Transmission Charging Forum

Demand-focussed day
16 October

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Welcome

Rebecca Yang

Revenue Manager

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Housekeeping

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Today's agenda

1	Welcome and introduction to the day	09:30 – 09:50
2	TNUoS - tariffs and billing (including coffee break)	09:50 – 11:30
3	BSUoS - forecasting, reporting and billing	11:30 – 12:20
4	Connection charging overview	12:20 – 12:30
	Lunch	12:30 – 13:20
5	Workshops	13:20 – 15:20
6	Q & A	15:20 – 15:40
7	Close	15:40 – 16:00

Workshops

How and why we monitor your credit (TNUoS and BSUoS)

All customers receive a credit statement from us each month.

In this session, we'll explain what it's all about and why it's important.

How and why we monitor demand forecasts (TNUoS)

TNUoS demand charges are based on the supplier forecast.

We'll go through what makes up the half-hourly and non-half hourly forecast.

How and why we reconcile your TNUoS charges

At the end of the charging year, you will have either underpaid or overpaid for TNUoS.

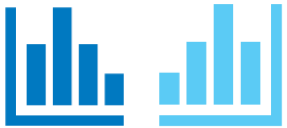
In this session we'll go take you through how we reconcile the charge.

Workshops continued

Connection charges explained

In the session we will take you through how connection charges are calculated and explain what post-commissioning securities are.

Ways to reconcile your BSUoS charges



We will take you through how to use different data sources as a way of reconciling the BSUoS charge.

Code development updates and Q & A

We will talk through current code modifications which may have an impact on the transmission charging regime.

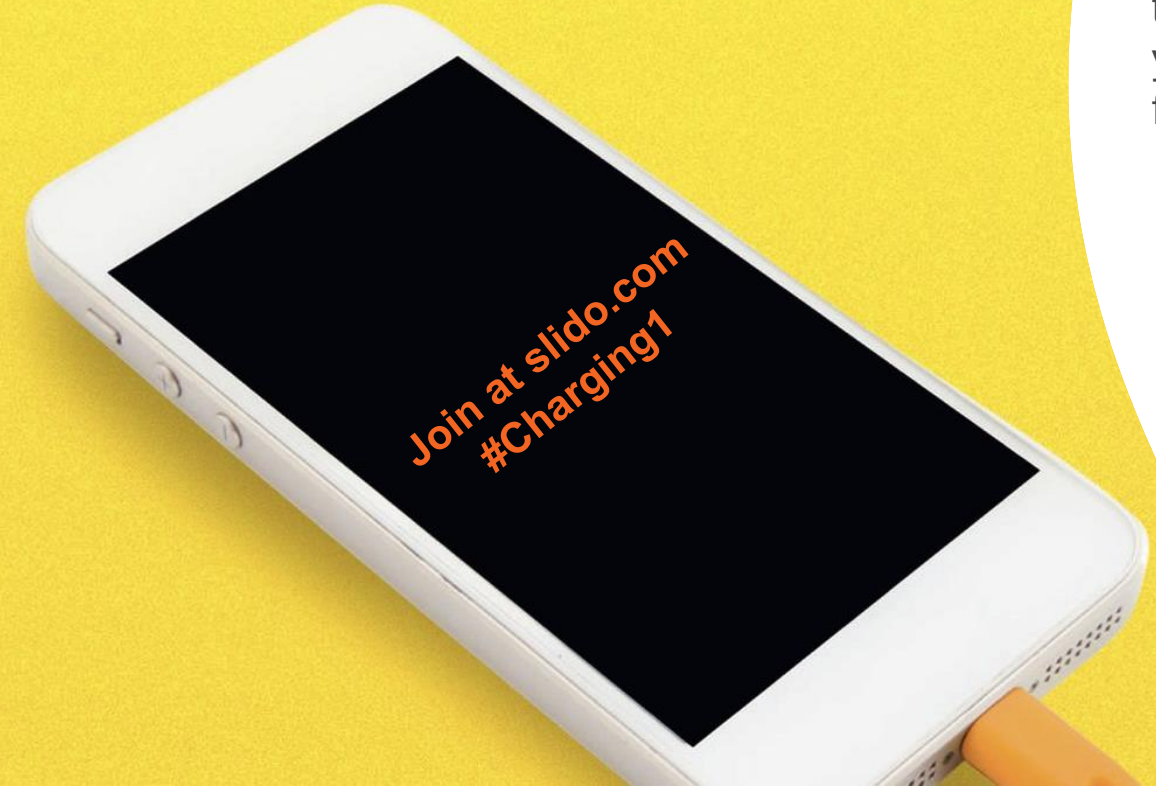
Workshop timetable

13:20 – 15:20

Time	Main room	L 10	L 9	Kitchen area
13:20 – 14:00	Ways to reconcile your BSUoS charges	How and why we monitor your credit (TNUoS and BSUoS)		Networking and refreshments
14:00 - 14:40	Code development updates and Q & A	How and why we monitor demand forecasts (TNUoS)	Connection charges explained	
14:40 – 15:20	Ways to reconcile your BSUoS charges	How and why we reconcile your TNUoS charges	Connection charges explained	

Sli.do

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



Join at slido.com

#Charging1

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Revenue Team Overview

Rebecca Yang

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Revenue team

- TNUoS Billing
- BSUoS Billing
- Tariff Forecasting and Setting
- Connection Charging
- Customer & Stakeholder


Rebecca Yang, Revenue Manager


Nick Everitt, Billing


Jo Zhou, Tariff Forecasting and Setting


Alice Grayson, Connections charging and TNUoS Tariff Forecasting and Setting


Sarah Chleboun, TNUoS Tariff Forecasting and Setting


Matt Wootton, Customer & Stakeholder


Paul Hitchcock, TNUoS Billing


Anthony Tichivangana, Connections Charging


Malcom Rowe, Charging System Development


Jennifer Groome, Customer & Stakeholder and BSUoS Billing


Andrew Havvas, TNUoS Billing


Luke Craddock, Connections Charging


Karen Sawbridge, BSUoS Billing


John Beezley, Connections Charging and BSUoS Billing


Matthew Marriott, TNUoS billing and BSUoS Billing

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Our charges…

TNUoS
Transmission Network Use of System Charges
£2.8bn TO Revenue

BSUoS
Balancing Services Use of System Charges
~ £1.4bn SO Revenue

Connection Charges
~ £300m TO Revenue

TNUoS Overview

Sarah Chleboun,
Alice Grayson &
Jo Zhou

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What is TNUoS and who pays

Sarah Chleboun

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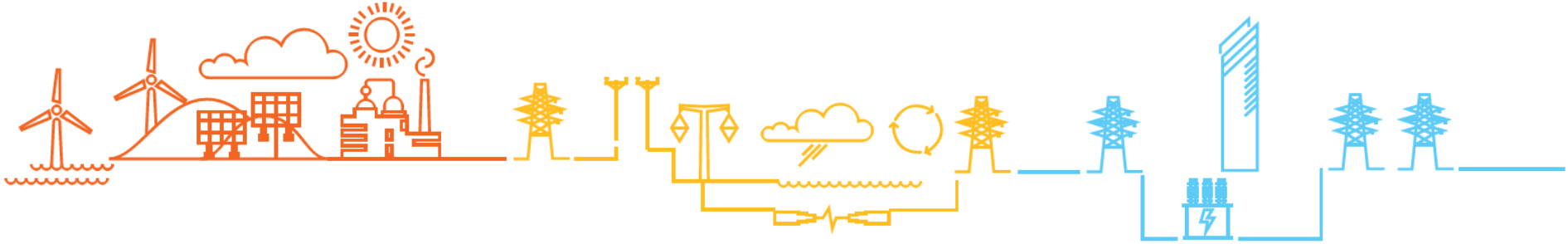
What is TNUoS?

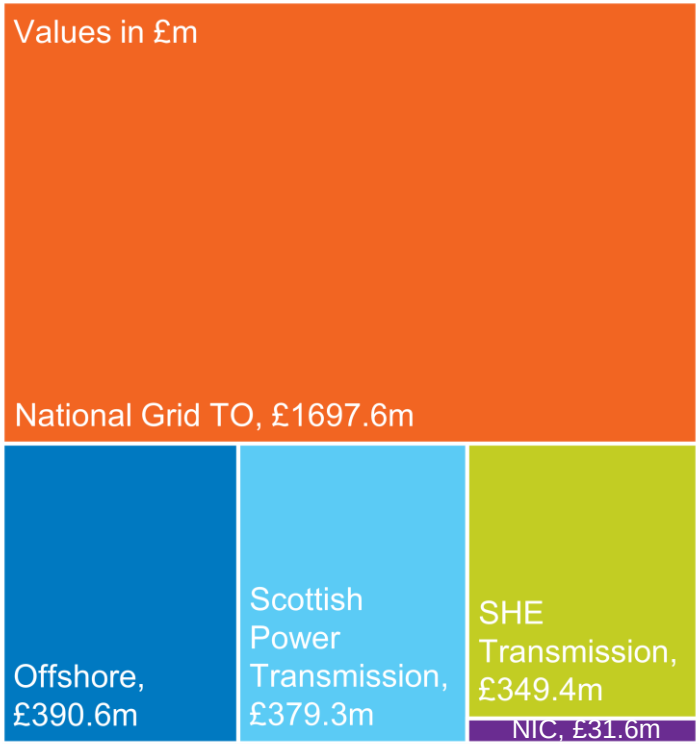
TNUoS is the Transmission Network Use of System charge, and recovers the allowed revenue for Transmission Owners for the cost of building and maintaining transmission infrastructure.

Locational charge: reflects the incremental cost of power being added to/taken off the system at different geographical points

Residual charge: what is not recovered under the Locational charge is recovered in this charge so that the TO's recover their total allowed revenue



What makes up the TNUoS charge?



