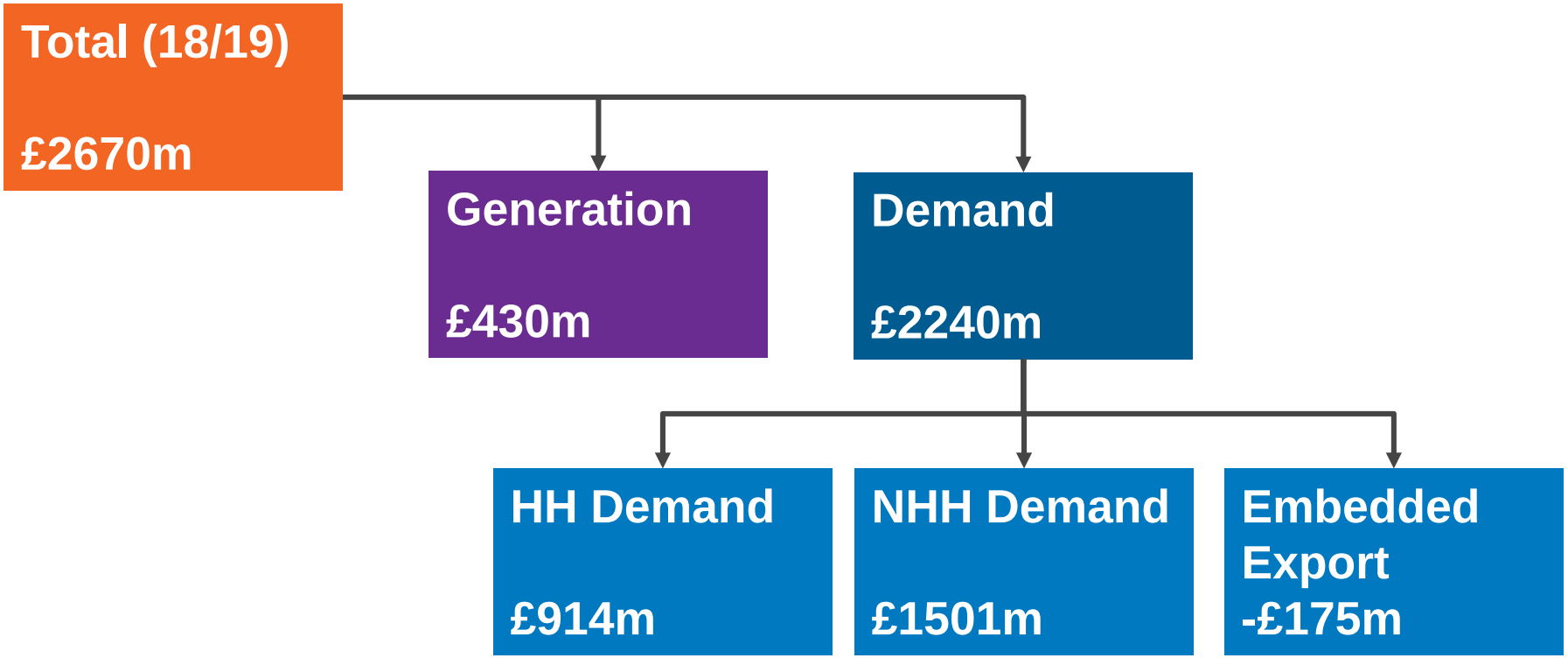
- National Grid TO
- Scottish Power Transmission
- Scottish Hydro Electricity Transmission
- Offshore TOs
- Network Innovation Competition Fund
- Transmission EDR

Charges are calculated *ex ante* and billed by NGESO

Methodology is defined in Section 14 of the CUSC

Tariffs apply for a whole year from 1 April, and are published by 31 January

Who pays TNUoS?



Who pays TNUoS?

Generators

Directly connected to the transmission network

Embedded generators >=100MW TEC

Total (18/19) £2670m

Generation £430m

Generation TNUoS is charged on the basis of Transmission Entry Capacity (TEC)

Generators are also liable for Demand TNUoS if they take demand over Triad

Who pays TNUoS?

Suppliers

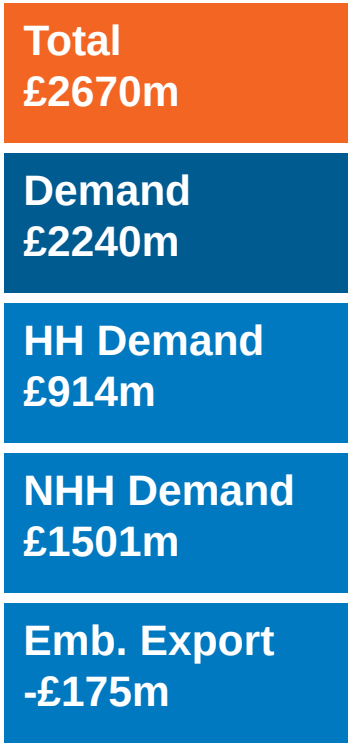
All licenced suppliers are liable for TNUoS, for their *gross demand* from the transmission network

Three categories of charge:

- **Half-Hourly** metered demand on the basis of Triads
- **Embedded Export** credited for export over Triads
- **Non Half-Hourly** demand, total 4pm-7pm annual consumption

The changes to HH charges were introduced by CMP264/265 from 2018/19 charging year

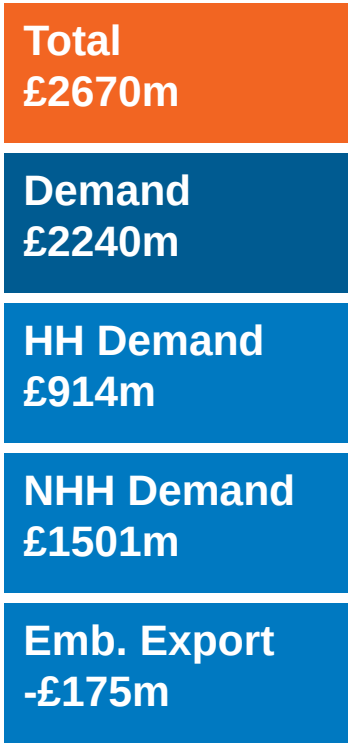
All demand is in one of these categories



Who pays TNUoS?

Directly Connected Demand sites pay HH demand charges

Embedded Generation (<100MW) which contracts directly with National Grid can gain Embedded Export payments



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Demand TNUoS

Alice Grayson

Demand TNUoS agenda

1	Overview
2	Triads
3	Embedded Export Tariffs
4	How charges are calculated

Demand TNUoS Tariffs

Demand TNUoS recovers £2.2bn of Revenue

There are two demand tariffs for each of the 14 demand zones

Gross Half-Hourly (HH) Demand

Charged a £/kW tariff for average demand over the Triads

Non Half-Hourly (NHH) Demand

Charged a p/kWh tariff for consumption between 4pm and 7pm each day

Triads

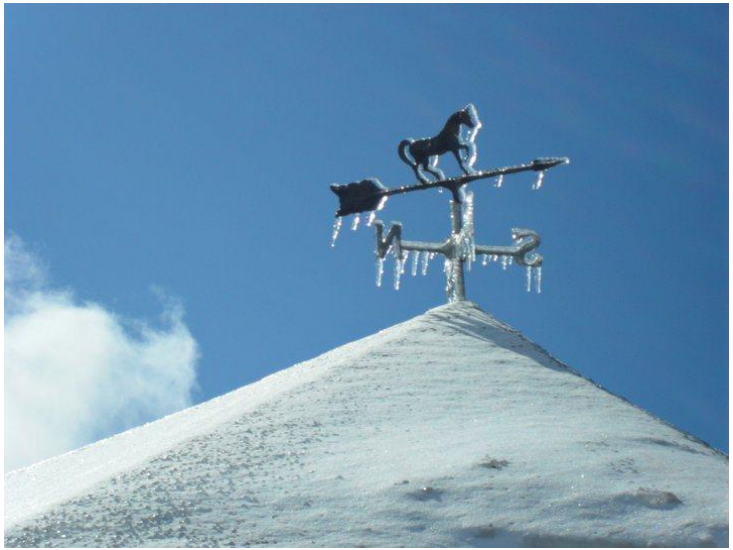
Three half hour settlement periods of highest GB net demand

1st November to end of February

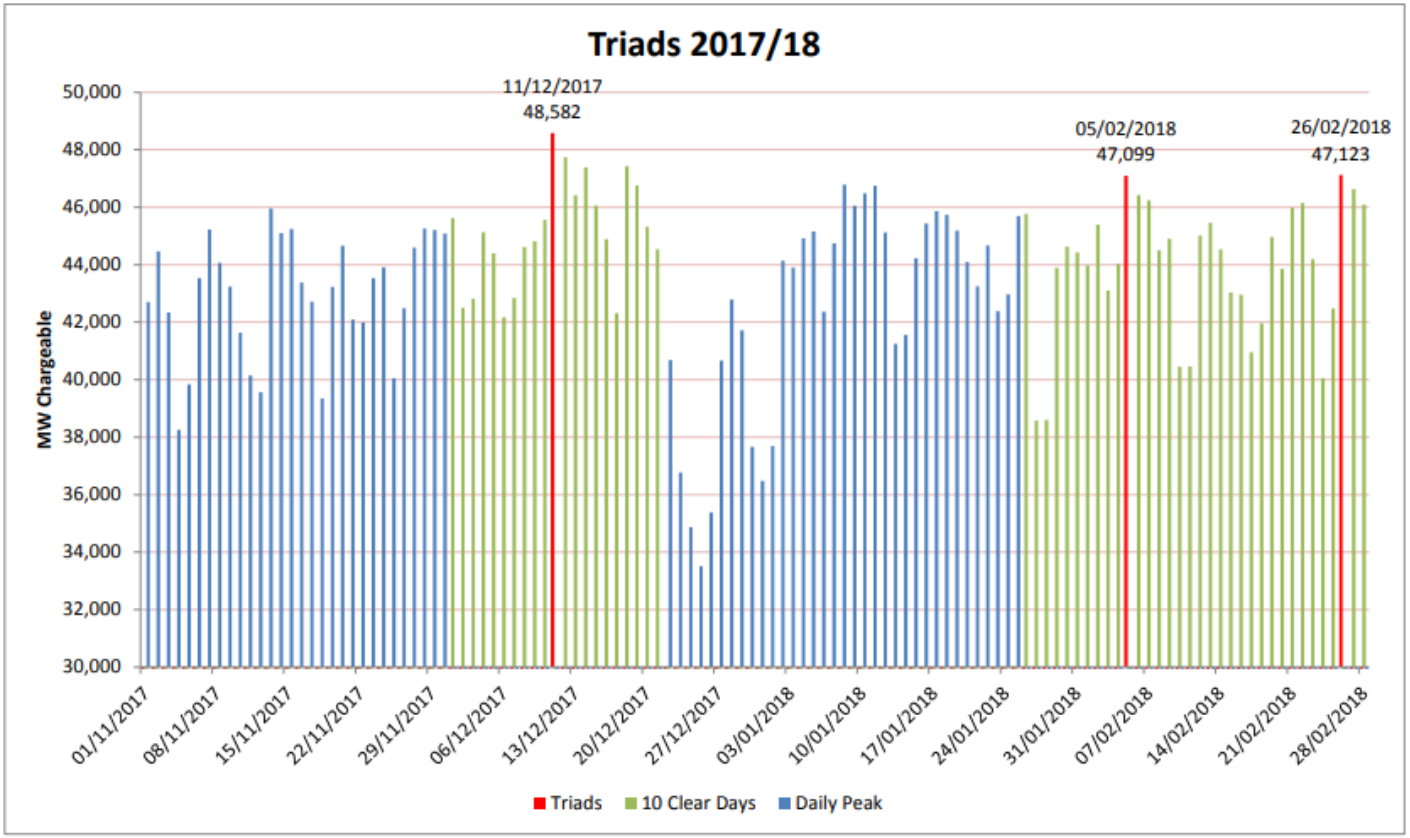
Separated from each other by a minimum of 10 clear days

Determined after the event using settlement metering data in March (mixture of SF, R1 & R2)

Exclude interconnector demand but include pumping and station demand



Triads for Winter 2017/18



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Embedded Export Tariff

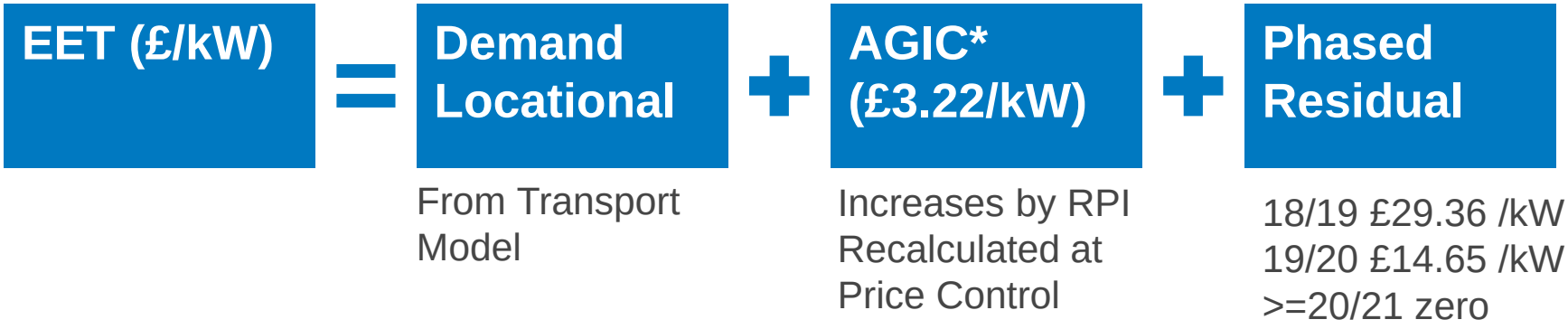
The Embedded Export Tariff is another element of TNUoS

- The EET is a new tariff under CMP 264/265 and is paid to customers based on the HH metered export volume during the triads
- This tariff is payable to exporting HH demand customers and embedded generators (<100MW CVA registered)

Embedded Export

Credited a £/kW tariff for average export over the Triads

Embedded Export Tariff



Based on the forecast of Embedded Generation output, this will cost £175m in 2018/19

This is added to the revenue to be recovered from the demand residual, to ensure overall revenue recovery is correct

***AGIC = Avoided GSP (Grid Supply Point) Infrastructure Credit, which is indexed by average May to October RPI each year.**

Embedded Export Tariff Revenues

- Forecast to cost £175m in 18/19
- Cost is added to the Demand Gross Residual
- Overall, same value is recovered from Demand

Demand Zone	2018/19 Tariff (£/kW)	EET Revenue for 2018/19 (£m)
1	11.36	11.37
2	14.12	9.46
3	22.87	13.28
4	28.86	9.91
5	29.13	18.50
6	30.57	16.44
7	32.56	15.52
8	33.85	7.16
9	34.48	21.52
10	30.86	10.22
11	37.16	11.83
12	39.96	5.96
13	38.47	16.80
14	36.92	7.40

Small Generators' Discount

Small generators (<100MW) connected at 132kV transmission receive a £/kW reduction in their TNUoS

- This is recovered from demand customers
- The licence condition and the scheme expire 31 March 2019

Ongoing CUSC Mod discussion (CMP302) may affect 2019/20 tariffs

For 2018/19

Total cost: £31.1m

HH demand = 0.59 £/kW	**NHH demand** = 0.08 p/kWh

Generation TNUoS

Jo Zhou

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Generation TNUoS

1	Wider tariffs - four elements
2	Annual load factors
3	Local tariffs
4	The TNUoS model – what it does
5	Model inputs

Generation TNUoS

Generation TNUoS recovers charges from Transmission connected generation and licensable embedded generation

- Maximum revenue from generation set by EU Regulation
- Tariffs are composed of wider and local elements
- Final tariffs are generator specific

Total (18/19) £2,670m

Generation £430m

Generation Wider Tariffs

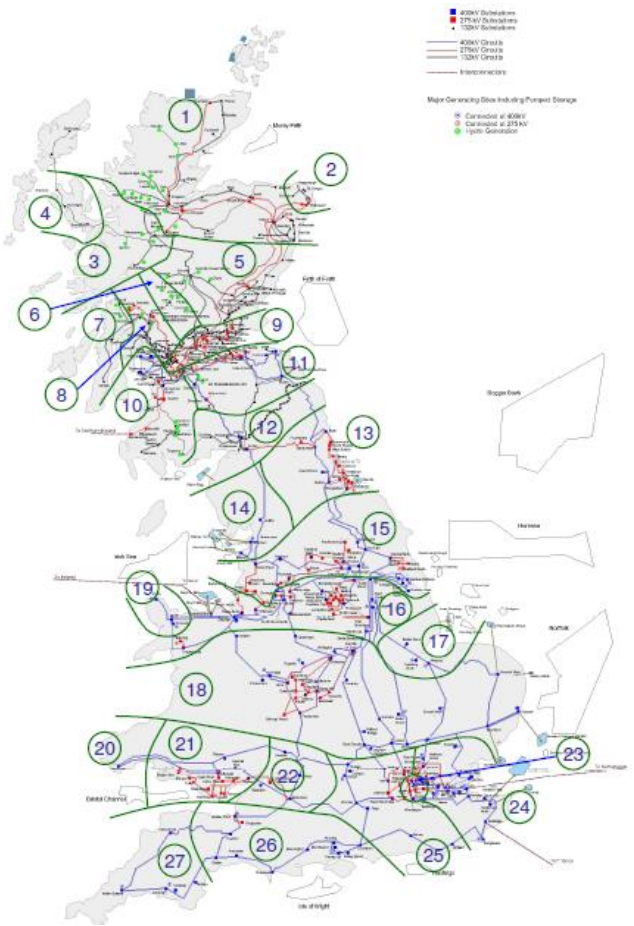
Wider tariffs are calculated per zone

27 generation zones

Components apply based on connection and generation type

Wider Tariff components:

Peak Security	**Year Round Shared**
Year Round Not Shared	**Generator Residual**



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Wider Generation Charging Categories

Intermittent e.g. Wind, Tidal

Conventional Low Carbon, e.g. Nuclear, Hydro

Conventional Carbon, e.g. Coal, Oil, Gas, Pump Storage

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Annual Load Factors (ALFs)

Annual Load Factor (ALF)

ALFs give a measure (over five years) of a generator's output compared to TEC using:

Transmission Entry Capacity (TEC)

Metered Flows (MF)

Final Physical Notifications (FPN)

ALFs for 2018/19 are based on data from charging years 2012/13, 2013/14, 2014/15, 2015/16 and 2016/17

Annual Load Factors (ALFs)

Annual Load Factor (ALF)

ALFs are calculated at power station level

For a power station with multiple Balancing Mechanism Units (BMU) representing generating sets and/or station demand, the BMUs are aggregated before calculating the ALF

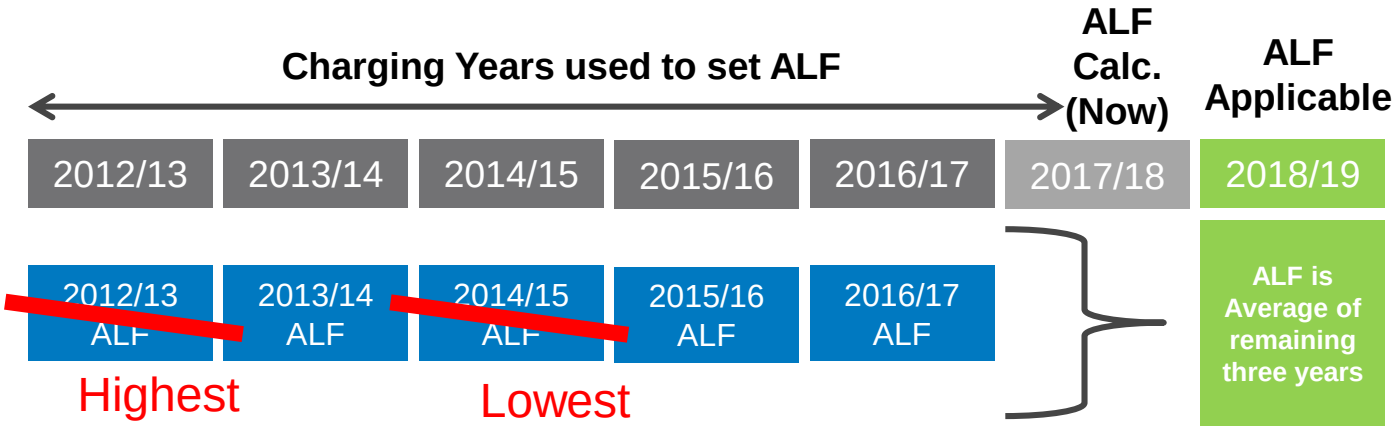
Co-location of generating sets of different fuel types within one power station

At the moment the power station is charged according to the predominant fuel type

A guidance document is available on our website

https://www.nationalgrid.com/sites/default/files/documents/Co-location%20Informal%20Guidance%20Document%20Consultation%20DRAFT.pdf

How to calculate an ALF….