Figures from Final TNUoS Tariffs for 2019/20

Recovers revenue for:

- Onshore TOs
  - National Grid TO
  - Scottish Power Transmission
  - Scottish Hydro Electricity Transmission
- Offshore TOs
- Network Innovation Competition (NIC) Fund

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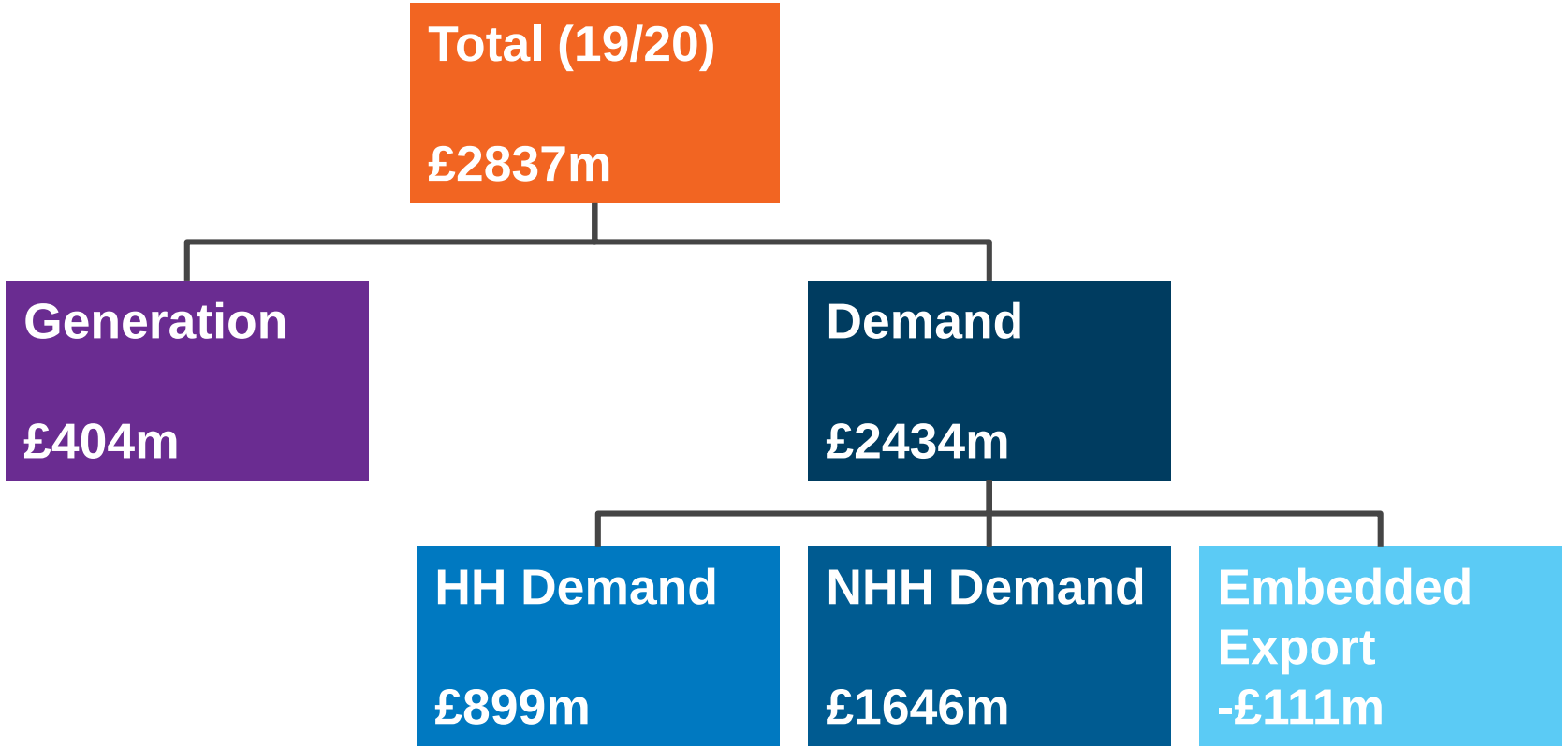
Who pays TNUoS?



Figures from Final TNUoS Tariffs for 2019/20
Note: figures have been rounded to the nearest £1m

Who pays TNUoS? - Generators

Generators that are directly connected to the transmission network & Embedded generators ≥100MW TEC are chargeable

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

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

Who pays TNUoS? - Demand

Suppliers

All licenced suppliers are liable for TNUoS charges, for their *gross demand* from the transmission network in one of the following 3 categories:

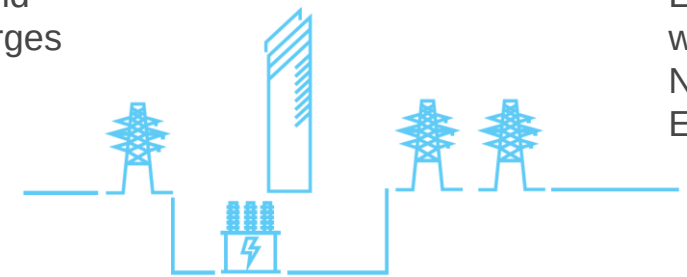
Half-Hourly metered demand on the basis of Triads

Non Half-Hourly demand, total 4pm-7pm annual consumption

Embedded Export credited for export over Triads

Directly Connected Demand

Directly Connected Demand sites pay HH demand charges



Embedded Generation

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

Demand TNUoS

Alice Grayson

Demand TNUoS agenda

1	Demand TNUoS Tariffs (HH & NHH)
2	What are Triads
3	Embedded Export Tariffs
4	How charges are calculated
5	Metering classes and Small Generator Discount

Demand TNUoS Tariffs

Demand TNUoS recovers £2.4bn of revenue

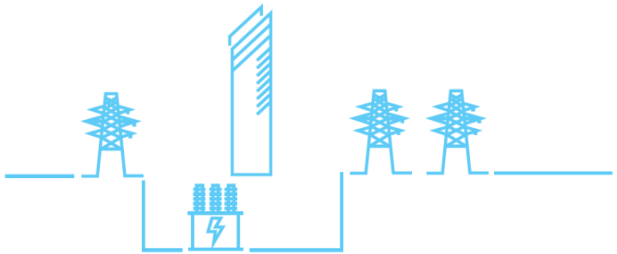
There are two demand tariffs for each of the **14 demand zones**

Half-Hourly (HH) Demand

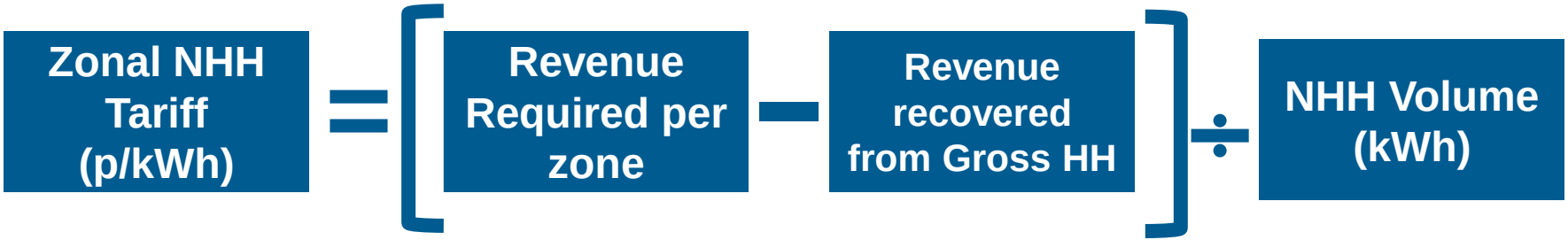
Charged a £/kW tariff for average gross demand over the triads

Non Half-Hourly (NHH) Demand

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



Demand TNUoS: HH & NHH Tariffs



Triads – what are they?

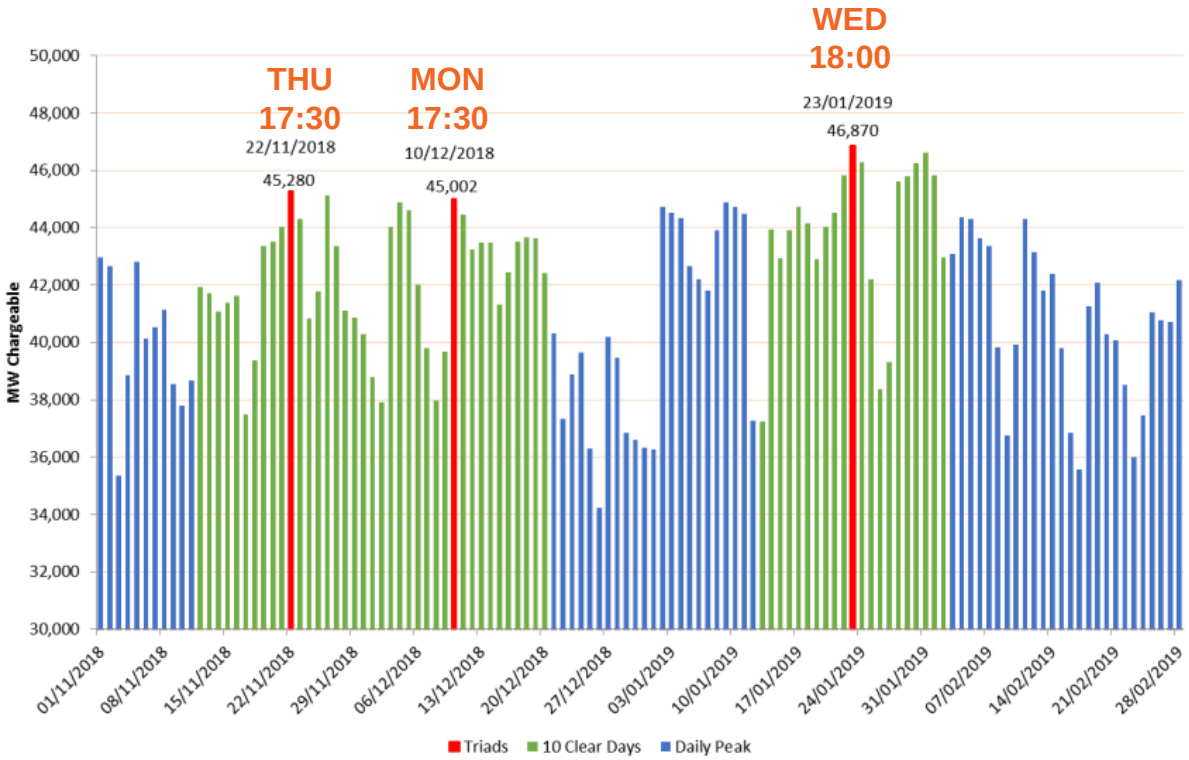
Three half hour settlement periods of highest GB net demand

- Separated by a minimum of 10 clear days
- Determined after the event using settlement metering data reported in March
- Excludes interconnector demand but includes pumping and station demand

November

February

Triads for Winter 2018/19



- Triads are usually around 17:30 on a weekday
- However, recently it has become more difficult to predict when a triad will be, due to:
  - Changing behaviours to avoid triad
  - Energy efficiency
  - Embedded generation

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Embedded Export Tariff

The Embedded Export Tariff is another element of TNUoS

- The EET 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)