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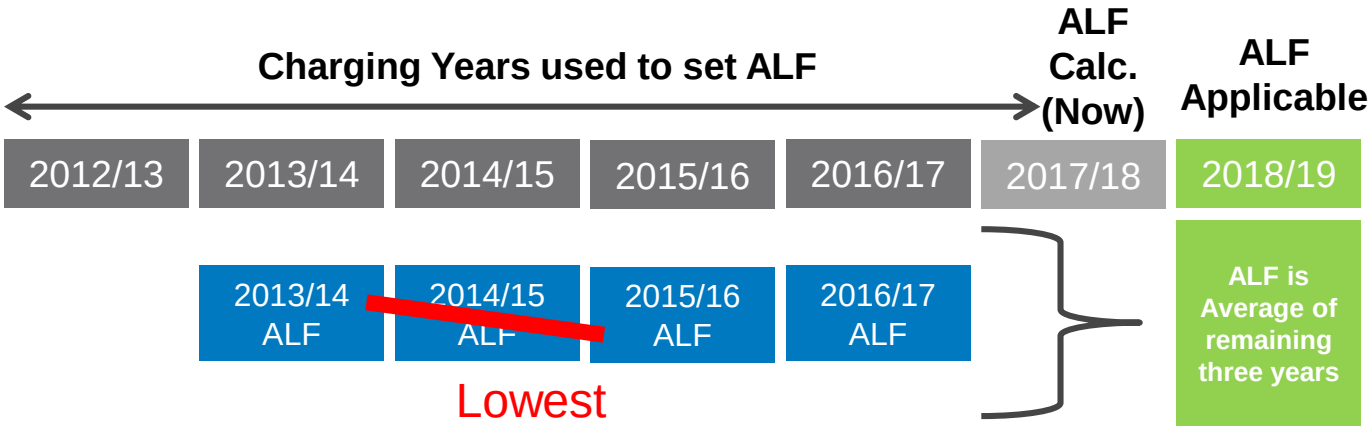
How to calculate an ALF….



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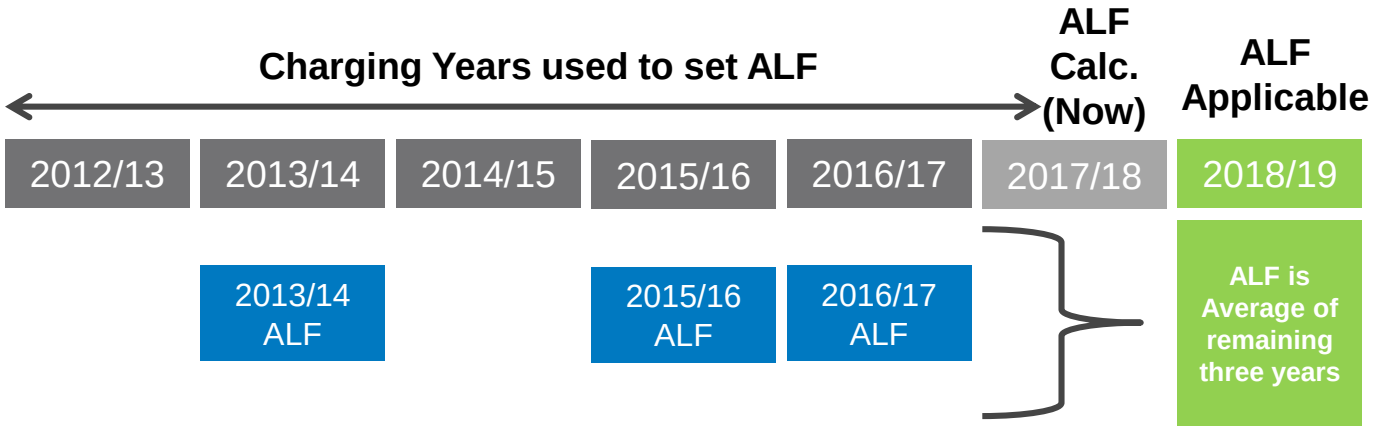
How to calculate an ALF….



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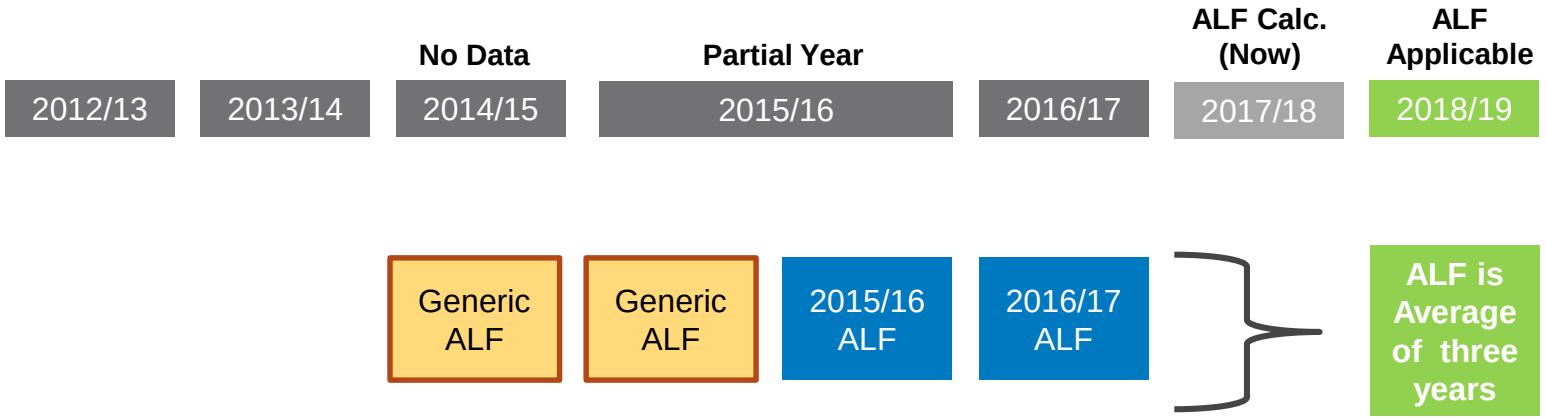
Less than 3 full years, e.g.



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Generation TNUoS Tariffs

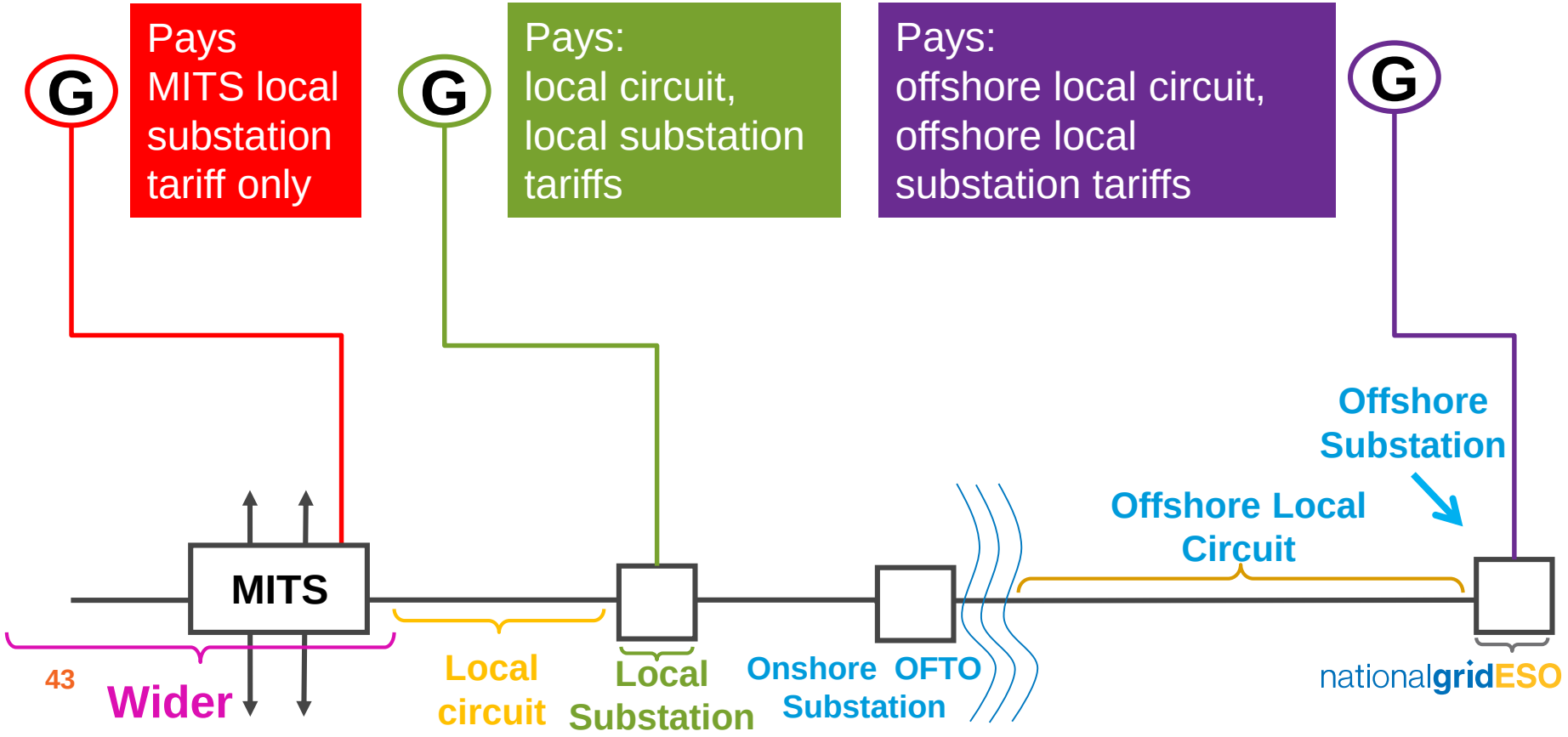
Generation Tariffs		System Peak Tariff	Shared Year Round Tariff	Not Shared Year Round	Residual Tariff
Zone	Zone Name	(£/kW)	(£/kW)	(£/kW)	(£/kW)
1	North Scotland	2.633478	17.866048	16.290564	-3.613060
2	East Aberdeenshire	4.856420	10.389876	16.290564	-3.613060
3	Western Highlands	2.066205	18.018719	16.300922	-3.613060
4	Skye and Lochalsh	-4.050899	18.018719	16.185831	-3.613060
5	Eastern Grampian and Tayside	3.028972	15.552842	15.695182	-3.613060
6	Central Grampian	3.703503	14.842849	15.388225	-3.613060
7	Argyll	3.318511	11.768130	25.125685	-3.613060
8	The Trossachs	3.605887	11.768130	13.992947	-3.613060
9	Stirlingshire and Fife	2.379372	8.968928	13.155213	-3.613060
10	South West Scotland	2.432017	9.529142	13.296532	-3.613060
11	Lothian and Borders	3.649624	9.529142	7.437838	-3.613060
12	Solway and Cheviot	1.965527	5.394191	7.505010	-3.613060
13	North East England	3.885956	3.015150	3.943079	-3.613060
14	North Lancashire and The Lakes	1.590933	3.015150	2.657327	-3.613060
15	South Lancashire, Yorkshire and Humber	4.476969	0.783197	0.117564	-3.613060
16	North Midlands and North Wales	3.942682	-0.830490	0.000000	-3.613060
17	South Lincolnshire and North Norfolk	2.119470	-0.474296	0.000000	-3.613060
18	Mid Wales and The Midlands	1.208746	-0.242530	0.000000	-3.613060
19	Anglesey and Snowdon	4.440111	-0.650476	0.000000	-3.613060
20	Pembrokeshire	9.187142	-4.517101	0.000000	-3.613060
21	South Wales & Gloucester	6.185924	-4.490373	0.000000	-3.613060
22	Cotswold	3.040964	2.258661	-6.725791	-3.613060
23	Central London	-5.765060	2.258661	-6.613056	-3.613060

We publish wider tariff components by zone

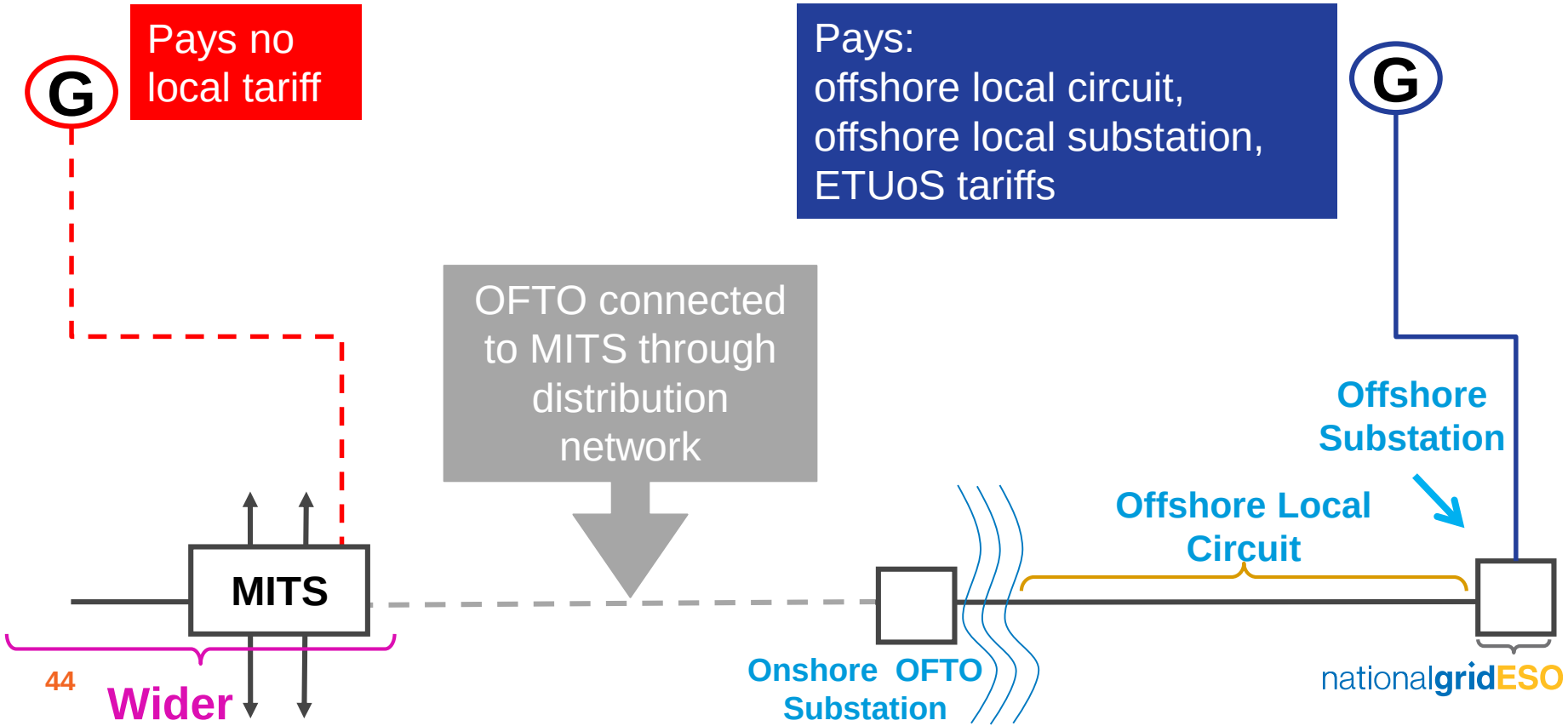
We publish example wider tariffs for 3 types of generator

Generation Tariffs	Conventional Carbon 80%	Conventional Low Carbon 80%	Intermittent 40%
Zone	Load Factor (£/kW)	Load Factor (£/kW)	Load Factor (£/kW)
1	26.345708	29.603820	19.823923
2	22.587712	25.845825	16.833454
3	25.908858	29.169042	19.895350
4	19.699681	22.936847	19.780259
5	24.414331	27.553368	18.303259