Embedded Export

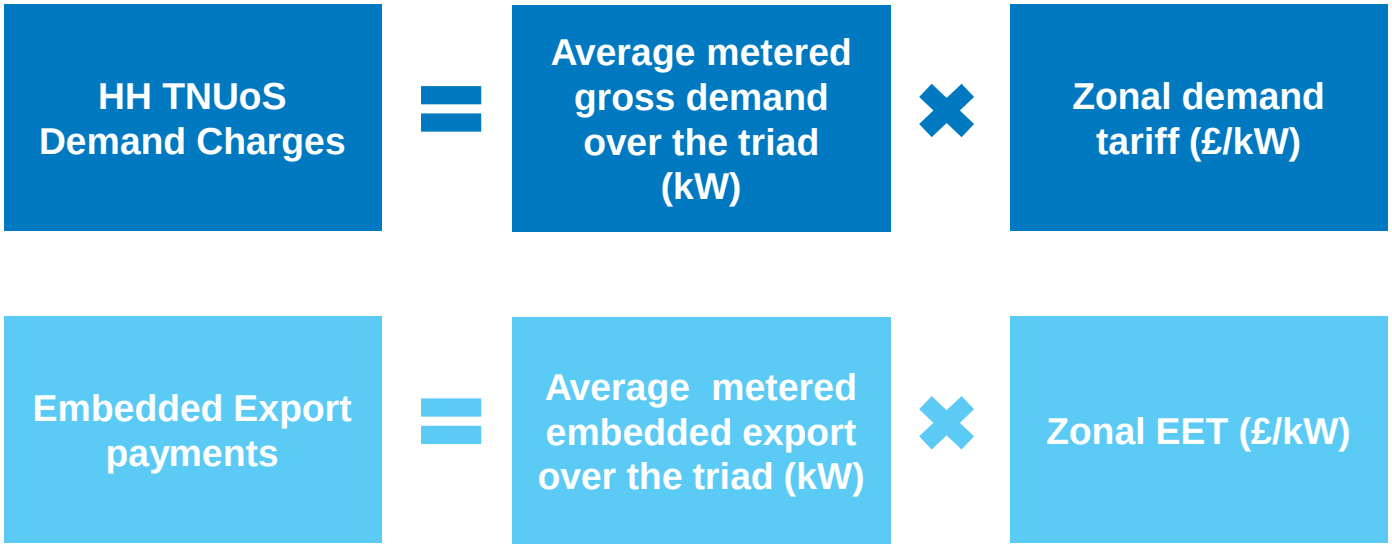
Credited a £/kW tariff for average export over the Triads

Embedded Export Tariff

- Based on the forecast of Embedded Generation output, this will cost £111m in 2019/20
- This is added to the revenue to be recovered from the demand residual, to ensure overall revenue recovery is correct
- The phased residual will be £0/kW from 2020/21

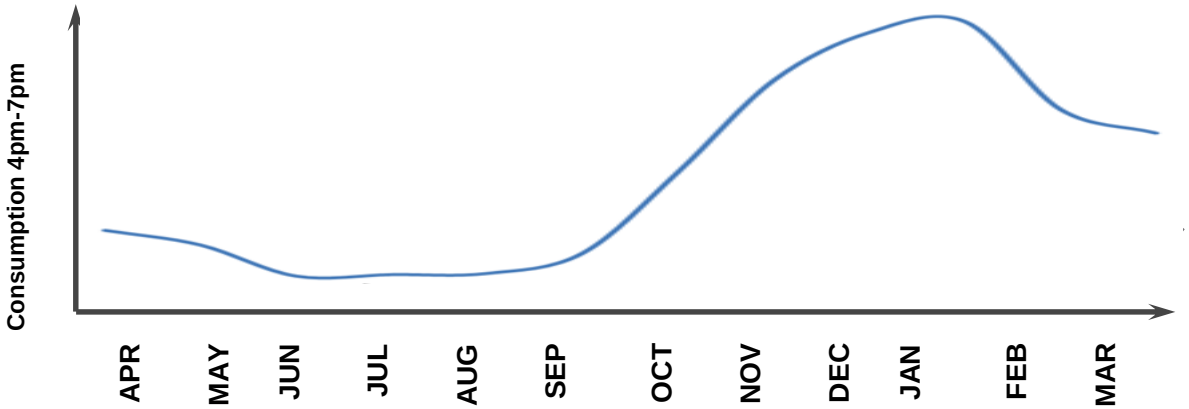
***AGIC = Avoided GSP (Grid Supply Point) Infrastructure Credit, which is indexed by average May to October RPI each year.**

HH Tariff Charges & Embedded Export Payment



NHH Tariff Charges

Non Half-Hourly Metered Demand = (**Energy Consumption between 4pm- 7pm each day (kWh)** × **Zonal Energy Tariff (p/kWh)**) / **100**



This graph shows how demand varies throughout the year

Treatment of metering classes from 2020/21 onwards

- Several of these classes are changing from being settled as NHH to being settled HH as per code modification CMP266.
- This will change the TNUoS demand tariff they are liable to pay.

Note a CUSC modification proposal (CMP318) has been raised, to extend the NHH TNUoS treatment for Class F and Class G customers to year 2020/21 and onwards.

Measurement class	Description	Settlement in 2019/20	2020/21 onwards
A	Non-Half Hourly metered	NHH	NHH
B	Non-Half Hourly unmetered	NHH	NHH
C	Half Hourly metered in 100kW premises	HH	HH
D	Half Hourly unmetered	HH	HH
E	Half Hourly metering equipment below 100kW with current transformer	HH	HH
F	Half Hourly metering equipment below 100kW with current transformer or whole current, at domestic premises	NHH	HH
G	Half Hourly metering equipment below 100kW with whole current, NOT at domestic premises	NHH	HH

Small Generator Discount

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

For 2019/20, the small generator discount tariff is **£11.81/kW**

The small generator discount has been extended until 31st March 2021

Total amount paid out through the discount is £31.8m for 2019/20

This is recovered through demand tariffs

It increases the demand tariffs by:

HH demand	NHH demand
£0.62/kW	0.08p/kWh

Generation TNUoS

Jo Zhou

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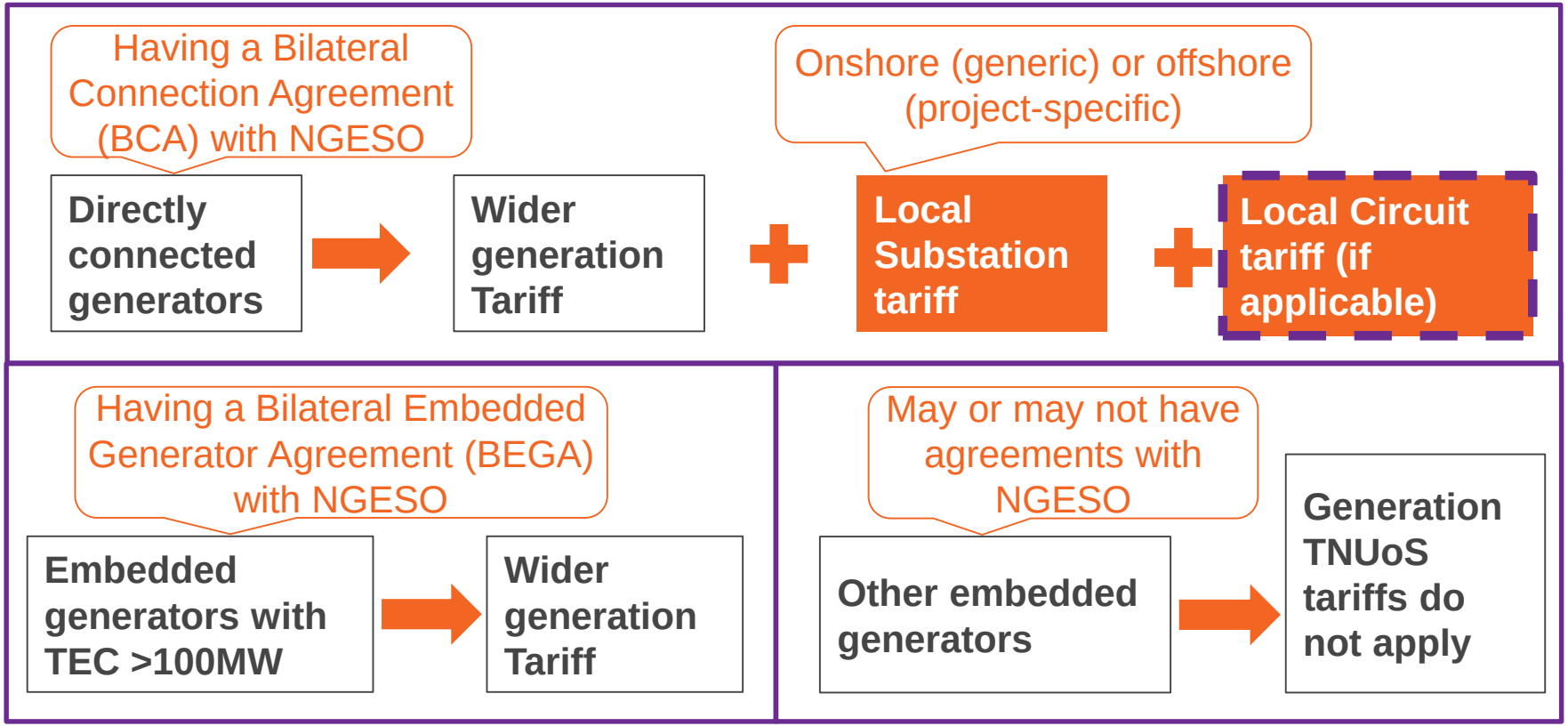
Generation TNUoS