Local generation tariffs: Directly connected generators

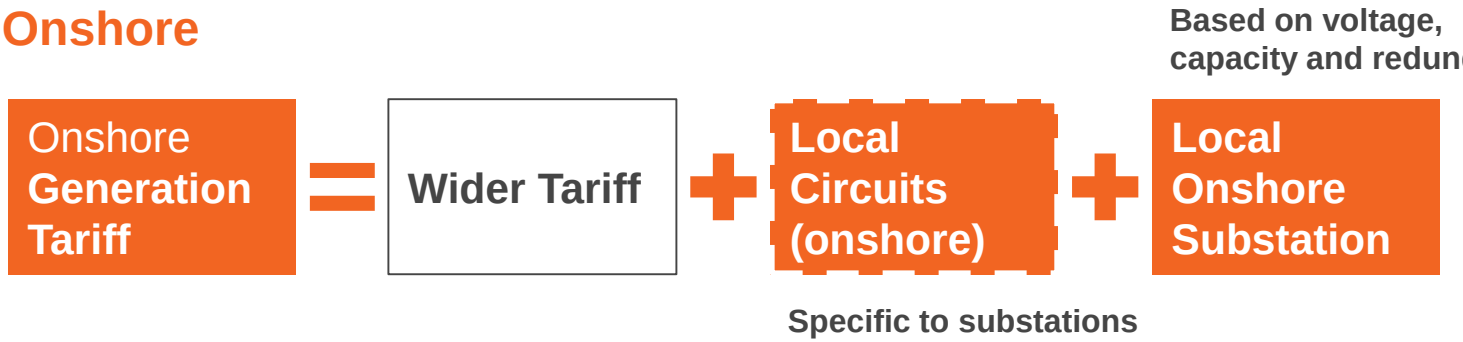


Local generation tariffs: Embedded generators



Final Generation Tariff

Onshore



Offshore

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Structure and Purpose of TNUoS Model

Transport Module

Calculates locational signals (on nodal basis)

Tariff Module

- **Aggregates locational signals from nodal to zonal tariffs**
- **Calculates residual tariffs**

Aim

- Cost reflectivity – quantifying incremental MW*km (cost) at each node
- Transparency – “contractual” background

Aim

- Stability & predictability - zones
- Recovery of total network costs - non-locational residual tariffs
- Target revenue recovery from generators and overall

Principles of locational signal

Please check our website if you are interested in the TNUoS model training

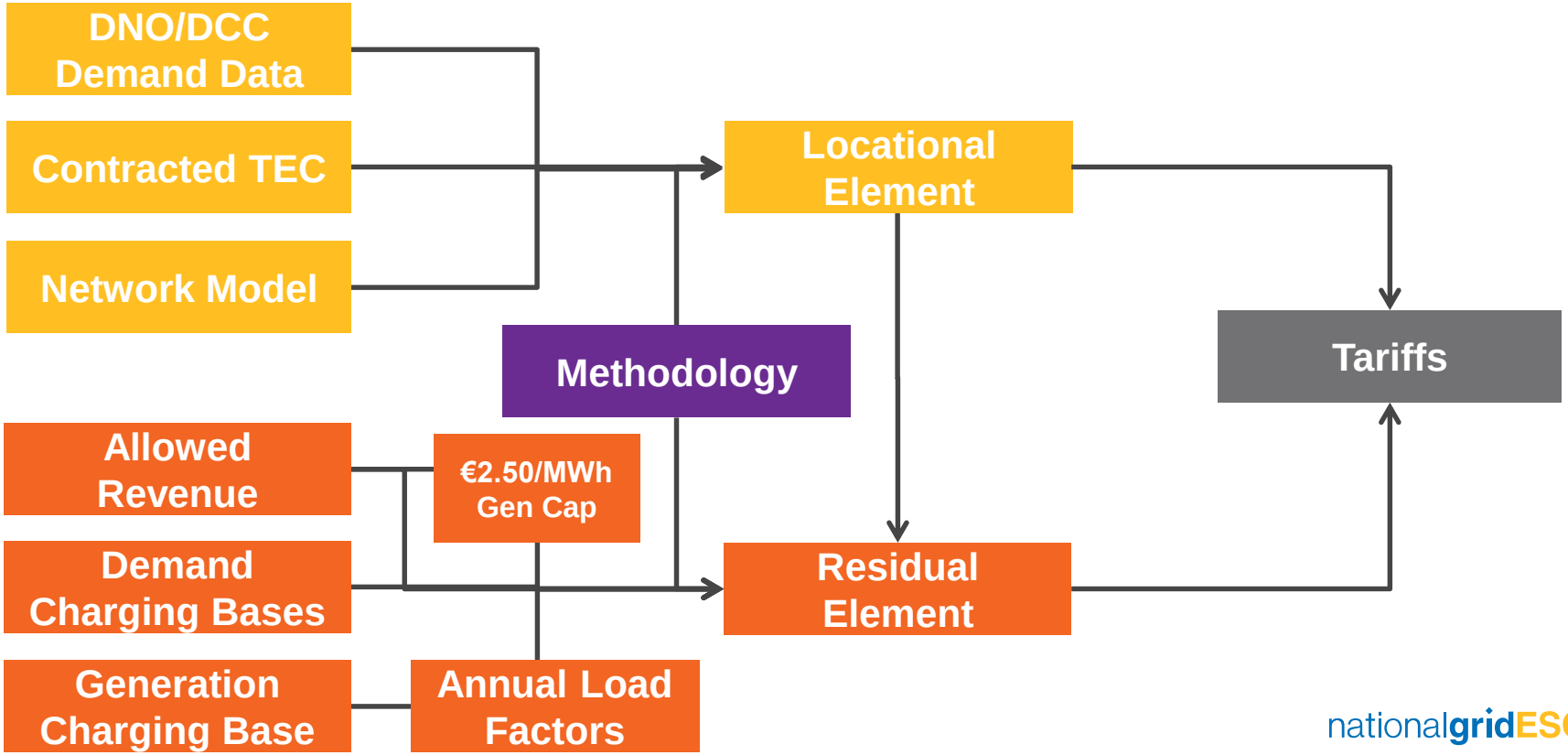
North: More Generation than Demand
Higher Generation Charges
Lower Demand Charges

South: More Demand than Generation
Lower Generation Charges
Higher Demand Charges

Flow of electricity under both backgrounds

Cost reflective signal reflects incremental network development to meet flows

Inputs in to TNUoS Tariffs



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TNUoS Charging and Billing

Jessica Rivalland

Paul Hitchcock

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Charging and Billing Agenda

1	TNUoS demand monthly forecasting
2	TNUoS monthly billing
3	TNUoS reconciliations
4	Credit monitoring and securities
5	Forecast monitoring
6	AAHEDC billing

TNUoS Demand Charges

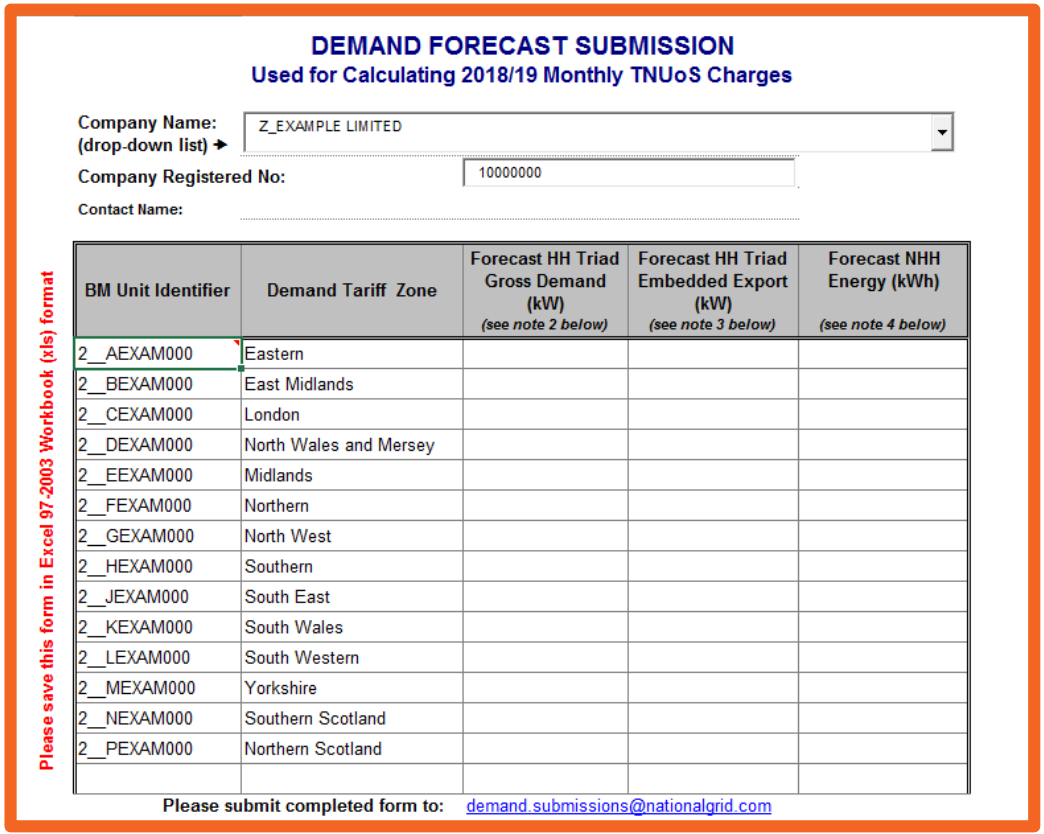
Demand TNUoS bills throughout the year are based on Supplier forecasts submitted in March

- Forecasts should be resubmitted when demand or consumption changes significantly
- The revised forecast must be received by the 10th of the month
- We send out quarterly reminders but you may submit forecasts more often

Forecasting Demand Submission Form

Demand submission forms need to be sent to the email address at the bottom of the form

The form can't be modified as our system can only accommodate this format



DEMAND FORECAST SUBMISSION

Used for Calculating 2018/19 Monthly TNUoS Charges

Company Name: (drop-down list) → Z_EXAMPLE LIMITED

Company Registered No: 10000000

Contact Name:

Please save this form in Excel 97-2003 Workbook (xls) format

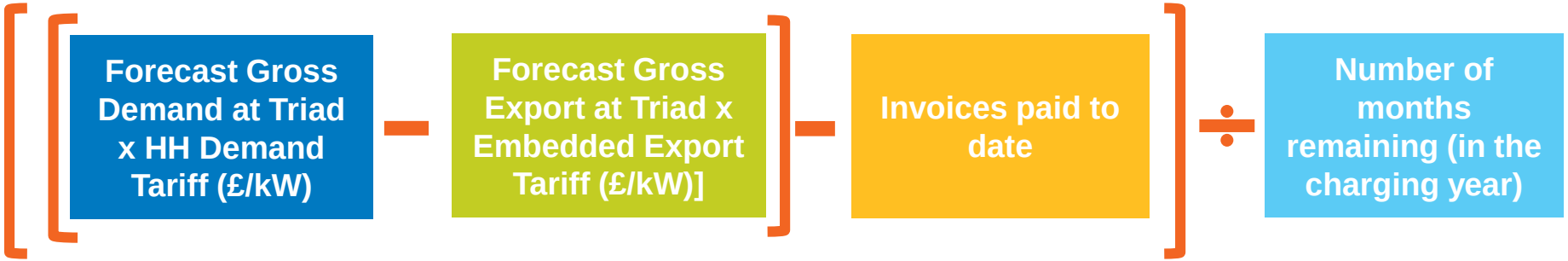
BM Unit Identifier	Demand Tariff Zone	Forecast HH Triad Gross Demand (kW) *(see note 2 below)*	Forecast HH Triad Embedded Export (kW) *(see note 3 below)*	Forecast NHH Energy (kWh) *(see note 4 below)*
2__AEXAM000	Eastern			
2__BEXAM000	East Midlands			
2__CEXAM000	London			
2__DEXAM000	North Wales and Mersey			
2__EEXAM000	Midlands			
2__FEXAM000	Northern			
2__GEXAM000	North West			
2__HEXAM000	Southern			
2__JEXAM000	South East			
2__KEXAM000	South Wales			
2__LEXAM000	South Western			
2__MEXAM000	Yorkshire			
2__NEXAM000	Southern Scotland			
2__PEXAM000	Northern Scotland			

Please submit completed form to: demand.submissions@nationalgrid.com

Half-Hourly Demand

Within year, suppliers are charged based on their forecast of Gross HH Demand and Exports over the Triads (kW)

Supplier monthly invoice:



HH exports will be netted off against HH demand, net credits are settled at the annual reconciliation. Monthly chargeable values cannot result in a credit to the supplier

Half-Hourly Demand Charging

Example 1

Forecast Gross Demand x Gross HH Demand Tariff (£/kW)	Forecast Gross Export x Gross HH Export Tariff (£/kW)	Monthly Invoice	Demand Reconciliation
100 kW x £45 = £4,500	10 kW x £30 = -£300	= £350 (£4,500-£300) 12	= £4,200

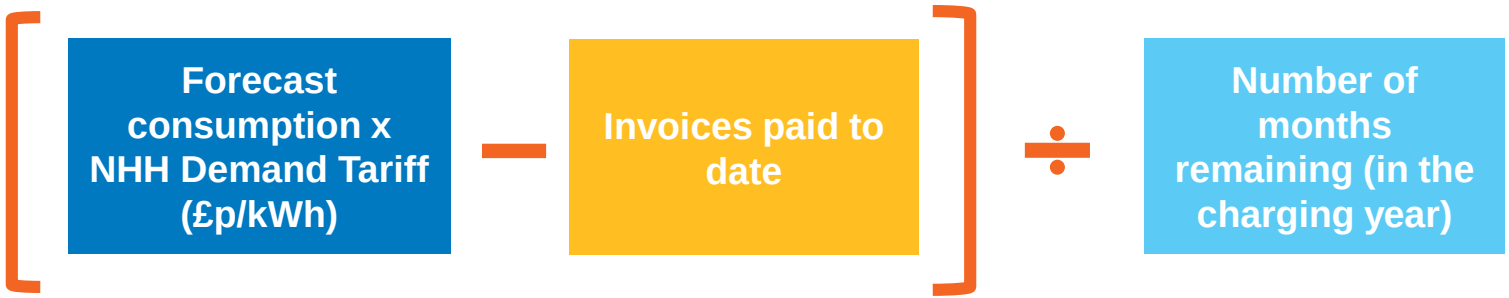
Example 2

Forecast Gross Demand x Gross HH Demand Tariff (£/kW)	Forecast Gross Export x Gross HH Export Tariff (£/kW)	Monthly Invoice	Demand Reconciliation
10 kW x £45 = £450	100 kW x £30 = -£3000	= £0 (£450 - £3000) 12	= -£2,550

Non Half-Hourly Consumption

Suppliers are charged based on their forecast of consumption between 16:00 – 19:00 (inclusive), every day of the year

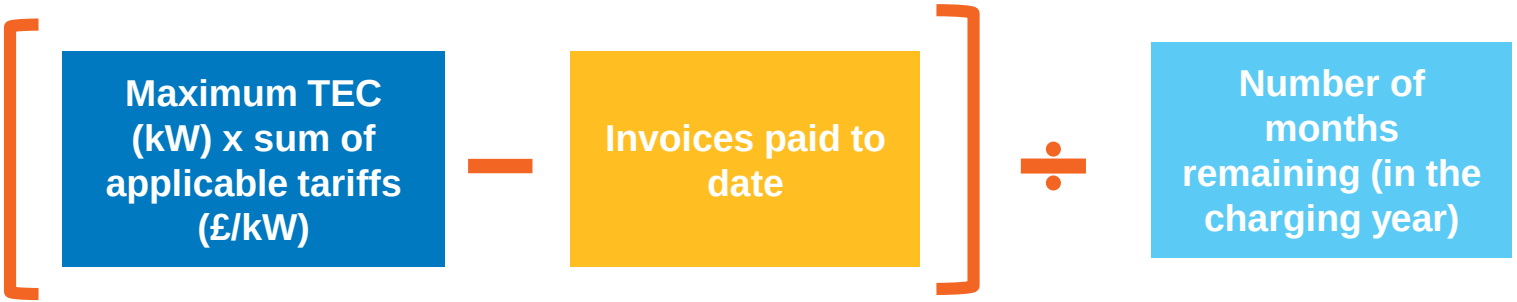
Supplier monthly invoice:



Generation Charging

Generation TNUoS is invoiced monthly on the basis of maximum Transmission Entry Capacity (TEC) within year

Generator monthly invoice:



TNUoS Billing Timeline

Monthly Invoices

Suppliers and Generators are billed on the 1st of every month and payable by the 15th

Reconciliations

Generation and Demand charges are reconciled annually but Demand charges are reconciled twice (interim / final metering)

Generation Reconciliation (April)

Charging year + 1 month

Initial Demand Reconciliation (June)

Charging year + 3 months

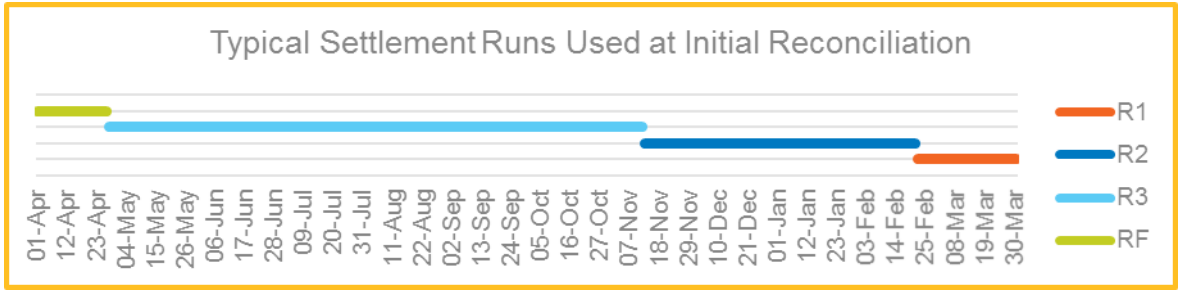
Final Demand Reconciliation (Autumn)

Charging year + 1 year

Supplier Reconciliations

Initial Demand Reconciliation (annually in June)

Charges are re-calculated using the latest available metering data and reconciled against invoices issued at monthly billing.



Final Demand Reconciliation (annually in autumn)

Charges are re-calculated using only **RF** settlement data and reconciled against invoices issued at initial reconciliation (14/15 months in arrears).

Supplier forecasts are reconciled using Elexon settlement data

Generation Reconciliation – 3 elements

1. **Annual liability is compared with the sum of invoices paid**

These values should be the same unless a generator increases TEC or connects late in March.