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

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

Generation TNUoS Tariffs



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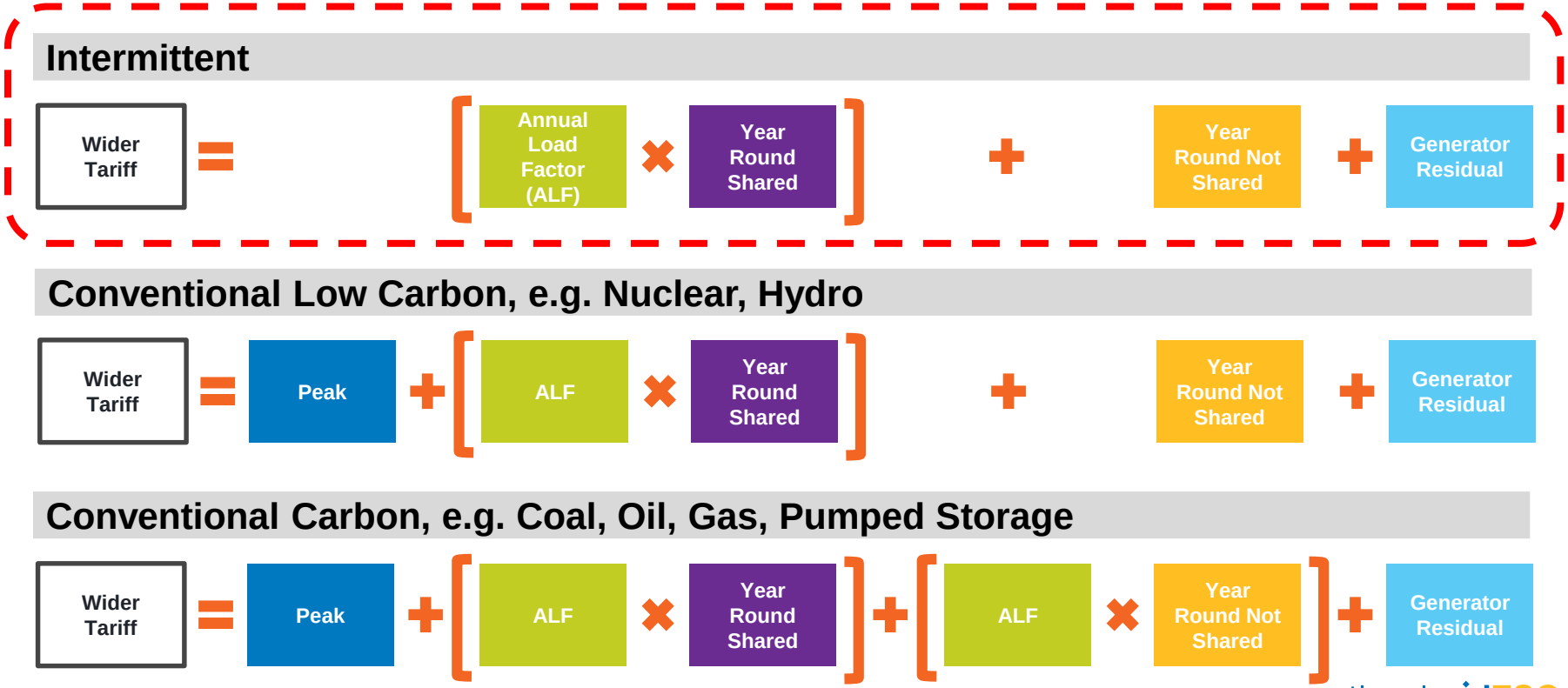
Wider Generation Charging Categories



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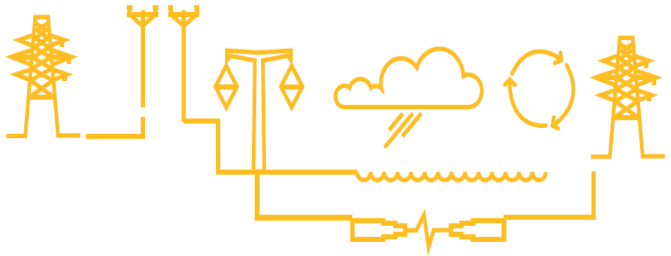
Local Generation Charging Categories

Local substation tariffs

- Signalling the cost of an additional MW capacity at the transmission substation
- Please see our tariff report for the £/kW figures (in the “Local substation tariffs” table)

Local circuit tariffs

- Reflects the costs of local transmission circuits that “flow” generation to the wider main interconnected transmission system (MITS)
- Onshore Local circuit tariffs are published by the “entry” substations
- Offshore local circuit tariffs are published by offshore generator projects



Tariff Forecasting and Setting

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Structure and Purpose of Transport and Tariff Model

Two elements:

Transport element

- Calculates locational signals (on nodal basis)

Aims:

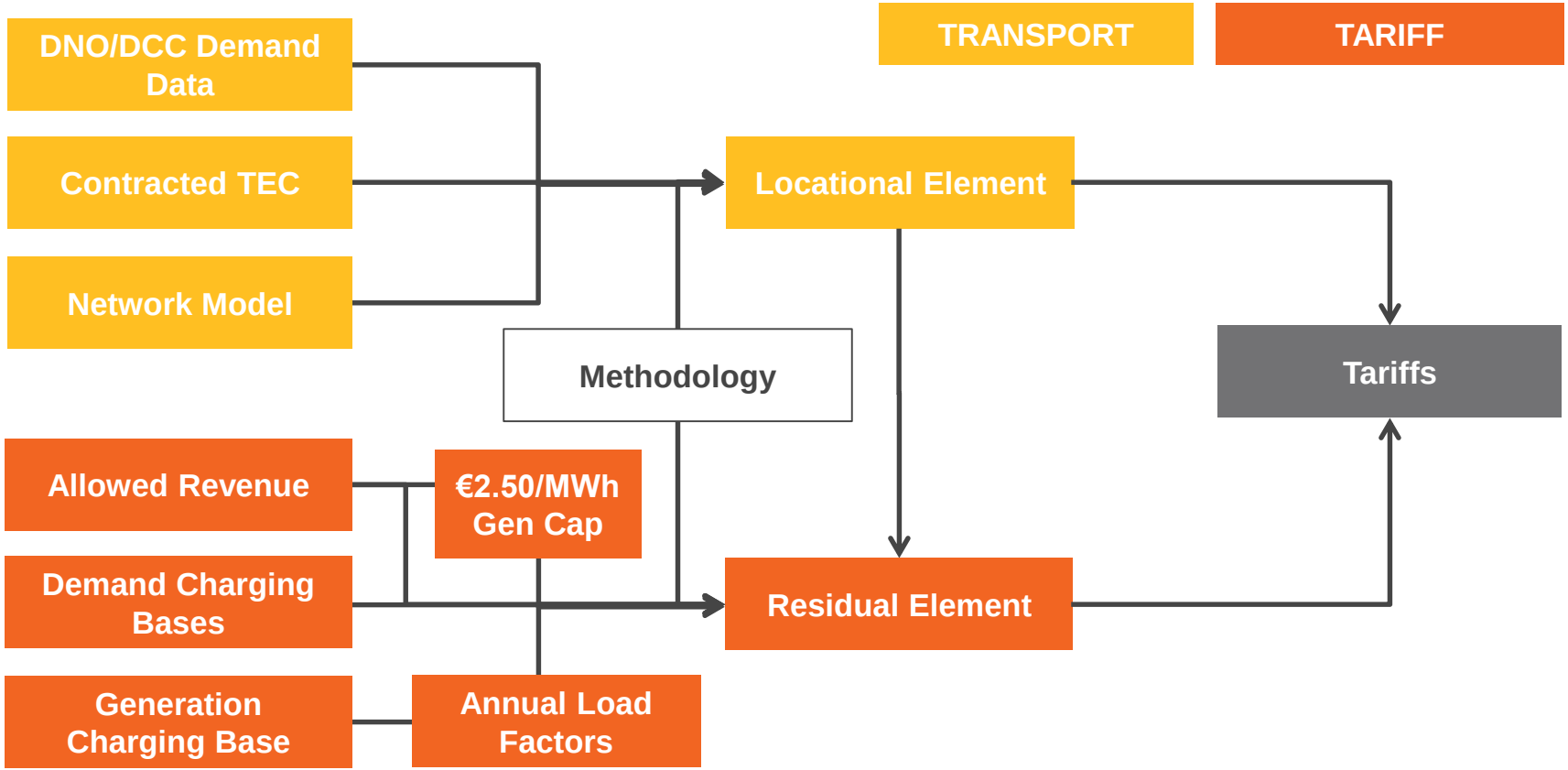
- Cost reflectivity – quantifying incremental MW*km (cost) at each node
- Transparency – “contractual” background

Tariff element

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

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

Inputs in to TNUoS Tariffs



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Tariff Setting and Forecasting Timescale

		Five-year forecast	March	July	DRAFT Nov	FINAL Jan
Methodology		Open to industry governance				
Locational	DNO/DCC Demand Data	Previous year			Week 24 updated	
	Contracted TEC	Latest TEC	Latest TEC	Latest TEC	TEC Register Frozen at 31 October	
	Network Model	Previous year (except new local circuits)			Latest version based on ETYS	
Residual	Allowed Revenue	Update financial parameters	Update financial parameters	Update financial parameters	Latest TO Forecasts	From TOs
	Demand Charging Bases	Revised Forecast	Revised Forecast	Revised Forecast	*Only by exception*	*Only by exception*
	Generation Charging Base	NG Best View	NG Best View	NG Best View	NG Best View	NG Final Best View
	Generation ALFs	Previous Year			New ALFs published	
	Generation Revenue	Forecast	Forecast	Fixed Gen Rev £m		

Coffee Break

Any questions?

Go to: www.slido.com
Event code: #Charging1

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TNUoS Charging and Billing

Paul Hitchcock

Andrew Havvas

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TNUoS Charging and Billing Agenda

1	TNUoS Billing Overview
2	Demand Forecasts
3	Your Bill
4	Forecast Monitoring
5	Reconciliation
6	Forecasting Performance

TNUoS Billing Overview

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

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

Forecasting Performance VAR (FPVAR)
Calculating accuracy of Demand forecasts, used as an input in security calculations from 1st October

Initial Demand Reconciliation (June)

Charging year + 3 months

FPVAR (end July; effective October)

Charging year + 4 months

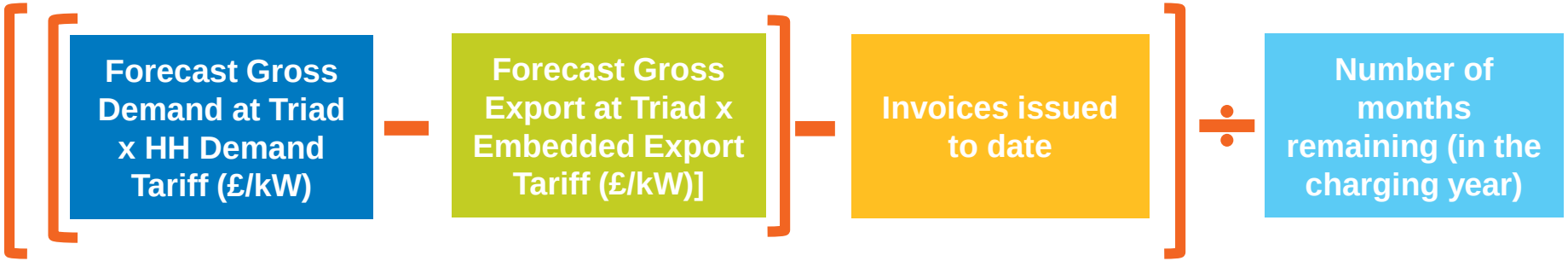
Final Demand Reconciliation (Autumn)