2. **Generators with negative tariffs**

Average output of the station's three highest generation peaks (between 1 November and the end of February) separated by 10 clear days. Reconciled against contracted TEC.

3. **Generators are also liable for Demand TNUoS charges if they take demand over Triads**

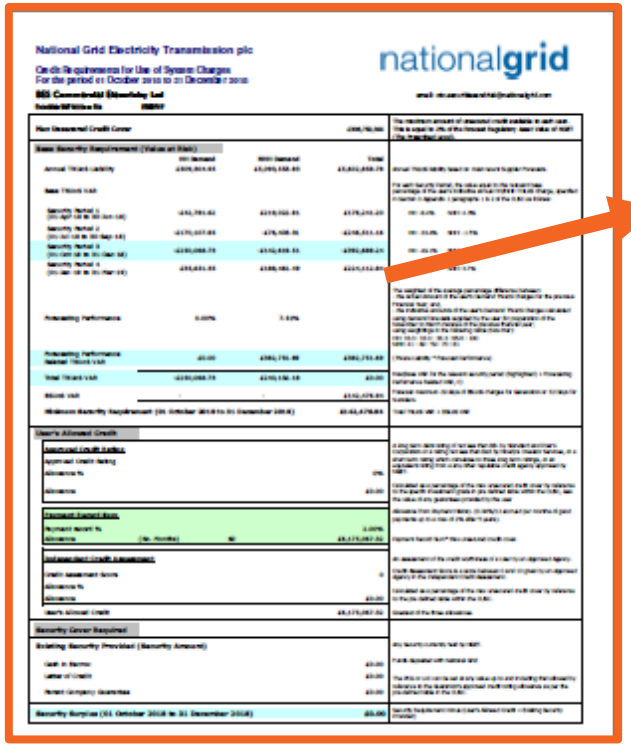
Credit Monitoring (1)

BSUoS and TNUoS liabilities must be secured (in line with Section 3, Part III of the CUSC)

- Suppliers secure 32 days of BSUoS charges and a small percentage of the annual liability arising from TNUoS charges (varying with each quarter of the charging year)
- Plus deemed HH and/or NHH performance error
- Generators secure 29 days of BSUoS charges

The value of security required is re-assessed at the start of each month and a statement is emailed to each customer.

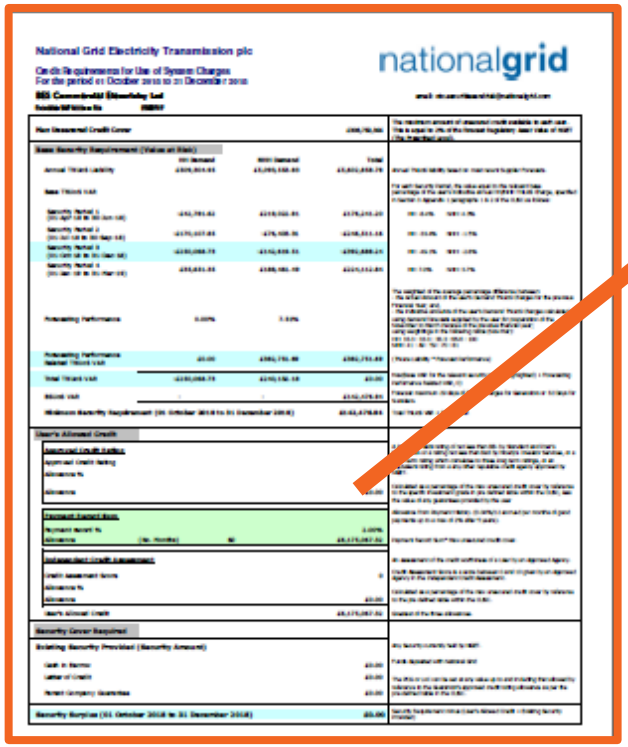
Credit Monitoring (2)



Base Security Requirement (Value at Risk)

	HH Demand	NHH Demand	Total
Annual TNUoS Liability	£509,304.95	£5,093,553.83	£5,602,858.78
Base TNUoS VAR			
Security Period 1 (01-Apr-18 to 30-Jun-18)	-£42,781.62	£219,022.81	£176,241.20
Security Period 2 (01-Jul-18 to 30-Sep-18)	-£170,107.85	-£76,403.31	-£246,511.16
Security Period 3 (01-Oct-18 to 31-Dec-18)	-£250,068.73	-£142,619.51	-£392,688.24
Security Period 4 (01-Jan-19 to 31-Mar-19)	£35,651.35	£188,461.49	£224,112.84
Forecasting Performance	0.00%	7.51%	
Forecasting Performance Related TNUoS VAR	£0.00	£382,751.69	£382,751.69
Total TNUoS VAR	-£250,068.73	£240,132.18	£0.00
BSUoS VAR	-	-	£142,476.94
Minimum Security Requirement (01 October 2018 to 31 December 2018)			**£142,476.94**

Credit Monitoring (3)


National Grid Electricity Transmission plc

Credit Requirements for Use of System Charges

For the period 01 October 2018 to 31 December 2018

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User's Allowed Credit			
Approved Credit Rating			
Approved Credit Rating			
Allowance %			0%
Allowance			£0.00
Payment Record Sum			
Payment record %			2.00%
Allowance	(No. Months)	60	£6,175,067.32
Independent Credit Assessment			
Credit Assesment Score			0
Allowance %			
Allowance			£0.00
User's Allowed Credit			£6,175,067.32
Security Cover Required			
Existing Security Provided (Security Amount)			
Cash in Escrow			£0.00
Letter of Credit			£0.00
Parent Company Guarantee			£0.00
Security Surplus (01 October 2018 to 31 December 2018)			**£0.00**

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Monitoring of Supplier Forecasts

Monthly process designed to monitor the accuracy of supplier demand forecasts (on which the charges are based)

Is the suppliers forecast consistent with:

- HH: The supplier's forecast at last year's Triad?
- This year's Settlement Period 35 average?

NHH: Compares the 'Annual Liability' arising from the supplier forecast against the liability arising from:

- This year's consumption to date vs the same period last year, scaled and extrapolated to the end of the charging year.

The supplier is contacted if the difference (HH and/or NHH) >20%

The CUSC (section 3.12 and 14.28)

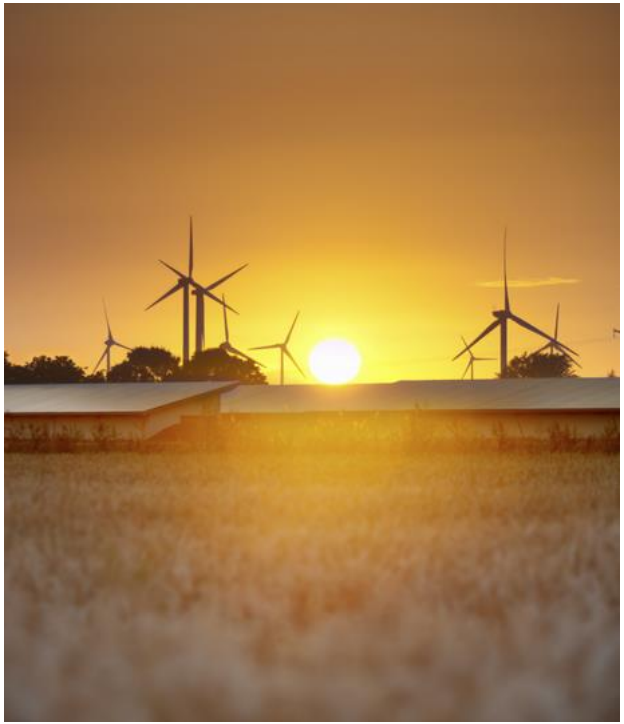
AAHEDC Charging

Assistance for Areas with High Electricity Distribution Costs

- Scheme introduced to provide assistance to areas with higher distribution costs
- All supplier BMU units are liable for the charge
- Invoiced quarterly
- Suppliers are charged based on their consumption in the previous quarter multiplied by tariff

Tariff published annually

- Draft tariff in March
- Final tariff in July, effective 1st April retrospectively



TNUoS publications, engagement and resources

Paul Wakeley

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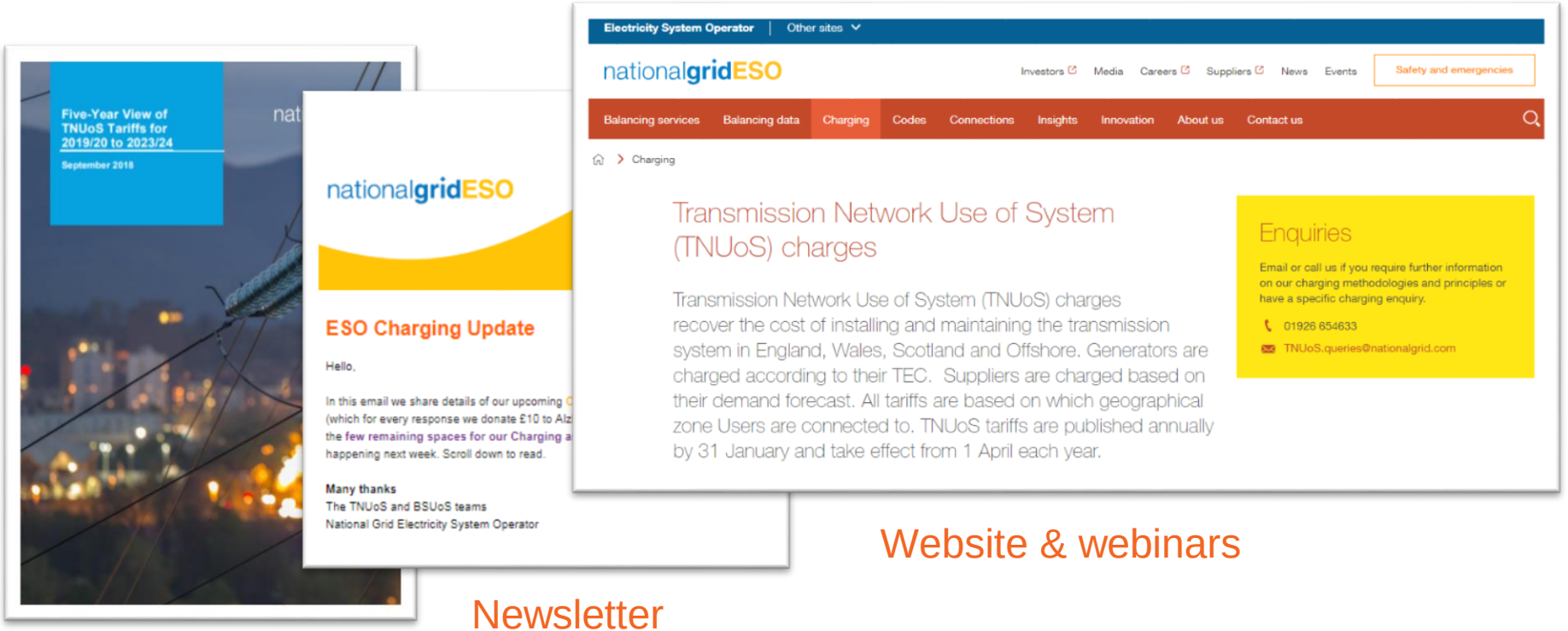
Our engagement timetable and resources



Website & webinars

Newsletter

Quarterly publications

Upcoming dates for your diary

- **2019/2020 Draft Tariffs Webinar:** 12 December 10:30 - 11:30am
- **TNUoS Transport & Tariff Model training:** 5 December 10:00am - 2:00pm

Registration links can be found on our website and are advertised in our newsletters

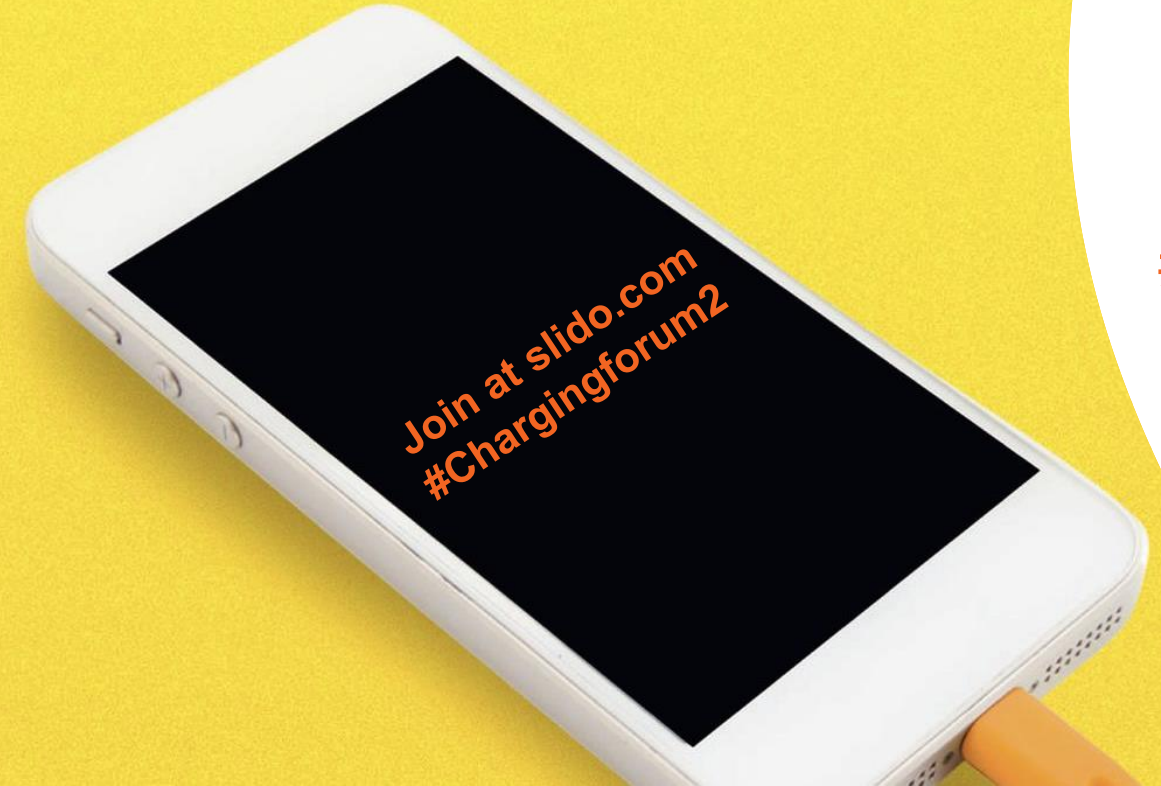
If you're not currently receiving newsletters and would like to subscribe, email us

TNUoS.queries@nationalgrid.com

https://www.nationalgrideso.com/TNUoS

Telephone: 01926 654633

Questions?



Join at slido.com

#Chargingforum2

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Lunch

45 minutes

Speak to our subject matter experts

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Speak to our subject matter experts

Balancing Services Use of System Charging (BSUoS)

Nick Everitt

Cristian Ebau

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BSUoS Agenda

1	BSUoS Overview
2	BSUoS Forecasting and Reporting
3	BSUoS Billing
4	Ancillary Service & Trades
5	Questions

Commercial Performance Review team

Mat Hofton

Forecast and report BSUoS costs and charges for current financial year and the next two years. Publish OPMR data and generation availability.

Jon McDonald

Cristian Ebau

Lisa Chennells

Harry Shearer

BSUoS reporting and forecasting

OPMR publication

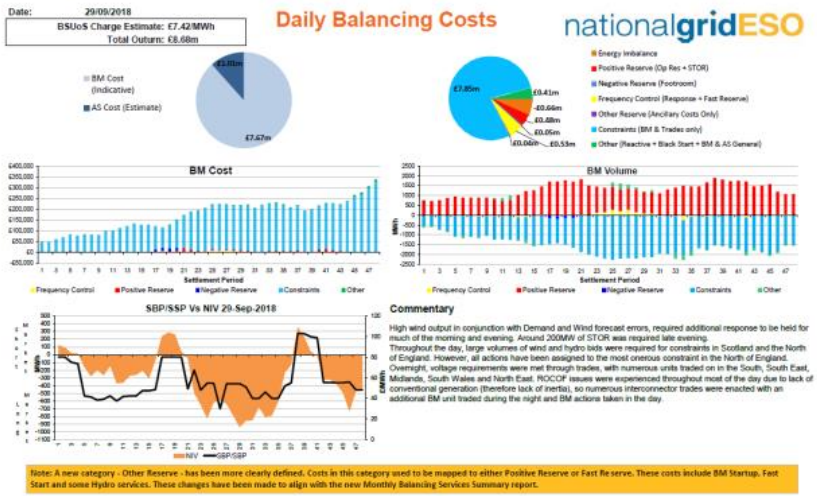
BSUoS Forecasting and Reporting Agenda

1	Daily Report
2	Monthly Balancing Services Summary
3	BSUoS Monthly Forecast Report
4	BSUoS Forecast Error (Jul - Sep)
5	Customer Journey
6	Feedback

Daily Balancing Cost Report

- Launched on 5 January 2018
- Some revisions – mostly visual
- Request for one data file – rolling BSUoS

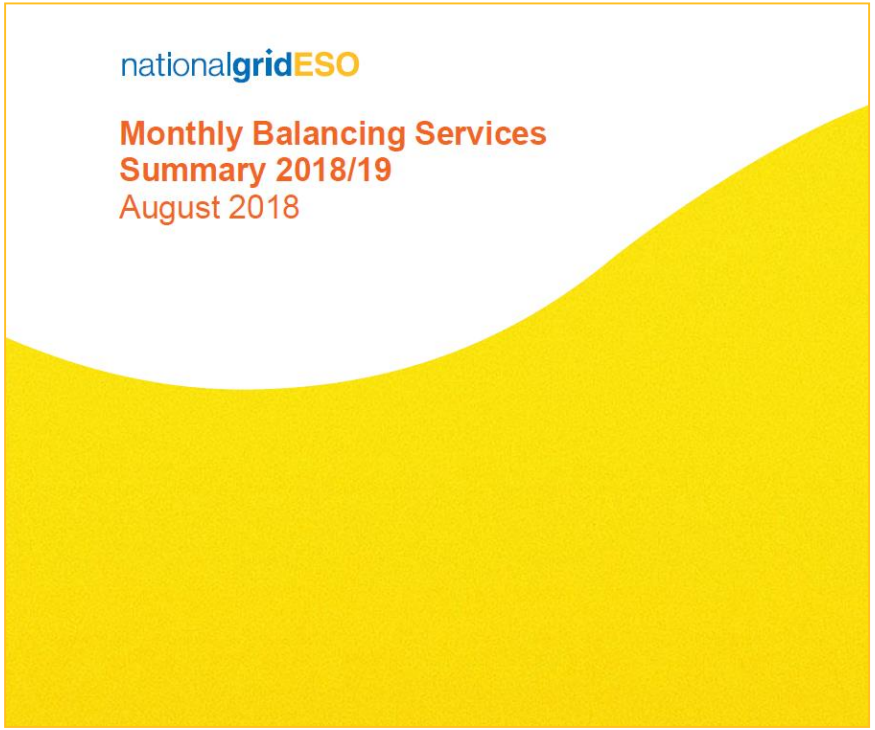
- Feedback request
  - Is narrative / graphs useful?
  - Level of detail?
  - Are all elements clear?
  - Anything else



Monthly Balancing Services Summary

- Launched in May 2018 – April report
- Redesigned using Customer Journey feedback
- Structure designed to flow through each service
- Increased level of cost/volume breakdown

- Feedback request
  - Level of detail?
  - Are all elements clear?
  - Anything else



BSUoS Monthly Forecast Report

- Launched in June 2018
- Customer Journey deliverable
- Cost breakdown changes

- Feedback request
  - Level of detail?
  - Are all elements clear?
  - Timescale (8th business day)
  - Anything else

BSUoS Outturn

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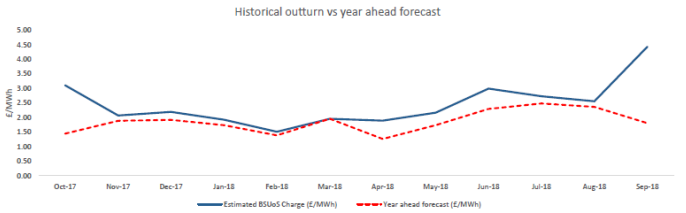
Average BSUoS charge	£/MWh
Sep-18	4.43
Past 12 months	2.41
2017/18	2.31

Outturn costs for September were significantly higher than forecast. Whilst some provision was made in the forecast for increased constraint costs due to HVDC fault, additional network outages were accommodated which further increased constraint costs, however these outages were required to optimise the system for October onwards.

NOTE: Cost categories have been adjusted to align with the daily cost reports and MBSS.

The blue line on the chart shows the estimated monthly average BSUoS charge for the past 12 months. The red line shows our forecast for each month, made at year ahead. The table shows a breakdown of the elements that make up the BSUoS charge (including volume), broken down by cost category. The total cost divided by the volume gives the estimated average charge.



Month	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18
Energy Imbalance	-2.8	-3.1	5.1	-1.9	-3.0	3.3	-5.7	-6.8	-2.8	-1.1	-3.9	-0.6
Operating Reserve	6.0	6.1	9.0	8.6	9.2	15.9	4.1	4.4	3.5	4.8	4.7	5.6
STOR	6.2	8.9	9.4	9.4	8.6	8.1	6.1	7.0	6.6	7.4	6.7	5.7
Constraints - E&W	10.0	16.3	9.8	12.3	4.0	14.2	9.1	20.3	33.3	37.3	32.3	78.4
Constraints - Cheviot	54.6	15.5	19.2	11.9	5.4	2.3	13.2	1.5	7.8	1.4	1.6	18.2
Constraints - Scotland	2.9	7.1	5.2	5.4	2.8	1.4	0.4	2.1	6.3	0.2	1.3	4.1
Constraints - AS	1.7	2.7	1.9	0.5	0.4	3.7	2.7	0.9	3.8	0.2	0.3	1.3
Negative Reserve	0.8	0.6	0.1	0.9	0.1	0.4	0.4	2.1	0.4	0.6	0.4	0.4
Fast Reserve	7.6	7.0	7.7	8.1	6.9	7.8	6.5	6.5	6.0	7.6	8.2	7.0
Response	11.4	10.3	11.4	10.4	9.3	11.6	11.0	12.2	11.5	10.5	10.7	11.3
Other Reserve	1.6	1.2	1.3	1.6	1.2	1.1	0.8	0.9	0.8	1.2	1.2	1.1
Reactive	6.3	6.2	6.7	6.6	5.7	5.9	6.5	7.1	7.4	6.6	6.7	6.2
Minor Components	3.3	0.9	2.1	1.8	1.6	1.2	1.4	1.0	1.2	1.2	2.1	1.4
Black Start	4.6	3.5	4.5	3.8	3.4	3.7	3.4	3.7	3.2	3.1	3.6	3.7
Total BSUos	114.0	83.4	93.4	79.4	55.3	80.7	59.8	62.9	89.0	80.8	75.9	143.6
Estimated BSUos Vol (TWh)	41.5	47.2	49.2	48.9	45.4	48.7	40.4	37.0	35.3	36.0	36.4	36.2
Estimated Internal BSUos(£m)	14.0	13.5	14.0	14.0	12.6	14.0	15.6	16.1	15.6	16.1	16.1	15.6
Estimated NGET Profit/(Loss)	0.8	0.8	0.8	0.8	0.8	0.8	1.2	1.3	1.2	1.3	1.3	1.2
Estimated BSUoS Charge (£/MWh)	3.11	2.07	2.20	1.93	1.51	1.96	1.90	2.17	3.00	2.73	2.56	4.43
Year ahead forecast (£/MWh)	1.45	1.89	1.92	1.74	1.39	1.96	1.27	1.74	2.30	2.49	2.37	1.81

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BSUoS Forecast Error

July 2018

- Cost: +£0.5m
- Vol: 0 TWh
- Charge: +£0.02 (0.7%)

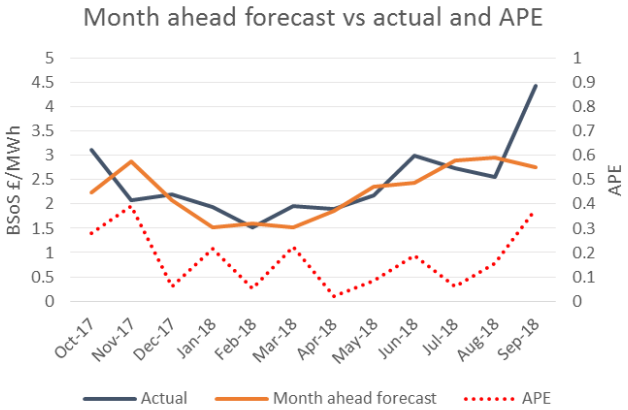
August 2018

- Cost: -£13.3m
- Vol: +0.7 TWh
- Charge: -£0.40 (15%)

September 2018

- Cost: +£57.7m
- Vol: -1.2 TWh
- Charge: +£1.68 (38%)

Month Ahead Forecast Error



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Customer Journey

Day Ahead BSUoS Forecast

- Half-hourly forecast
- Published by 8am, day -1
  - Saturday – Monday (published Friday)

Customer Portal

- Successful trial
- CRM (Customer Relationship Management)
- All ESO published information in one place

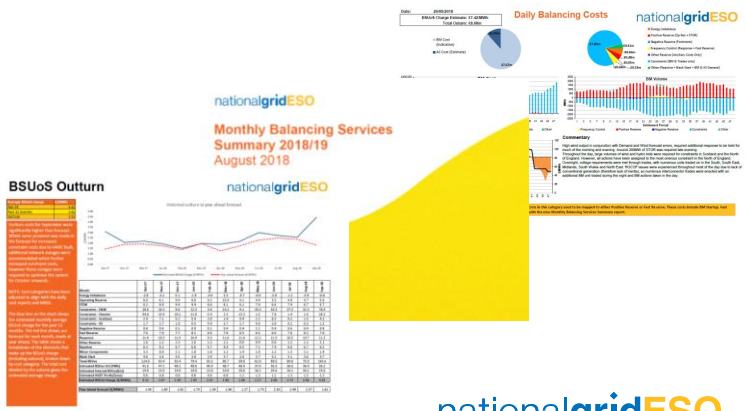
Feedback

1. Which of these reports are you aware of?
2. How useful have these reports been in informing business decisions?
3. To what level do you understand the content of the reports?
4. How likely are you to recommend these reports to a friend or colleague?
5. Do you have any other feedback on the reports?

Poll questions

Go to: sli.do
Event code:
#Chargingforum2

Respond to the 5 questions



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Settlements Team

Paul Lowbridge

Settlements Manager
BSUoS Charging,
Settlement of Ancillary
Services and Trades

Nick Everitt

Rachel Payne

Joanne Barker

Tariq Hakeem

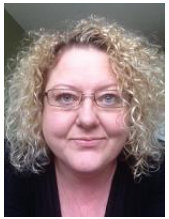
Gabriel Griffin-Booth

Theresa Greaves

Manpreet Patel

Craig Perks

Karen Sawbridge



Rachel Hanlon

Bea Ennim

Julie Bubb

Mohammad Razaq

Ancillary Service Settlement | **BSUoS Charging** | **Trading Settlement** | **Projects**

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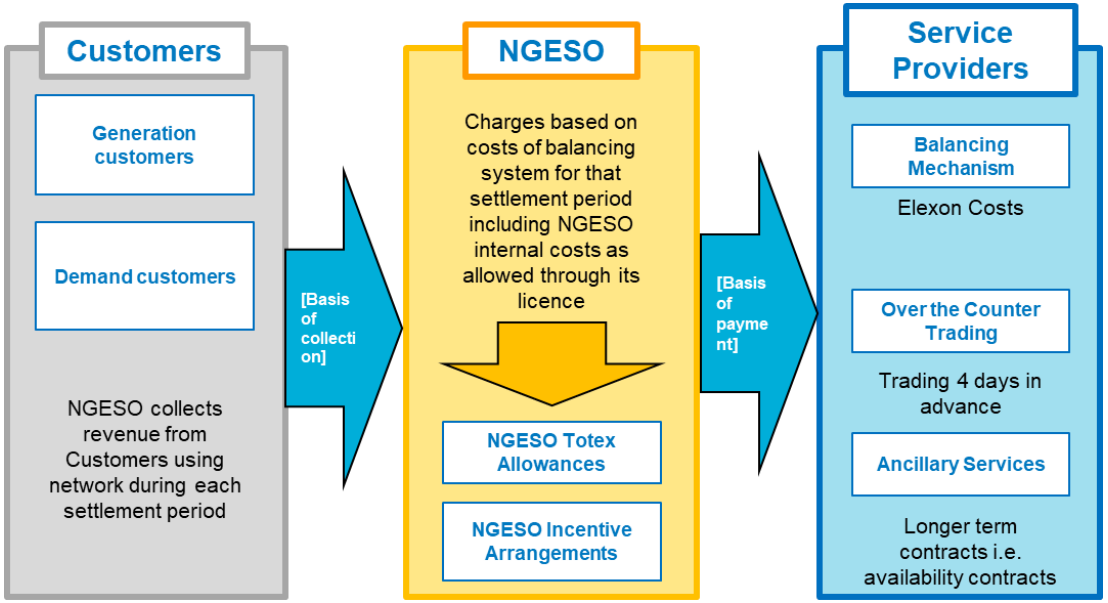
What are BSUoS Charges and who pays them?

The BSUoS charge recovers the cost of day-to-day operation of the transmission system

Generators and suppliers are liable for these charges, which are calculated daily as a flat tariff for all users. BSUoS charges depend on the balancing actions that we take each day, but we provide a monthly forecast of BSUoS.

Run type	Definition	When billed
II	Interim Initial	Settlement Day + 5 working days (no invoice sent)
SF	Settlement Final	Daily, Settlement Day + 16 working days
RF	Reconciliation Final	Daily, Settlement Day + 14 months



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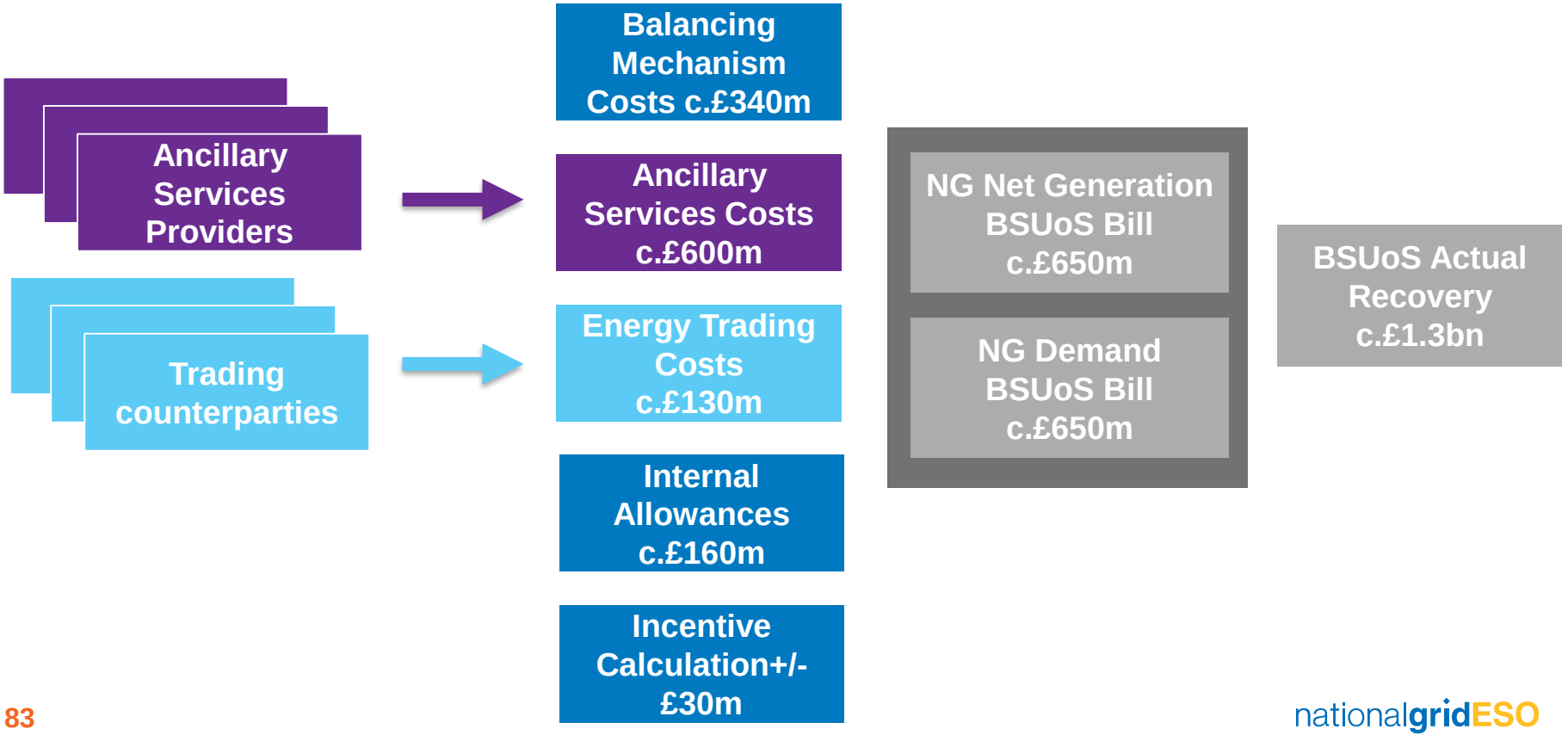
What are BSUoS Charges Comprised of?



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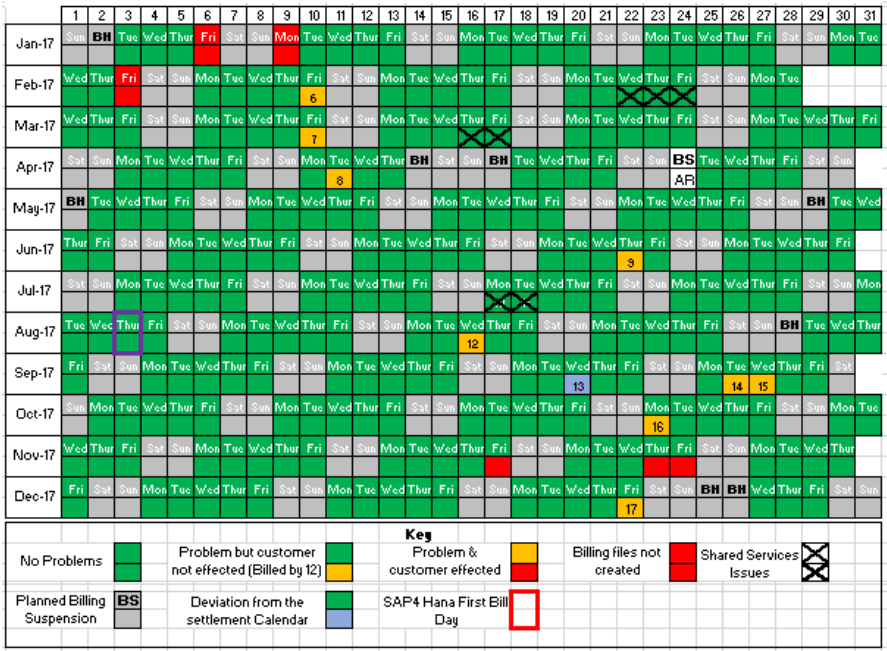
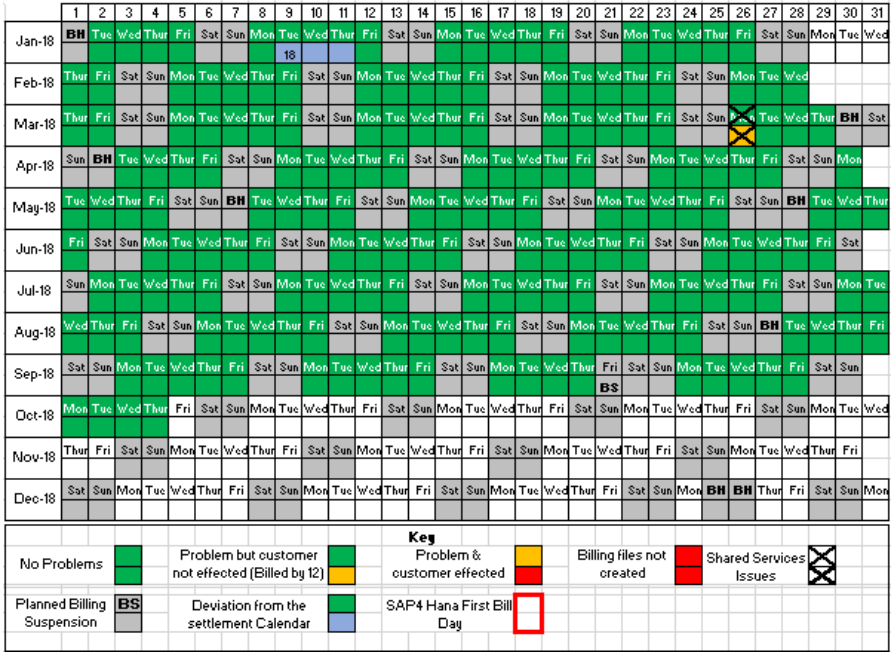
BSUoS Billing Performance