Charging year + ~18 months

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:

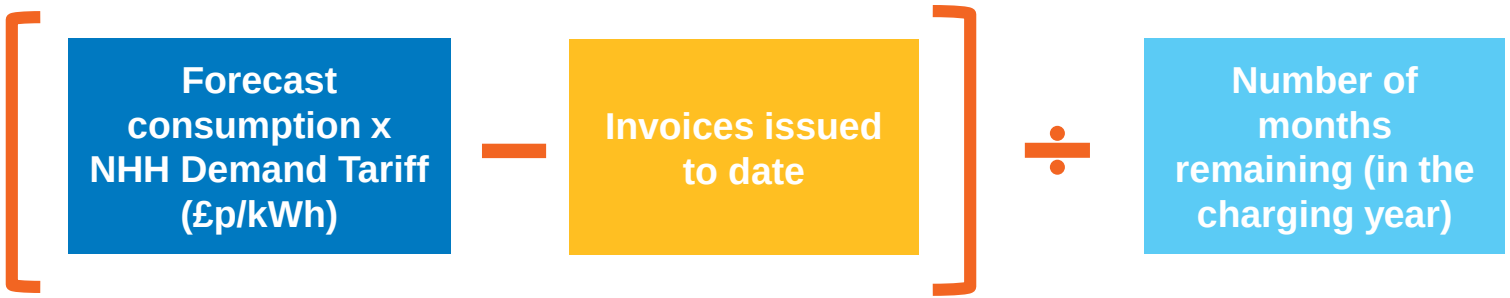


HH exports will be netted off against HH demand, net credits are settled at the annual reconciliation. Monthly chargeable values cannot result in a credit to the supplier

Non Half-Hourly Consumption

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

Supplier monthly invoice:



Demand forecasts

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TNUoS Demand Charges

Demand TNUoS charges are based on the supplier forecast

- Mandatory requirement to submit a forecast by 10th March
- Forecasts should be revised if there are significant changes in demand/consumption
- The revised forecast must be received by the 10th of the month
- We send out quarterly reminders, but you may submit forecasts more often (especially if you are a new supplier)

Demand Forecast Submission Form

Send to us

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

Format of the form

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

Validation

The completed form is validated (CUSC 14.28) and uploaded into the billing system.

DEMAND FORECAST SUBMISSION

Used for Calculating 2019/20 Monthly TNUoS Charges

Company Name: (drop-down list) Z EXAMPLE LIMITED

Company Registered No: 10000000

Contact Name:

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	745		6,774,773
2__BEXAM000	East Midlands	914		5,513,249
2__CEXAM000	London	1,746		4,996,105
2__DEXAM000	North Wales and Mersey	912		3,206,701
2__EEXAM000	Midlands	1,228		4,686,015
2__FEXAM000	Northern	824		2,452,885
2__GEXAM000	North West	1,008		5,530,108
2__HEXAM000	Southern	1,230		5,568,630
2__JEXAM000	South East	479		4,426,747
2__KEXAM000	South Wales	334		2,195,350
2__LEXAM000	South Western	955		3,904,759
2__MEXAM000	Yorkshire	579		4,592,799
2__NEXAM000	Southern Scotland	945		3,824,910
2__PEXAM000	Northern Scotland	301		1,644,185

What to include in Demand Forecasts

HH (Triad) demand / exports

- A forecast of your contracted customers' average demand, summed by BM Unit (kW)
- A forecast of HH embedded exports average summed by BM Unit (kW)

NHH consumption

- A forecast of your contracted customers' energy consumption between 16:00 and 19:00 (inclusive) every day of the financial year, summed by BM Unit level (kWh)

Your monthly demand TNUoS bill

Suppliers receive a monthly invoice

Details include:

- HH and/or NHH charges
- Due date
- VAT

Description	Value	VAT Amount
Infrastructure Demand - HH Standard rated VAT: 20% Our Job Ref: CAB_TNUD_00000	56,794.94	11,358.99
Infrastructure Demand - NHH Standard rated VAT: 20% Our Job Ref: CAB_TNUD_00000	315,326.75	63,065.35
Total	372,121.69	74,424.34
Total value inclusive of VAT		446,546.03
Payment Terms: **Due 15th**		
Advance Paid		
Payment Due Date: **15.10.2019** **Total Amount Due**	GBP	446,546.03

The backing sheet – Half-Hourly (1)

The HH Annual Liability is the supplier forecast:

- The value of gross demand at the Triad less the value of any gross exports at the Triad

Example 1 - Page 1 of backing sheet

Gross HH Demand and Embedded Export Calculation:

BM Unit	Zone ID	Zone Name	Latest Forecast Gross HH Demand (kW)	Gross HH Demand Tariff (£/kW)	Forecast Gross HH Annual Liability (£)	Latest Forecast Gross HH Export (kW)	Gross HH Export Tariff (£/kW)	Forecast Gross HH Export Annual Liability (£)	Forecast HH Annual Liability (£)
2_A[redacted]	09	EASTERN	745	53.788327	40,072.30	0	20.366546	0.00	40,072.30
2_E[redacted]	07	EAST MIDLANDS	914	51.439770	47,015.95	0	18.017989	0.00	47,015.95
2_G[redacted]	12	LONDON	1,746	59.175788	103,320.93	0	25.754007	0.00	103,320.93
2_D[redacted]	06	N WALES & MERSEY	912	49.345368	45,002.98	0	15.923587	0.00	45,002.98
2_B[redacted]	08	MIDLANDS	1,228	52.928066	64,995.67	0	19.506286	0.00	64,995.67
2_F[redacted]	03	NORTHERN	824	41.026683	33,805.99	0	7.604902	0.00	33,805.99
2_C[redacted]	04	NORTH WEST	1,008	47.831581	48,214.23	0	14.409800	0.00	48,214.23
2_H[redacted]	13	SOUTHERN	1,230	57.338781	70,526.70	0	23.917000	0.00	70,526.70
2_J[redacted]	11	SOUTH EAST	479	56.110850	26,877.10	0	22.689070	0.00	26,877.10
2_K[redacted]	10	SOUTH WALES	334	49.725642	16,608.36	0	16.303862	0.00	16,608.36
2_L[redacted]	14	SOUTH WESTERN	955	55.686678	53,180.78	0	22.264898	0.00	53,180.78
2_M[redacted]	05	YORKSHIRE	579	48.039318	27,814.77	0	14.617537	0.00	27,814.77
2_N[redacted]	02	SOUTHERN SCOTLAND	945	30.755392	29,063.85	0	0.000000	0.00	29,063.85
2_P[redacted]	01	NORTHERN SCOTLAND	301	20.971270	6,312.35	0	0.000000	0.00	6,312.35

The backing sheet – Half-Hourly (2)

Example 2 - Value of HH exports partially offset value of HH demand

Gross HH Demand and Embedded Export Calculation:

BM Unit	Zone ID	Zone Name	Latest Forecast Gross HH Demand (kW)	Gross HH Demand Tariff (£/kW)	Forecast Gross HH Annual Liability (£)	Latest Forecast Gross HH Export (kW)	Gross HH Export Tariff (£/kW)	Forecast Gross HH Export Annual Liability (£)	Forecast HH Annual Liability (£)
2_A[redacted]000	09	EASTERN	180,537	53.788327	9,710,783.19	36,670	20.366546	-746,841.24	8,963,941.95

The value of gross embedded exports is netted off against the value of gross demand

Example 3 - Value of HH exports exceed value of HH demand

Gross HH Demand and Embedded Export Calculation:

BM Unit	Zone ID	Zone Name	Latest Forecast Gross HH Demand (kW)	Gross HH Demand Tariff (£/kW)	Forecast Gross HH Annual Liability (£)	Latest Forecast Gross HH Export (kW)	Gross HH Export Tariff (£/kW)	Forecast Gross HH Export Annual Liability (£)	Forecast HH Annual Liability (£)
2_[redacted]	14	SOUTH WESTERN	20	55.686678	1,113.73	558	22.264898	-12,423.81	0.00

The backing sheet - NHH

The NHH Annual Liability is the supplier forecast of:

- kWh consumption between 16:00 and 19:00 (inclusive) every day of the financial year (sometimes referred to as Chargeable NHH)

NHH Calculation:

BM Unit	Zone ID	Zone Name	Latest Forecast Annual Chargeable NHH Energy (kWh)	Forecast NHH Energy Applicable to Tariffs (kWh)	NHH Tariff (p/kWh)	Forecast NHH Annual Liability (£)	HH+ NHH Forecast Annual Liability (£)
2__A[redacted]	09	EASTERN	6,774,773	6,774,773	7.496688	507,883.59	547,955.89
2__B[redacted]	07	EAST MIDLANDS	5,513,249	5,513,249	6.738557	371,513.43	416,529.38
2__C[redacted]	12	LONDON	4,996,105	4,996,105	6.291396	314,324.75	417,645.68
2__D[redacted]	06	N WALES & MERSEY	3,206,701	3,206,701	6.223760	199,577.37	244,580.35
2__E[redacted]	08	MIDLANDS	4,686,015	4,686,015	6.977433	326,963.56	391,959.23
2__F[redacted]	03	NORTHERN	2,452,885	2,452,885	5.213833	127,889.33	161,695.32
2__G[redacted]	04	NORTH WEST	5,530,108	5,530,108	6.202276	342,992.56	391,206.79
2__H[redacted]	13	SOUTHERN	5,568,630	5,568,630	7.586023	422,437.55	492,964.25
2__J[redacted]	11	SOUTH EAST	4,426,747	4,426,747	7.945653	351,733.96	378,611.06
2__K[redacted]	10	SOUTH WALES	2,195,350	2,195,350	5.873287	128,939.21	145,547.57
2__L[redacted]	14	SOUTH WESTERN	3,904,759	3,904,759	7.767486	303,301.61	356,482.39
2__M[redacted]	05	YORKSHIRE	4,592,799	4,592,799	6.116328	280,910.65	308,725.42
2__N[redacted]	02	SOUTHERN SCOTLAND	3,824,910	3,824,910	4.026035	153,992.22	183,056.07
2__P[redacted]	01	NORTHERN SCOTLAND	1,644,185	1,644,185	2.820450	46,373.42	52,685.77
					Total Liability HH + NHH:		£ 4,491,645.17

The backing sheet - Summary

[redacted] ELECTRICITY LTD		
Total Annual Forecast Liability	£	4,491,645.17
Invoice to Date	£	2,258,915.04
Remaining Annual Forecast Liability	£	2,232,730.13
Remaining Months		06
Current Monthly Invoice Amount	£	372,121.69

Monthly invoice value:

[Forecast consumption x NHH Demand Tariff (£p/kWh) − Invoices issued to date] ÷ Number of months remaining (in the charging year)

How and why we monitor your demand forecasts

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Monitoring of Supplier Forecasts (1)

Monthly monitoring process

Designed to monitor the accuracy of supplier demand forecasts (which charges are based on)
The supplier is contacted if the difference is >20% (HH and/or NHH)

Criteria

HH: Is the value of the supplier forecast consistent with:

- the demand at last year's Triad?
- this year's week-day Settlement Period 35 (5 – 5:30pm) average?