2017



2018



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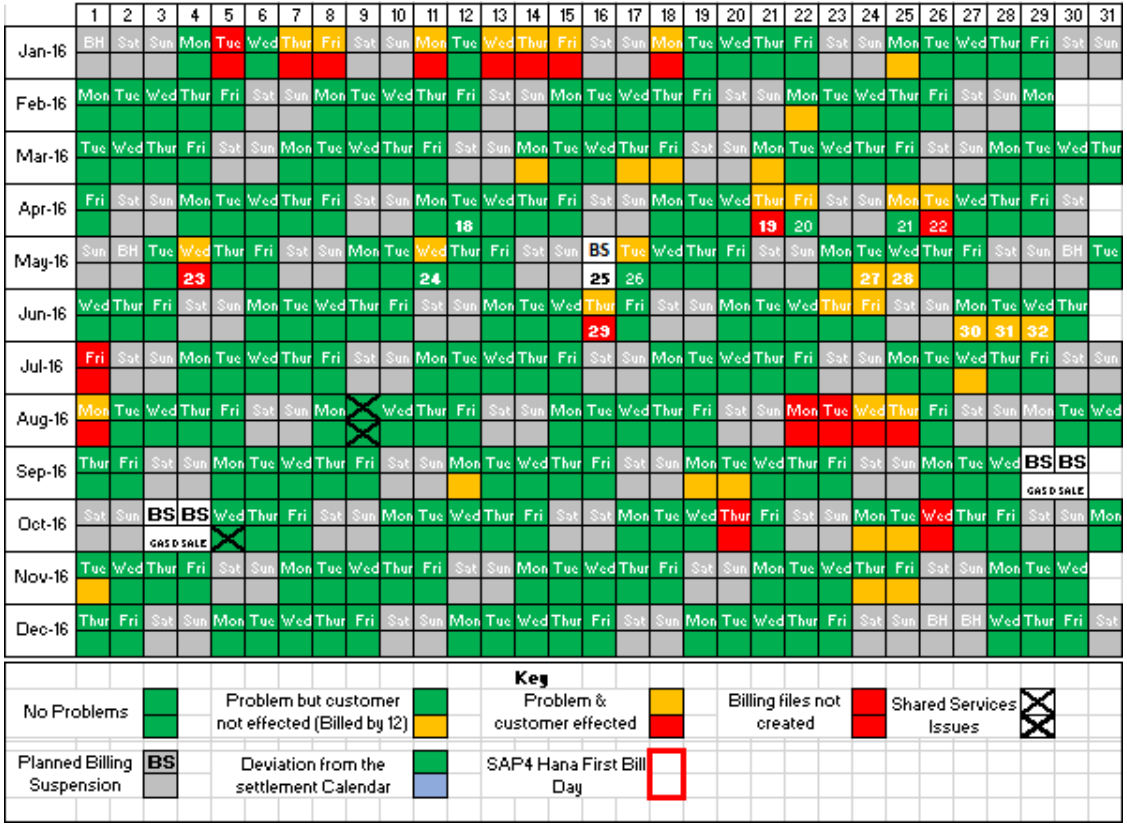
Flash Back to 2016



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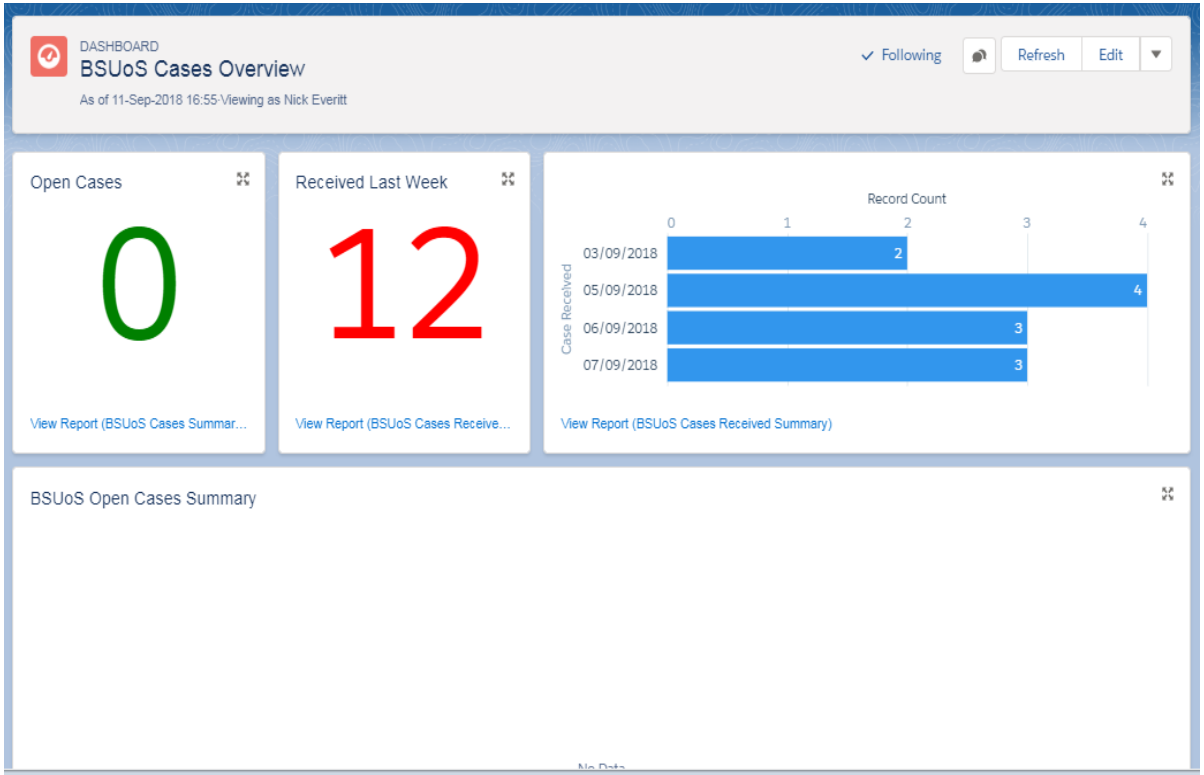
Query Management



- Zero open queries for first time ever in September
- New system from July 2018
- YTD 100% Acknowledged within 1 *business* day
- Aug/Sep 2018 - 100% of queries closed in 14 days
- Since July 100% Positive feedback from Surveys

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Developments

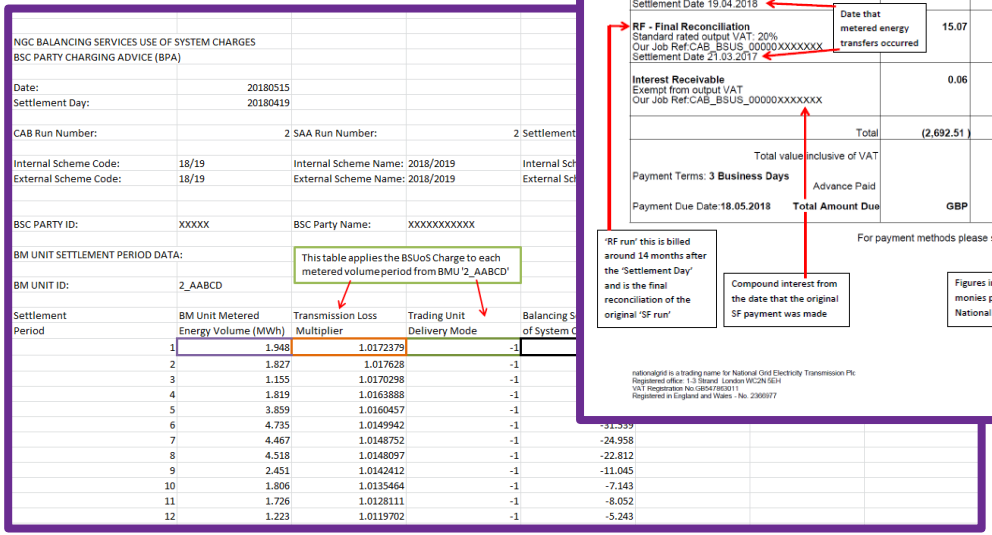
In place

- Salesforce CRM
- Website Changes

Upcoming

- Bank details and DD mandate changes
- Charging Contact Details
- BCR Report/CAB Changes
- Business Services SAP Upgrade

BSUoS Data Sources



NGC BALANCING SERVICES USE OF SYSTEM CHARGES
BSC PARTY CHARGING ADVICE (BPA)

Date: 20180515
Settlement Day: 20180419

CAB Run Number: 2 SAA Run Number: 2 Settlement

Internal Scheme Code: 18/19 Internal Scheme Name: 2018/2019 Internal Sch
External Scheme Code: 18/19 External Scheme Name: 2018/2019 External Sc

BSC PARTY ID: XXXXX BSC Party Name: XXXXXXXXXXX

BM UNIT SETTLEMENT PERIOD DATA:

This table applies the BSUoS Charge to each metered volume period from BMU '2_AABCD'

BM UNIT ID: 2_AABCD

Settlement Period	BM Unit Metered Energy Volume (MWh)	Transmission Loss Multiplier	Trading Unit Delivery Mode	Balancing S of System C
1	1.948	1.0172379	-1	
2	1.827	1.017628	-1	
3	1.155	1.0170298	-1	
4	1.819	1.0163888	-1	
5	3.859	1.0160457	-1	
6	4.735	1.0149942	-1	-51.539
7	4.467	1.0148752	-1	-24.958
8	4.518	1.0148097	-1	-22.812
9	2.451	1.0142412	-1	-11.045
10	1.806	1.0135464	-1	-7.143
11	1.726	1.0128111	-1	-8.052
12	1.223	1.0119702	-1	-5.243

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BSUoS Account Number

SALES INVOICE

Company Name
Street Address
City
Postcode

Invoice Number → Your account number: XXXXXXX
Document Number: XXXXXXXXXXX
(Please quote in all enquiries)

Notification Date (Date invoice issued) → Date:15.05.2018
Your Order Ref:BSUoS Charges

'SF run' this is billed 16 days after the 'Settlement Day'

THIS IS A VAT INVOICE

Please see final page for enquiry information

Description	Value	VAT Amount
SF - Initial Settlement Standard rated output VAT: 20% Our Job Ref:CAB_BSUS_00000XXXXXXX Settlement Date 19.04.2018	(2,707.64)	(541.52)
RF - Final Reconciliation Standard rated output VAT: 20% Our Job Ref:CAB_BSUS_00000XXXXXXX Settlement Date 21.03.2017	15.07	3.01
Interest Receivable Exempt from output VAT Our Job Ref:CAB_BSUS_00000XXXXXXX	0.06	0.00
Total	(2,692.51)	(538.51)
Total value inclusive of VAT		(3,231.02)
Payment Terms: **3 Business Days** Advance Paid		0.00
Payment Due Date:**18.05.2018** **Total Amount Due**	GBP	(3,231.02)

Date that metered energy transfers occurred

For payment methods please see final page

'RF run' this is billed around 14 months after the 'Settlement Day' and is the final reconciliation of the original 'SF run'

Compound interest from the date that the original SF payment was made

Figures in brackets are monies paid to you by National Grid

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Registered office: 1-3 Strand London WC2N 5EH
VAT Registration No:GB547950311
Registered in England and Wales - No. 2366977

page 1 of 2

Settlement Day	Settlement Period	BSUoS Price (£/MWh Hour)	Half-hourly Charge	Total Daily BSUoS Charge	Run Type
26/09/2018	25	3.47114	91280.98512	9,421,272.39	II
26/09/2018	26	2.84174	73691.34808	9,421,272.39	II
26/09/2018	27	3.48438	89853.10081	9,421,272.39	II
26/09/2018	28	3.91878	100553.23	9,421,272.39	II
26/09/2018	29	4.12649	105938.2636	9,421,272.39	II
26/09/2018	30	4.16213	107005.8234	9,421,272.39	II
26/09/2018	31	2.56337	65478.92835	9,421,272.39	II
26/09/2018	32	2.21720	59226.48939	9,421,272.39	II
26/09/2018	33	2.91378	83245.03375	9,421,272.39	II
26/09/2018	34	2.54998	76558.55954	9,421,272.39	II
26/09/2018	35	1.66420	51770.00017	9,421,272.39	II
26/09/2018	36	2.55942	81382.59438	9,421,272.39	II
26/09/2018	37	3.83798	123067.1699	9,421,272.39	II
26/09/2018	38	4.20699	136490.1532	9,421,272.39	II
26/09/2018	39	5.81223	193681.754	9,421,272.39	II
26/09/2018	40	4.49342	149520.7073	9,421,272.39	II
26/09/2018	41	4.77589	155692.1514	9,421,272.39	II
26/09/2018	42	3.26165	102557.1047	9,421,272.39	II
26/09/2018	43	2.74101	83049.12192	9,421,272.39	II
26/09/2018	44	2.87808	81762.82788	9,421,272.39	II
26/09/2018	45	3.69546	97749.90587	9,421,272.39	II
26/09/2018	46	4.71192	115004.2084	9,421,272.39	II
26/09/2018	47	8.98547	203070.0945	9,421,272.39	II
26/09/2018	48	11.73666	248456.2897	9,421,272.39	II

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Charging and Billing System Improvement

We are working on a new price file which will be issued alongside the existing reports via the FTP server. The price file will contain II, SF and RF daily price data.

The Balancing Services Charging Report (BCR) will be revamped to include:

Section 1
Summary of costs by daily and year to date category.

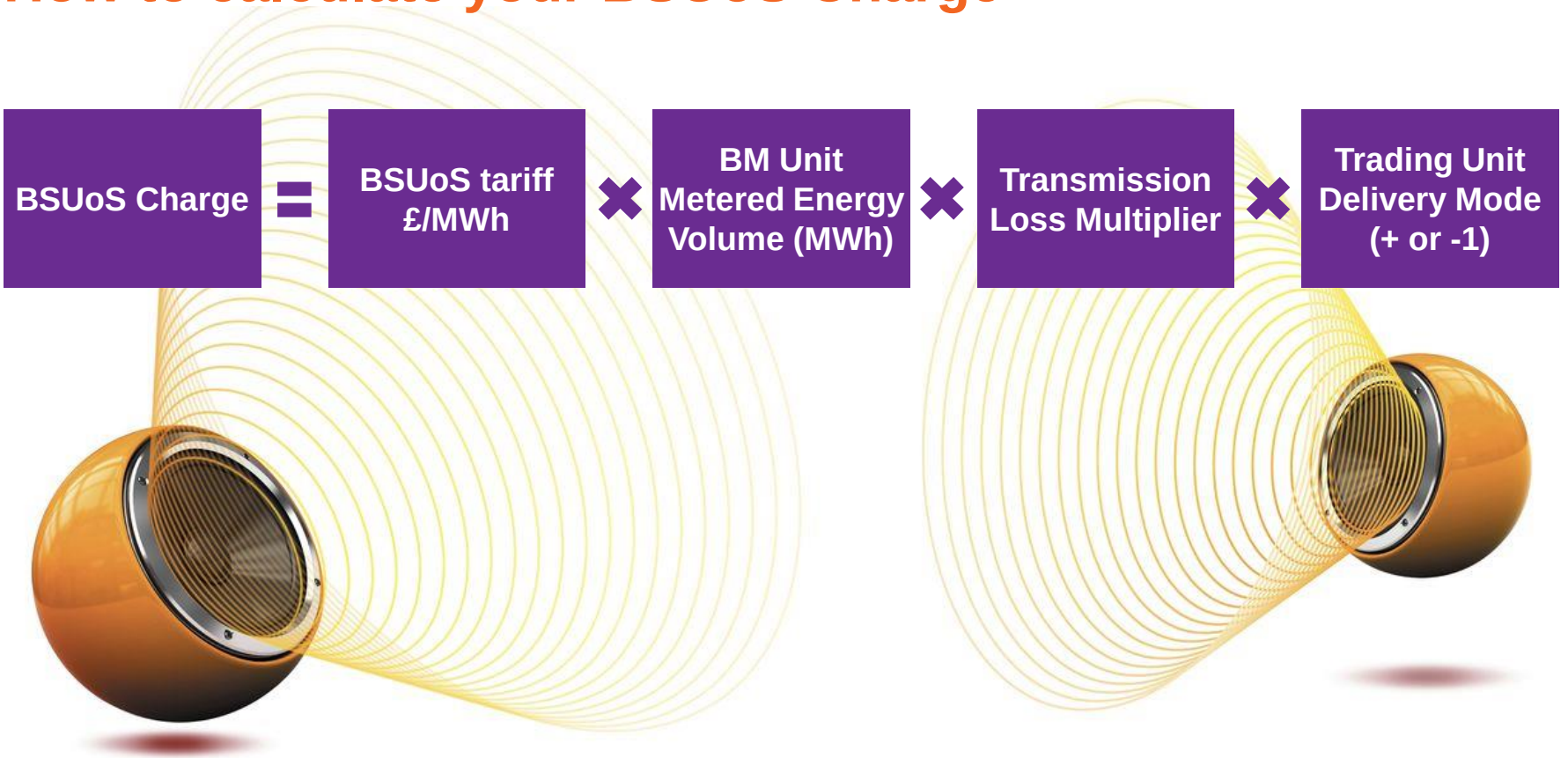
Section 2
Shows the costs and price by SP (already shown on the existing BCR report).

Section 3
More granular costs by settlement period. Will enable users to see different cost components and model future prices.

- A draft of the new reports will be issued in November
- On go-live there will be a period of parallel run when both new and old BCR reports are generated
- January 2019 is the plan for go-live of the new reports

How to calculate your BSUoS Charge

BSUoS Charge = **BSUoS tariff £/MWh** × **BM Unit Metered Energy Volume (MWh)** × **Transmission Loss Multiplier** × **Trading Unit Delivery Mode (+ or -1)**



BPA report backing data (1/4)

NGC BALANCING SERVICES USE OF SYSTEM CHARGES							
BSC PARTY CHARGING ADVICE (BPA)							
Date:	20180515						
Settlement Day:	20180419						
CAB Run Number:	2	SAA Run Number:	2	Settlement Run Type:	SF	NGC Version Id:	1
Internal Scheme Code:	18/19	Internal Scheme Name:	2018/2019	Internal Scheme Day:	19		
External Scheme Code:	18/19	External Scheme Name:	2018/2019	External Scheme Day:	19		
BSC PARTY ID:	XXXXX	BSC Party Name:	XXXXXXXXXXX				
BSC PARTY BALANCING SERVICES USE OF SYSTEM CHARGE (£):	-2,707.64						

This will either be for the II, SF or RF run

Lead Party ID

Company Name

Total SF Charge

Backing data is available to download in four different formats

pdf, .dat, .prt and .csv which is shown above

BPA report backing data (2/4)

BM UNIT SETTLEMENT DAY CHARGES:	
BM Unit Id	Balancing Services Use of System Charge(£)
2_AABCD	-358.09
2_BABCD	-144.38
2_CABCD	0
2_DABCD	-244.15
2_EABCD	-334.54
2_FABCD	-307.34
2_GABCD	-21.61
2_HABCD	-318.25
2_JABCD	-66.23
2_KABCD	-242.71
2_LABCD	-202.51
2_MABCD	-474.6
2_NABCD	-26.65
2_PABCD	33.42
C_DBCDE	0
C_FBCDE	0

BSC PARTY BALANCING SERVICES USE OF SYSTEM CHARGE	-2,707.64

This is a list of each BMU's individual BSUoS charges for this settlement day.

Breakdown of BSUoS charge per BMU

This section of the BPA file will show a list of every BMU owned by the BSC Party ID/ Lead Party ID, including directly connected & embedded BMU's as well as the supplier BMU's shown to the left.

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BPA report backing data (3/4)

NGC BALANCING SERVICES USE OF SYSTEM CHARGES
BSC PARTY CHARGING ADVICE (BPA)

Date:	20180515						
Settlement Day:	20180419						
CAB Run Number:	2	SAA Run Number:	2	Settlement Run Type:	SF	NGC Version Id:	1
Internal Scheme Code:	18/19	Internal Scheme Name:	2018/2019	Internal Scheme Day:	19		
External Scheme Code:	18/19	External Scheme Name:	2018/2019	External Scheme Day:	19		
BSC PARTY ID:	XXXXX	BSC Party Name:	XXXXXXXXXXX				

The rest of the BPA file will show how the BSUoS Charge was applied to each BMU

BM UNIT SETTLEMENT PERIOD DATA:

This table applies the BSUoS Charge to each metered volume period from BMU '2_AABCD'

BM UNIT ID: 2_AABCD

Settlement Period	BM Unit Metered Energy Volume (MWh)	Transmission Loss Multiplier	Trading Unit Delivery Mode	Balancing Services Use of System Charge (£)
1	1.948	1.0172379	-1	**-13.782**
2	1.827	1.017628	-1	-12.364
3	1.155	1.0170298	-1	-7.924
4	1.819	1.0163888	-1	-13.429
5	3.859	1.0160457	-1	-23.641
6	4.735	1.0149942	-1	-31.539
7	4.467	1.0148752	-1	-24.958

Useful calculation

BSUoS Charge Calculation

BSUoS Price £/MWh x BM Unit metered Energy Volume (MWh) x Transmission Loss Multiplier x Trading Unit Delivery Mode (+ or – 1) = **BSUoS Charge for Settlement Period**

£6.9953 x 1.948 x 1.0172379 x -1
= **-£13.782**

BPA report backing data (4/4)

BM UNIT SETTLEMENT PERIOD DATA:				
BM UNIT ID:	2_PABCD			
Settlement Period	BM Unit Metered Energy Volume (MWh)	Transmission Loss Multiplier	Trading Unit Delivery Mode	Balancing Services Use of System Charge (£)
1	0.879	0.9677364	1	5.916
2	0.934	0.967474	1	6.009
3	0.927	0.9677468	1	6.051
4	0.969	0.9682556	1	6.815
5	0.986	0.968559	1	5.758
6	0.869	0.9690831	1	5.526
7	0.896	0.9692148	1	4.781
8	0.939	0.9693277	1	4.529
9	0.909	0.9696446	1	3.916
10	0.949	0.9702299	1	3.593
11	0.873	0.9708463	1	3.904
12	0.941	0.9712337	1	3.871
13	0.766	0.971835	1	2.821
14	0.678	0.9890128	-1	-1.438
15	0.64	0.9886449	-1	-0.553
16	0.728	0.9885363	-1	-0.683

Example: Charge to credit

This is a good example of how the BM unit metered volume stays more or less the same, but the charges flip to a credit due to the trading unit delivery mode changing at the Settlement Period 14.

What makes up the BSUoS Charge

The following section gives the pricing information for how the BSUoS Charge is calculated, more detail for these components can be found in the daily BCR files

NGC BALANCING SERVICES USE OF SYSTEM CHARGES
BSC PARTY CHARGING ADVICE (BPA)

Date:	20180515						
Settlement Day:	20180419						
CAB Run Number:	2	SAA Run Number:	2	Settlement Run Type:	SF	NGC Version Id:	1
Internal Scheme Code:	18/19	Internal Scheme Name:	2018/2019	Internal Scheme Day:	19		
External Scheme Code:	18/19	External Scheme Name:	2018/2019	External Scheme Day:	19		

SETTLEMENT PERIOD CHARGING COMPONENTS:

The components of this table make up the Total BSUoS Charge amount by settlement period for this this settlement day

Settlement Period	Internal Balancing Services Use of System Charge (£)	External Balancing Services Use of System Charge (£)	Settlement Period Balancing Services Use of System Charge (£)	Total Adjusted Energy Volume (MWh)	Balancing Services Price (MWh)
1	9,064.33	145,241.84	154,306.16	22,185.40	6.9553
2	8,979.61	137,166.47	146,146.08	21,976.53	6.6501
3	8,910.78	138,168.23	147,079.02	21,804.42	6.74538
4	8,974.32	150,534.85	159,509.17	21,959.53	7.26378
5	8,820.78	121,325.18	130,145.96	21,585.06	6.02945
6	8,540.16	128,591.76	137,131.92	20,896.43	6.56246
7	8,439.57	105,300.50	113,740.07	20,660.01	5.50532
8	8,376.03	93,619.97	101,996.00	20,500.00	4.97542
9	8,466.04	83,615.68	92,081.72	20,724.05	4.44323
10	8,651.35	73,970.61	82,621.96	21,172.43	3.90234

The Balancing Services Price is published daily on the National Grid Website under 'Current BSUoS Data', there is a file for each run type: II, SF & RF

BCR report

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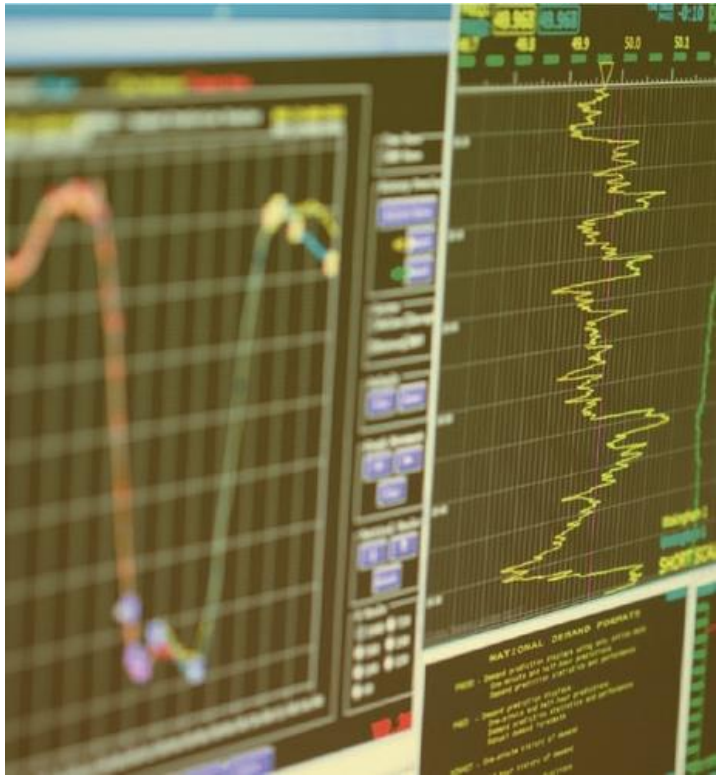
Ancillary Services

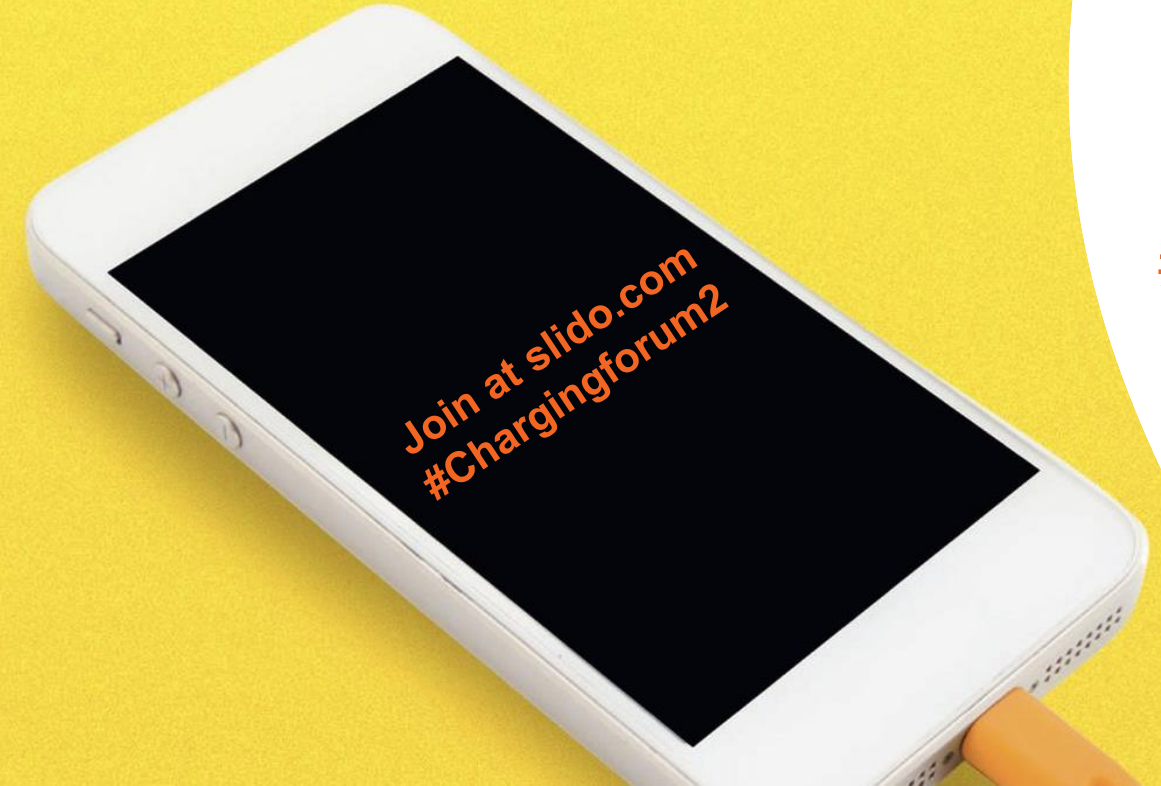
- Paperless Invoicing
- Salesforce CRM
- Ancillary Service settlement system project

Trading



- New Settlement System installed last year
- Developing new confirmations process
- Gas trades settlement to move to a new team
- Shaped Trades
- Salesforce CRM
- Payment Process

Questions?



Join at slido.com

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Coffee Break

15 minutes

Speak to our subject matter experts

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Speak to our subject matter experts

ESO Incentives Update

Joseph Donohoe

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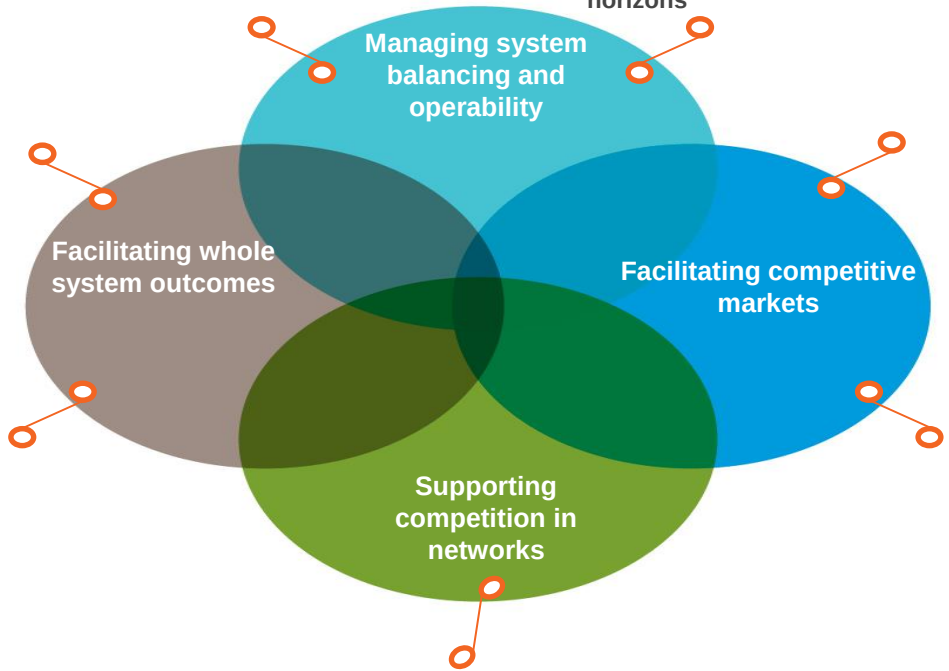
The ESO is operating under a new incentive scheme for 2018-21

Principle 1: Support market participants to make informed decisions by providing user friendly, comprehensive and accurate information

Principle 2: Drive overall efficiency and transparency in balancing services, taking into account impacts of ESO actions across time horizons



Principle 5: Coordinate across system boundaries to deliver efficient network planning and development

Principle 3: Ensure the rules and processes for procuring balancing services, maximise competition where possible and are simple, fair and transparent

Principle 6: Coordinate effectively to ensure efficient whole system operation and optimal use of resources

Principle 4: Promote competition in the wholesale and capacity markets

Principle 7: Facilitate timely, efficient and competitive network investments

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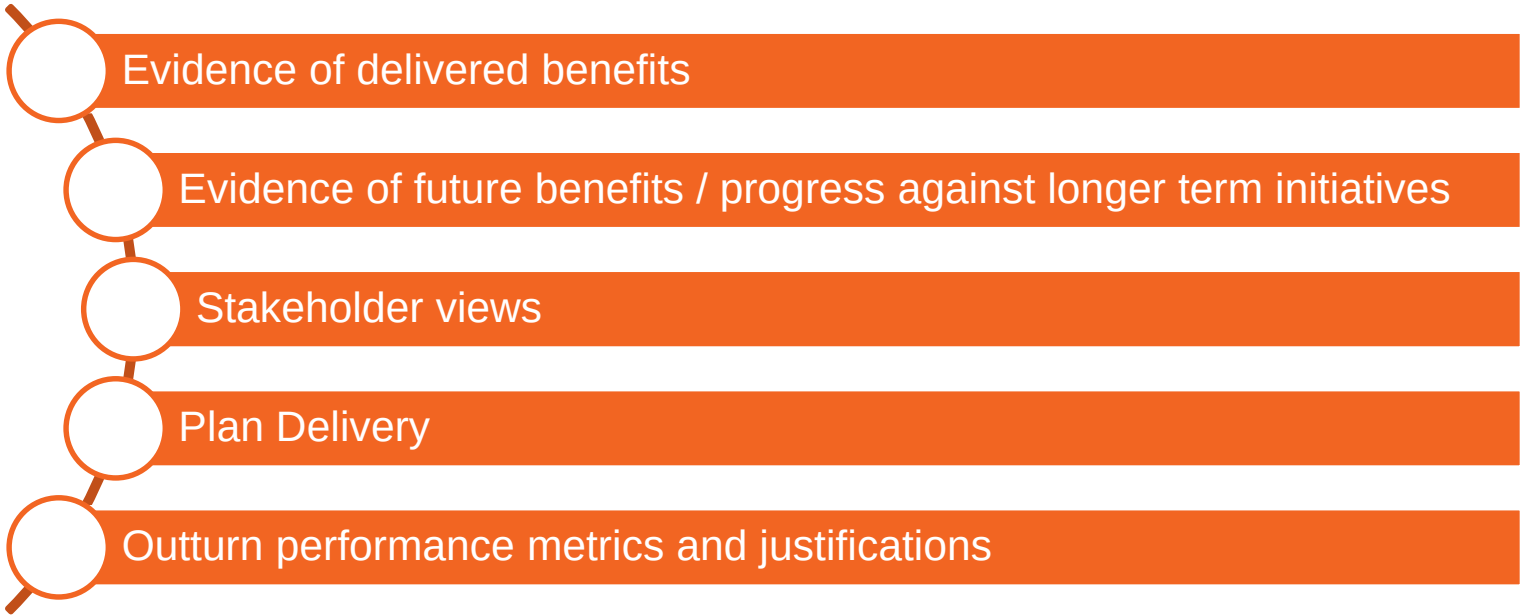
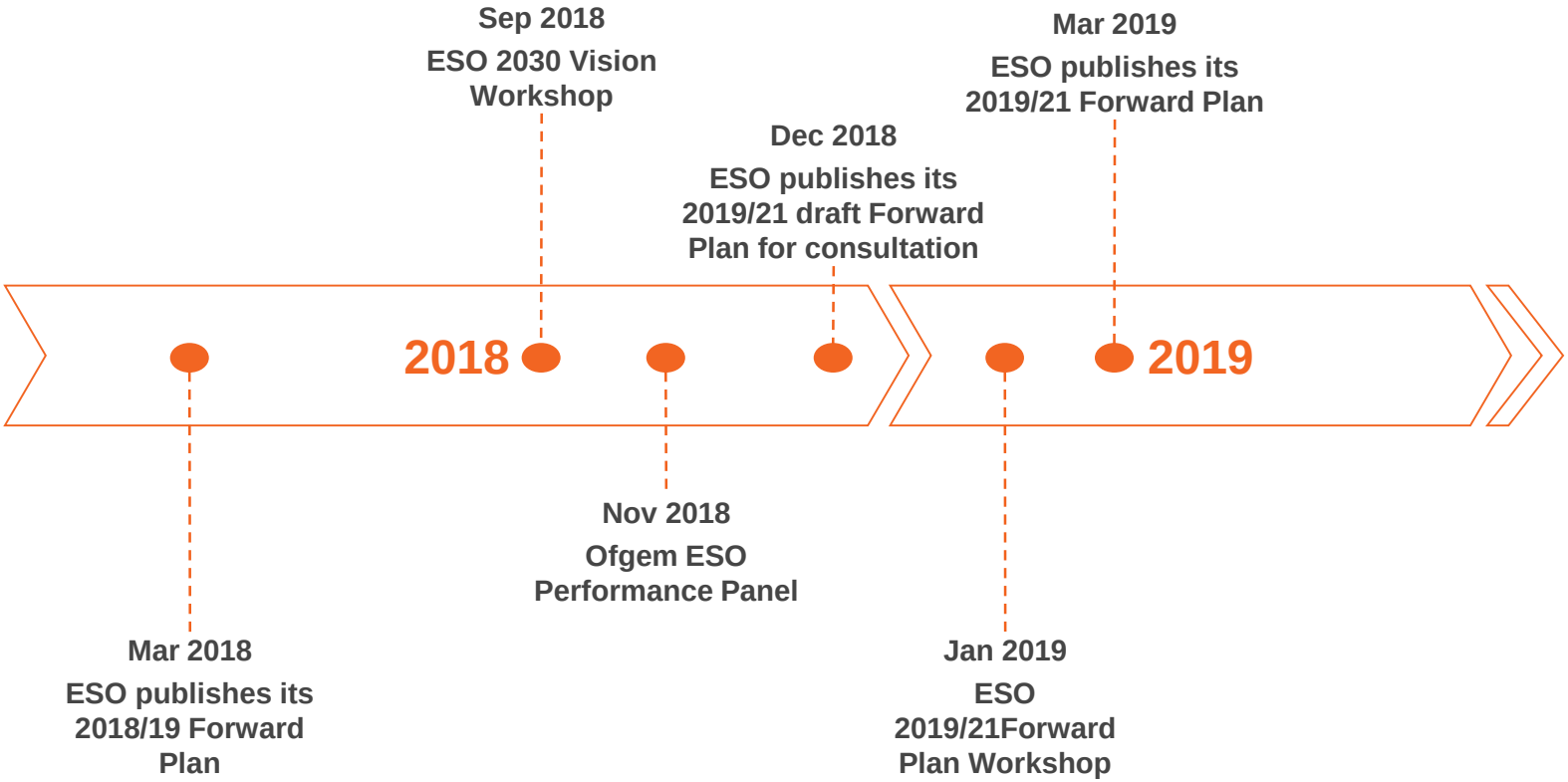
How is it going?