NHH: Is the value of the supplier forecast consistent with:

- the same period from the previous year?
- recent consumption trend at each BMU

CUSC (section 3.12 and 14.28)

Monitoring of Supplier Forecasts (2)

Example of statement

Under-forecasting

CUSC 3.12 Summary:	Z_EXAMPLE LIMITED			
NHH	Annual Liability (based on latest forecast)	National Grid Forecast Annual Liability	Percentage Under-Forecast	Predicted 2019-20 Reconciliation (if not corrected)
Summary	£ 141,218.30	£ 231,490.79	39.0%	£ 90,272.48
Total (including VAT but excluding interest)				£ 108,326.98

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Summary	£ 141,218.30	£ 231,490.79	39.0%	£ 90,272.48
Total (including VAT but excluding interest)				£ 108,326.98

The following information should be read in conjunction with Sections 14.17.17 and 14.28 of The CUSC (Determination of The Company's Forecast for Demand Charge Purposes).

CUSC 14.28 ▶	[D]	[P]	[E]	[S]	[J]	[M]	[R]	[V]				[X]		
BMU	kWh Consumption (16:00-19:00) Financial Year to Date (i.e. 15-09-19)	kWh Consumption (16:00-9:00) Previous Financial Year to Same Date (i.e. 15-09-18)	Total Consumption (16:00-19:00) Previous Financial Year (kWh)	Latest complete month of Settlement Data (Aug-2019)	Residual Part Month (If New User)	kWh Consumption in month [S] of this Financial Year (August 2019)	Total System Consumption from month [S] (Aug-18) to the end of the previous financial year (31-03-19)	Total System NHH consumption during month [S] (Aug 2018) of the previous financial year	Calculation Methodology	Calculation	Latest Customer NHH Forecast (kWh)	NG Predicted Annual Liability	Customer Predicted Liability	Difference (Between NG Predicted and Customer Predicted Liability)
2_AEXAM000	195,902	2,062	18,031	31/08/2019	9,864	59,161	17,269,657,630	1,514,545,068	New User *	[J / (M x (R / W))]	407,389	£48,990.76	£29,159.59	£19,831.17
2_BEXAM000	93,967	285	1,216	31/08/2019	3,288	29,176	17,269,657,630	1,514,545,068	New User *	[J / (M x (R / W))]	197,944	£21,317.30	£12,559.72	£8,757.58
2_CEXAM000	71,407	1,760	6,950	31/08/2019	3,702	19,645	17,269,657,630	1,514,545,068	New User *	[J / (M x (R / W))]	172,146	£13,904.13	£10,511.53	£3,392.61
2_DEXAM000	65,415	0	1,278	31/08/2019	2,385	19,476	17,269,657,630	1,514,545,068	New User *	[J / (M x (R / W))]	129,404	£13,308.07	£7,672.32	£5,635.75
2_EEXAM000	106,247	-3,398	-875	31/08/2019	-	-	-	-	Existing User	[E x (D / P)]	16,924	£1,842.74	£1,139.41	£703.33
2_FEXAM000	47,852	0	595	31/08/2019	2,596	14,106	17,269,657,630	1,514,545,068	New User *	[J / (M x (R / W))]	99,454	£8,170.68	£4,971.75	£3,198.93
2_GEXAM000	72,198	-796	-129	31/08/2019	-	-	-	-	Existing User	[E x (D / P)]	8,064	£688.22	£474.32	£213.89
2_HEXAM000	166,458	542	4,630	31/08/2019	7,193	53,403	17,269,657,630	1,514,545,068	New User *	[J / (M x (R / W))]	327,037	£45,084.29	£23,930.90	£21,153.39
2_JEXAM000	110,764	-1,986	420	31/08/2019	-	-	-	-	Existing User	[E x (D / P)]	8,408	-£1,804.87	£648.53	-£2,453.39
2_KEXAM000	48,500	208	1,433	31/08/2019	2,134	15,390	17,269,657,630	1,514,545,068	New User *	[J / (M x (R / W))]	91,016	£9,862.46	£5,053.84	£4,808.62
2_LEXAM000	180,677	0	238	31/08/2019	6,228	54,628	17,269,657,630	1,514,545,068	New User *	[J / (M x (R / W))]	389,075	£47,562.64	£29,414.43	£18,148.21
2_MEXAM000	42,802	0	18	31/08/2019	1,140	13,259	17,269,657,630	1,514,545,068	New User *	[J / (M x (R / W))]	80,063	£8,812.12	£4,631.80	£4,180.32
2_NEXAM000	39,873	0	898	31/08/2019	2,140	11,359	17,269,657,630	1,514,545,068	New User *	[J / (M x (R / W))]	93,441	£5,158.85	£3,661.34	£1,497.51
2_PEXAM000	84,250	0	2,702	31/08/2019	6,129	20,939	17,269,657,630	1,514,545,068	New User *	[J / (M x (R / W))]	210,557	£8,593.41	£7,388.83	£1,204.57
Total	1,326,311.3										2,230,922	£231,490.79	£141,218.30	£90,272.48

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Credit Monitoring

A supplier will be asked to place security against BSUoS / TNUoS charges

- BSUoS: security is equal to 32 days of BSUoS charges
- TNUoS: is equivalent to a small percentage of your annual liability. The accuracy of your forecast will have an impact on your security requirements for the following year
- The value of security required is re-assessed at the start of each month and a statement is emailed to each customer.

If you want to know more about security requirements, come to the workshop later.

Reconciliation & Forecasting Performance

Andrew Havvas

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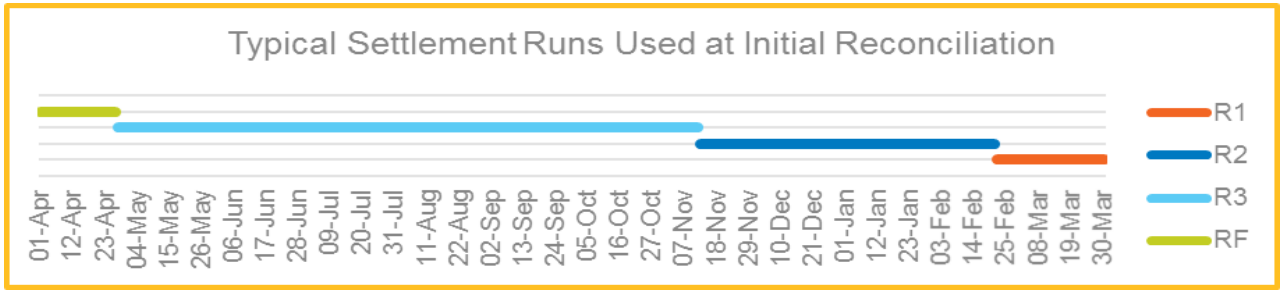
Demand Reconciliations

Initial Demand Reconciliation (annually in June Y + 1)

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



Final Demand Reconciliation (annually in autumn Y + 2)

- Charges are re-calculated using only **RF** (Reconciliation Final) settlement data
- They are reconciled against invoices issued at initial reconciliation

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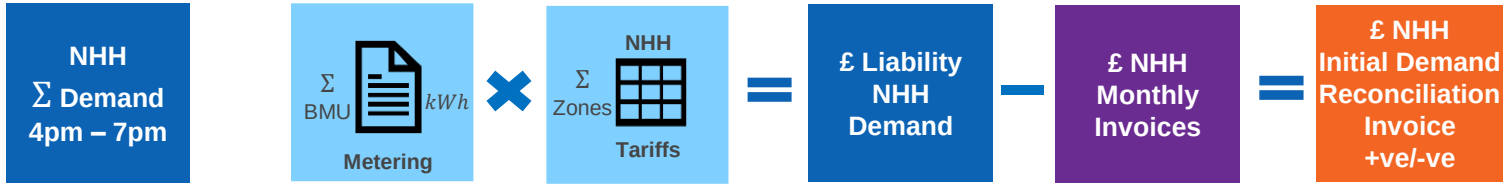
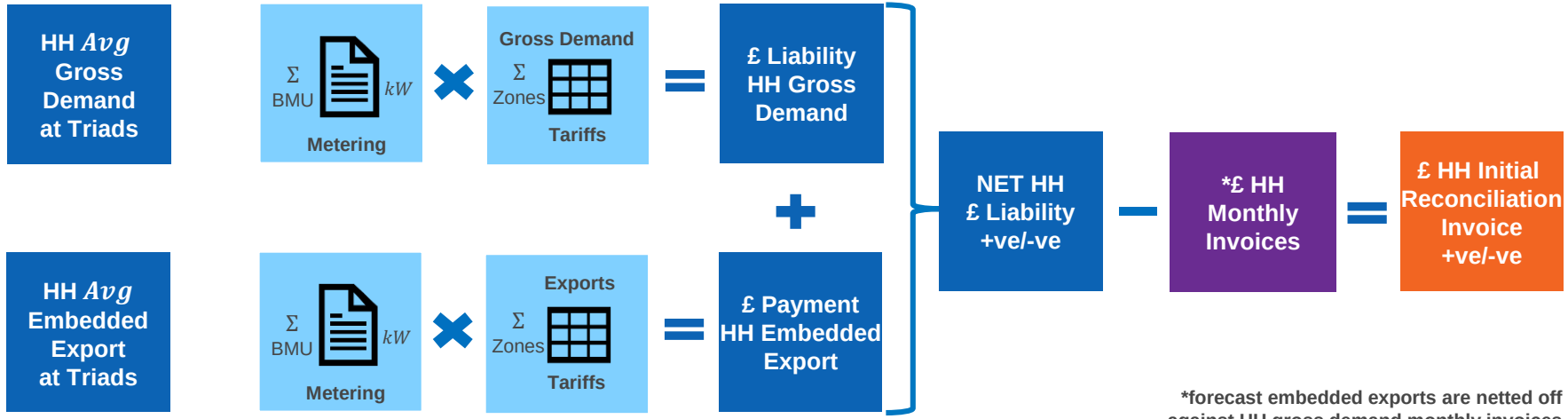
Initial Demand Reconciliation