Challenging but driving positive change

What happens next?



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RIIO-2 and the future of charging

Rob Marshall

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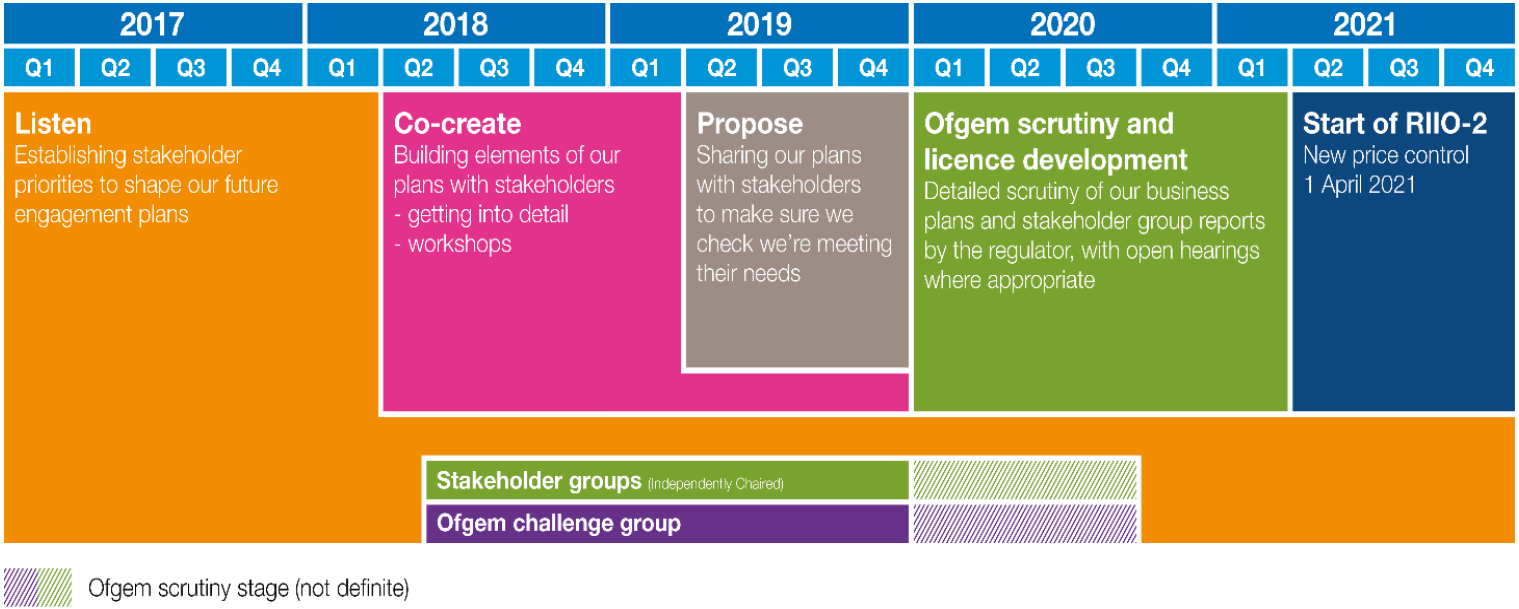
RIIO-2 – The first price control for a legally separate ESO

- Ofgem has confirmed that the ESO will have its own price control from 2021
- We will be expected to submit our well justified business plan in Q4 2019
- We will build our business plan with our stakeholders using a three phased approach – Listen, Co-create and Propose



Email: Box.ESO.RIIO2@nationalgrid.com
Visit our RIIO-2 website: yourenergyfuture.nationalgrid.com

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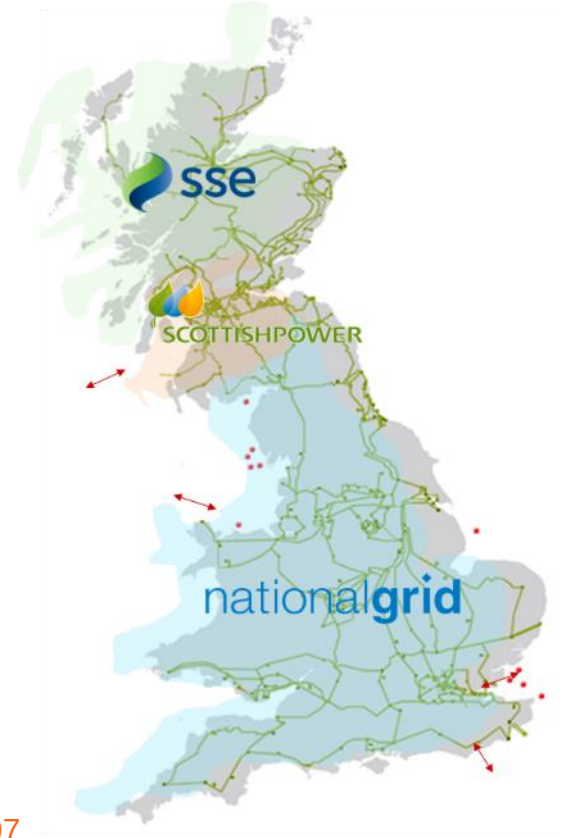
ESO role in charging



Onshore Transmission Owners (TOs)

Offshore Transmission Owners (OFTOs)

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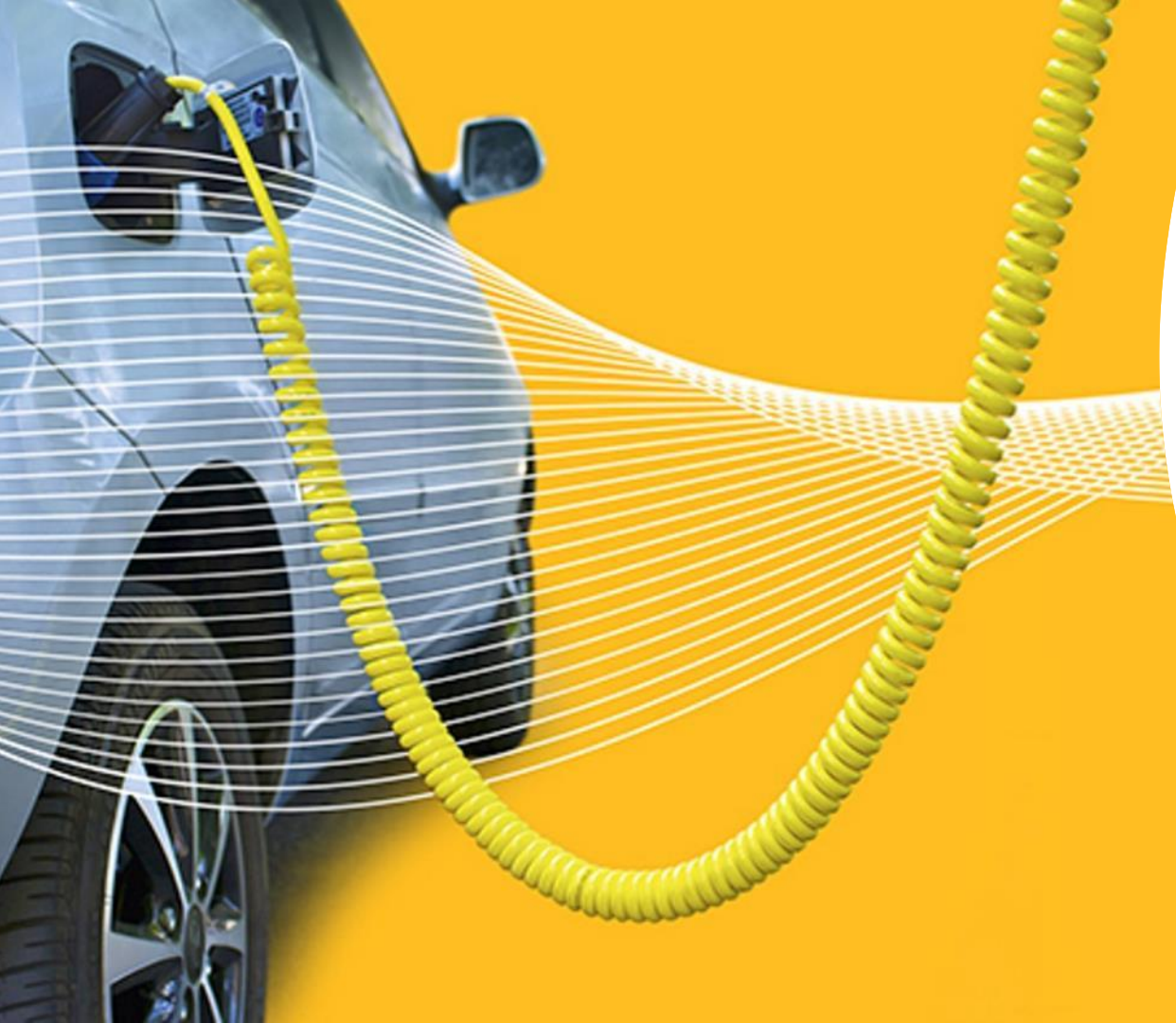
Electricity System Operator (ESO)



Why are they changing?

The way the system is used is changing

- Changing demand patterns and technologies
- Changing generation mix
  - Decentralisation
  - Decarbonisation

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What are the issues in charging?

Themes on stakeholders views

There is too much **volatility** in my charges

I can't **predict** what my charges will be

Network charging doesn't reflect the cost and benefit I have on the **whole system**

I am not on a **level playing field** with other users

Poll question

Go to: sli.do
Event code:
#Chargingforum2

Rate each theme out of 5
1 = I strongly disagree, there is no problem
5 = I strongly agree, it is a significant issue

Access and Forward Looking Charges

Access rights

Defines the relationship between network users and the network

Forward looking charges

Signals to network users how their actions impact the costs of the system

Timeline

2018

- Consultation on launching SCR closed
- Ofgem decision on SCR launch late 2018

2019

- Option development and assessment

2020

- SCR concludes in mid 2020

2022

- Implementation in tariffs from 2022

Targeted Charging Review

Residual charges

- Recovers the shared costs of the system
- No change in user behaviour reduces overall system costs

Options

Fixed charge

Gross consumption

Ex-ante capacity

Ex-post capacity

Timeline

- Minded to decision and consultation later this year
- Final decision in Spring 2019
- Implementation in tariffs from April 2020

How can I get involved?

Charging Futures

Reforming electricity charging, together

www.chargingfutures.com

Webinars - Summary notes - Podcasts - Email updates

Charging Futures Forum

Charging Methodology Developments

Jon Wisdom

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CUSC Modifications - TNUoS

- **CMP271/274/276**
  - These modifications are all on hold while Ofgem carry out their Significant Code Review into Residual Charging. They all amend the way the demand residual is charged.

- **CMP280** – Creation of a New Generator TNUoS Demand Tariff
  - Intent is to remove liability for TNUoS residual charges from Generation and Storage Users.

- **CMP286/7** – Increasing predictability through Increased Notice of Target Revenue/Inputs
  - Intent is to fix elements of the charging methodology such as revenue or volume inputs earlier in the tariff setting process

- **CMP288/9** – Explicit charging arrangements for customer delays and backfeeds
  - Intent is to allow the TO to charge connectees explicitly for delays in connection and ensure value is shared with consumers

CUSC Modifications - TNUoS

- **CMP292** – Introducing a cut off date for charging methodology changes
  - Intent is to ensure that the charging methodology is known well in advance of tariff setting

- **CMP301** – Clarification on the treatment of Project costs for HVDC and subsea circuits
  - As the CUSC is currently unclear on the charging arrangements for these circuits this change removes any ambiguity.

- **CMP302** – Extend the small generator discount
  - Small generator discount is currently a licence condition set to expire in March 2019. This mod introduces the effect to the CUSC to ensure it continues.

- **CMP303** – Improving local circuit charge cost reflectivity
  - Intent is to assess the costs going into the calculation of sub sea and HVDC circuits to ensure cost reflectivity.

CUSC Modifications - BSUoS

- **CMP281** – Removing liability for BSUoS charges from imports at storage sites
  - Intent is to exempt storage operators from paying the BSUoS charge on imports.

- **CMP296/7** – Introducing changes to BSUoS charging to support Project TERRE
  - Intent is to remove liability for BSUoS from Virtual Lead Parties to avoid double counting

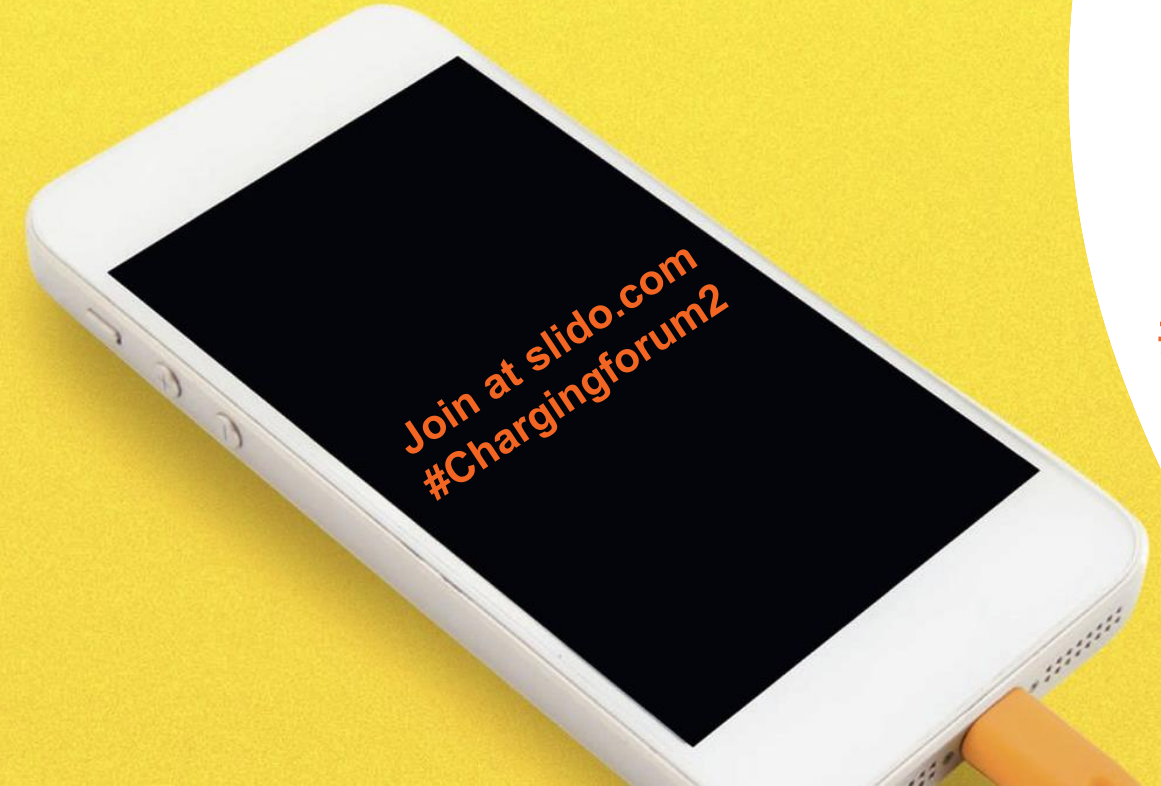
- **CMP307** – Expanding BSUoS charging to include embedded generation
  - Intent is to spread the costs of BSUoS over all demand and generation

CUSC Modifications – Connection Charging

- **CMP306** – Aligning connection charge rate of return with price control costs of capital
  - Intent is to ensure that the rates used within the connection charging methodology vary according to each TO's cost of capital rather than a fixed value.

Question and Answer session

Paul Wakeley



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Your feedback on today

1. How likely is it that you would recommend the Charging and Settlement Forum to a friend or colleague?
2. What did you like about this event?
3. How could we improve this event?

Poll questions

Go to: sli.do
Event code:
#Chargingforum2

Respond to 3 questions

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