NHH demand reconciliation



HH demand reconciliation



*forecast embedded exports are netted off against HH gross demand monthly invoices

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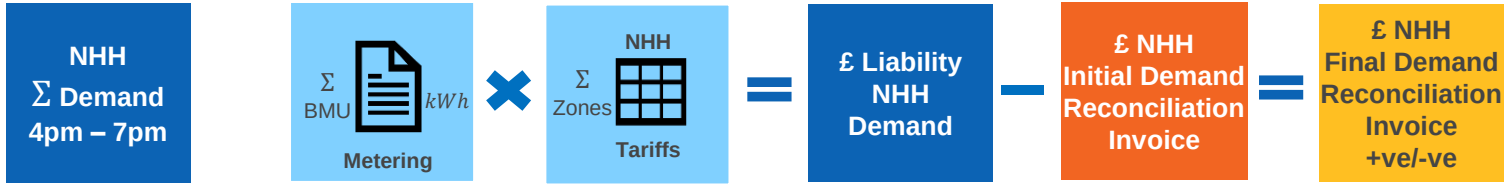
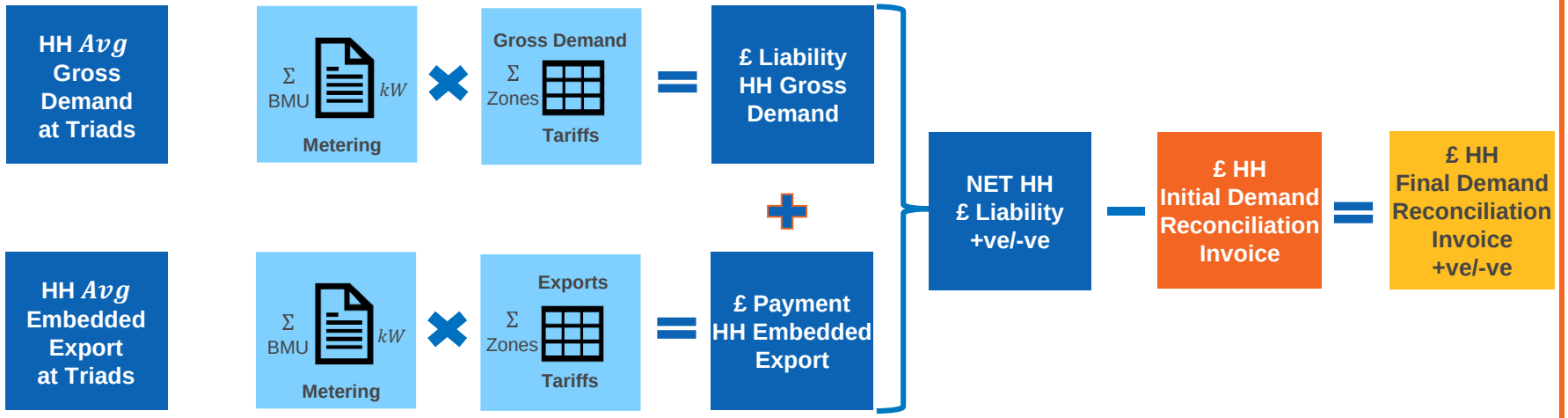
Final Demand Reconciliation

NHH demand reconciliation



HH demand reconciliation



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Forecasting Performance Variance

Andrew Havvas

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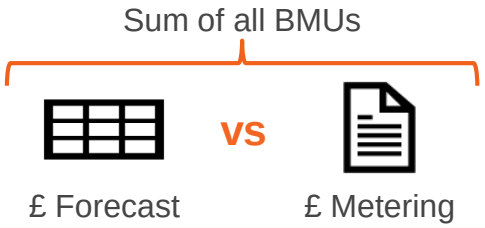
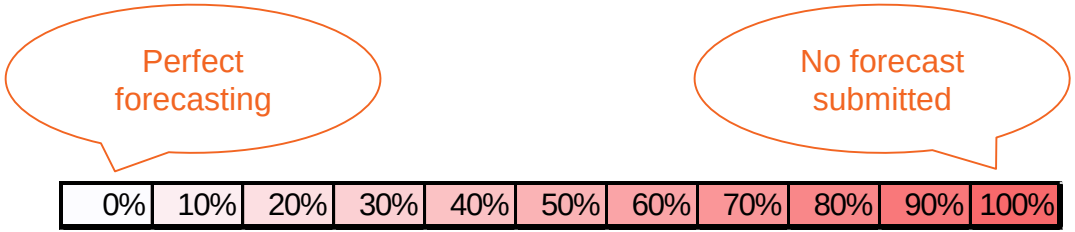
Forecasting Performance VAR (FPVAR)

What: FPVAR is the variance between the value of **forecast** demand and **actual** demand



Why: FPVAR is one of the inputs that determines the amount of security required for the following year



When:

- Calculated in July, using values from Initial Demand Reconciliation
- Used in security calculations from 1 October to 30 September

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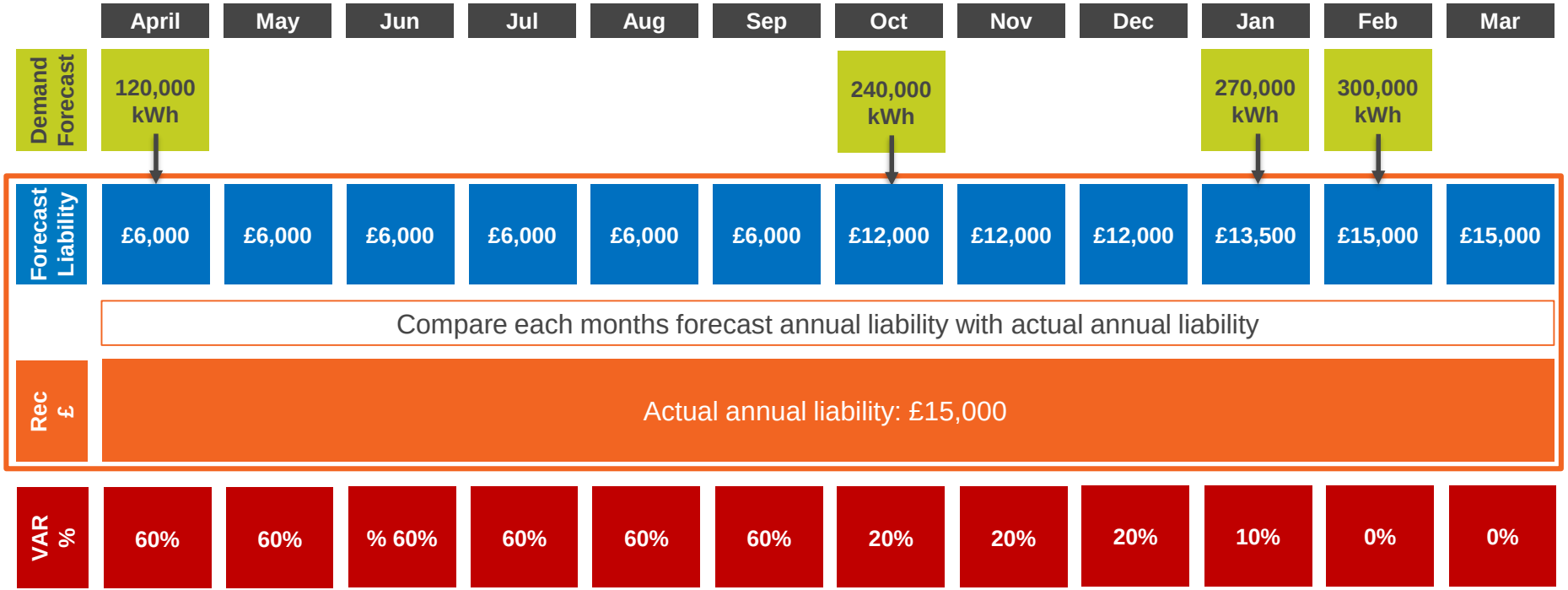
Forecasting Performance VAR (FPVAR) - NHH example (1)



VAR = (Actual - forecast) / actual

A positive VAR indicates under-forecasting

A negative VAR indicates over-forecasting

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Forecasting Performance VAR (FPVAR) – NHH example (2)

	April	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
VAR %	60%	60%	60%	60%	60%	60%	20%	20%	20%	10%	0%	0%
Forecast Weight ($\Sigma = 300$)	0	0	0	0	0	0	0	41	49	59	70	81
VAR % x Weight	0	0	0	0	0	0	0	820 %	980 %	590 %	0 %	0 %

Sum of VAR X weight: **2,390%**

÷

Sum of weight: **300**

=

NHH weighted average VAR: **7.97%**

NHH weighted average VAR: **7.97%**

−

NHH extreme condition adj: **3%**

=

NHH deemed FPVAR: **4.97%**

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Forecasting Performance VAR

- HH FPVAR is calculated on the same principles as NHH, but using HH forecast weightings defined in CUSC
- All FPVAR(s) are sent to Suppliers by the end of July
- Supplier can request a revision to the FPVAR
- The FPVAR is used in the calculation of security requirements .The greater the FPVAR the greater potential for a higher amount of security.

If you want to know more about FPVAR, come to the workshop later

Balancing Services Use of System Charging (BSUoS)

Nick Everitt

Nigel Swan

nationalgridESO

BSUoS Agenda

1	BSUoS Overview
2	BSUoS Forecasting and Reporting
3	BSUoS Billing
4	Questions

What are BSUoS charges and who pays them?

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

What is the charge for?

To recover balancing services costs

Recovers the cost of day-to-day operation of the transmission system

How is it charged?

Half hourly £/MWh applied proportionally according to your portfolio share

Charges are based on the costs of balancing actions taken on the transmission system over the 48 settlement periods each day

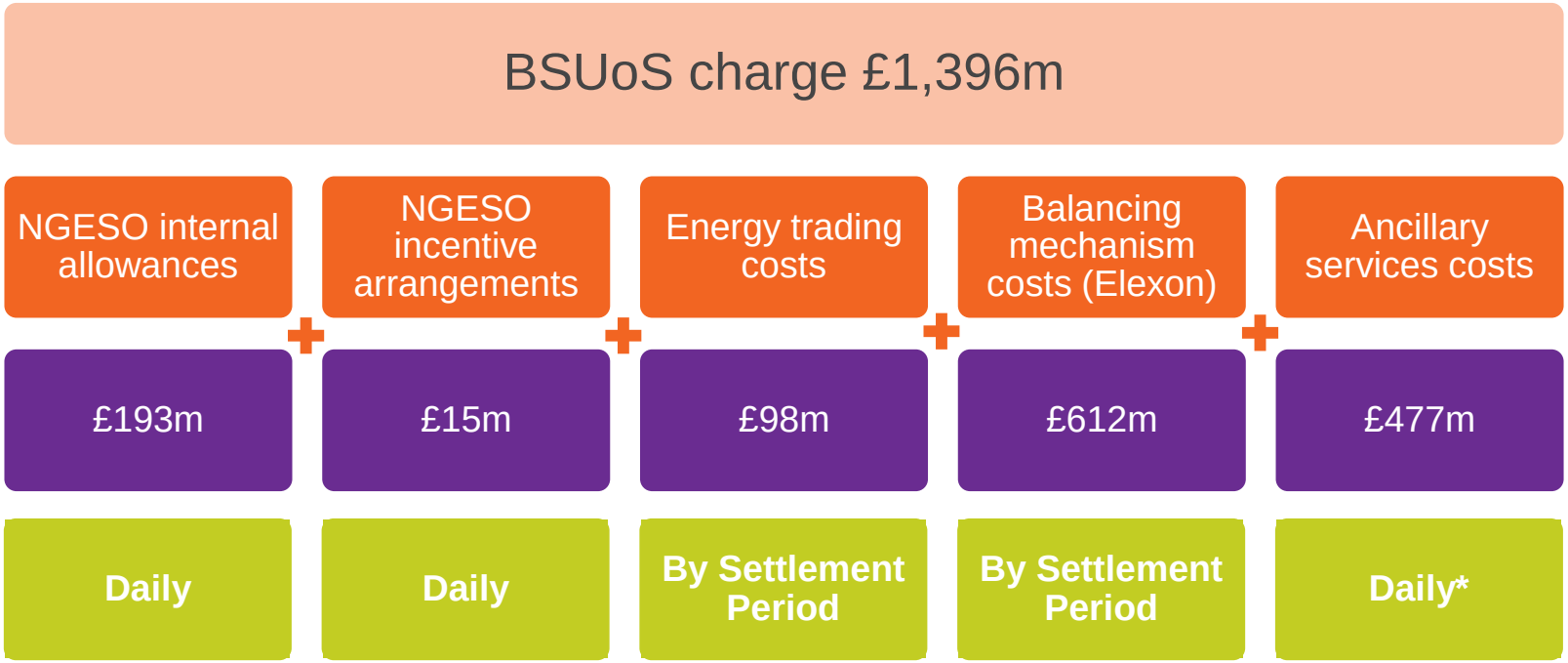
Who pays?

Generators

Suppliers

NGESO collects revenue from the customers that are using the network during each settlement period

What is the charge comprised of?



Figures rounded to nearest £m / 18/19 Scheme Year Actuals
Daily* - STOR week ahead availability costs by settlement period

BSUoS Forecasting and Reporting

Nigel Swan

nationalgridESO

BSUoS Forecasting and Reporting Agenda

1	Performance Review Team
2	Data Explorer
3	Daily Report
4	Monthly Balancing Services Summary
5	BSUoS Monthly Forecast Report
6	BSUoS Forecast Error (Jun - Aug)
7	New and Future Reports

Commercial Performance Review team

Nigel Swan

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

Nicholas Robertson

Pavinder Babra

Cristian Ebau

Anita Wong

Harry Shearer

BSUoS reporting and forecasting

OPMR publication

Feedback on each report

1. What extent the reports help to inform business decisions

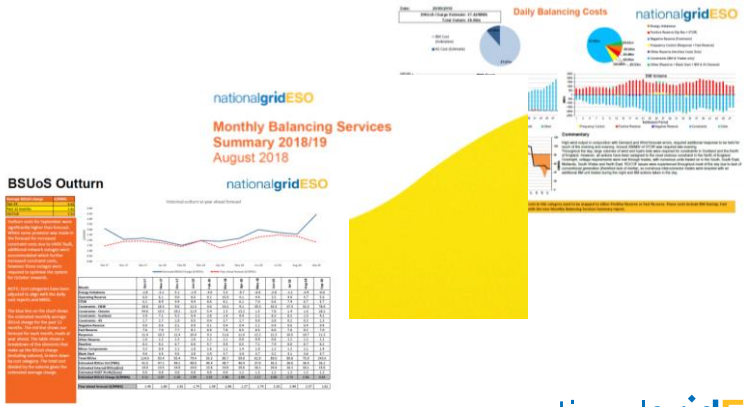
2. How understandable the content is of the reports

3. How likely you are to recommend the reports to a friend or colleague

Poll questions

Go to: www.slido.com
Event code: #Charging1

Respond to the 5 questions



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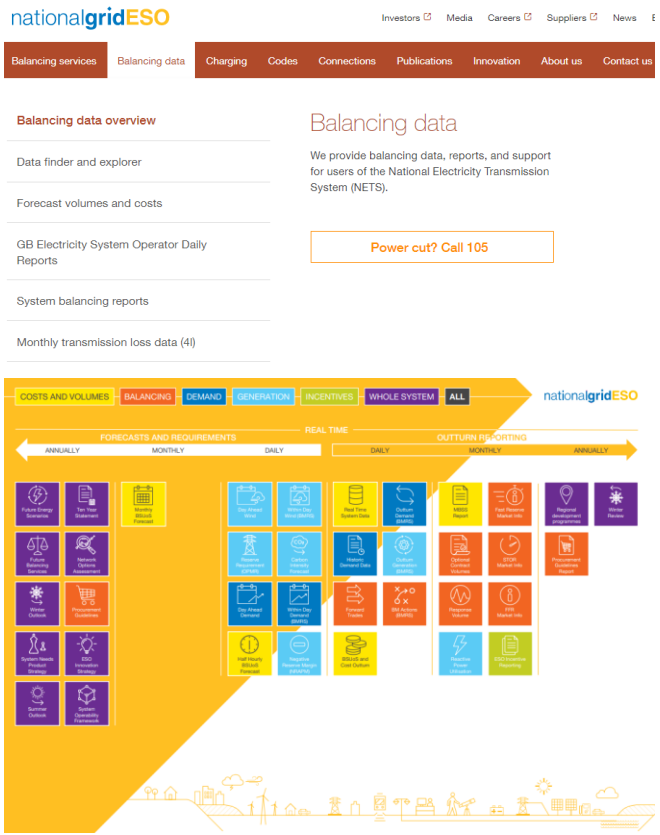
Data Explorer Page

- Launched Q1 this year
- Interactive way of navigating through information published on website
- Organised by timescale and granularity

- Feedback request
  - Informing business decisions?
  - Understand content?
  - Would recommend?



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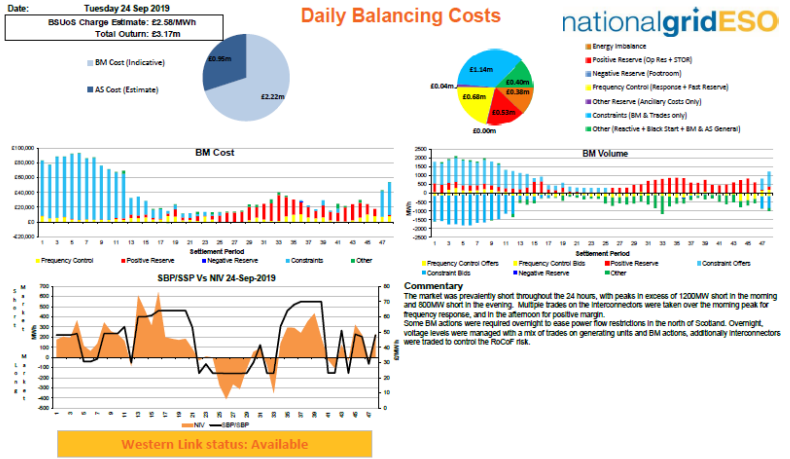
Daily Balancing Cost Report

- Launched on 5 January 2018
- It has been through several iterations
- Aim to publish within 2 working days

- Feedback request
  - Informing business decisions?
  - Understand content?
  - Would recommend?



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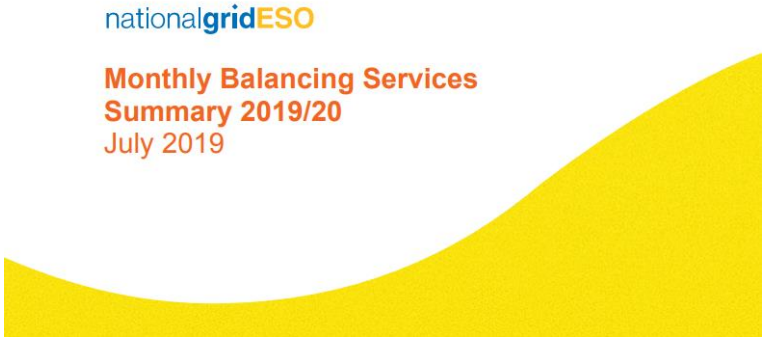
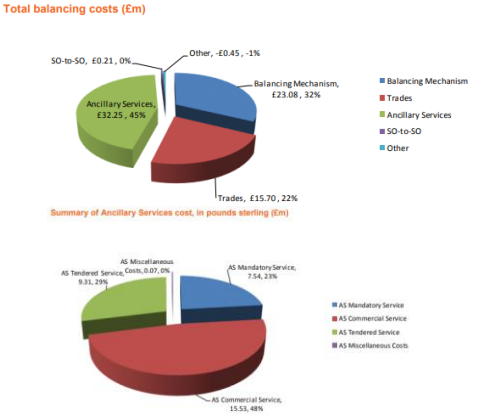
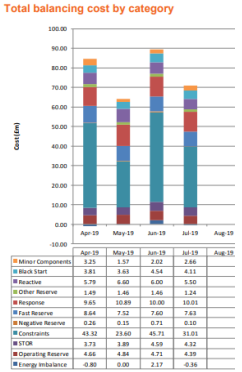
Monthly Balancing Services Summary

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

- Feedback request
  - Informing business decisions?
  - Understand content?
  - Would recommend?







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BSUoS Monthly Forecast Report

- Launched in June 2018
- Cost breakdown changes

- Feedback request
  - Informing business decisions?
  - Understand content?
  - Would recommend?

BSUoS Outturn

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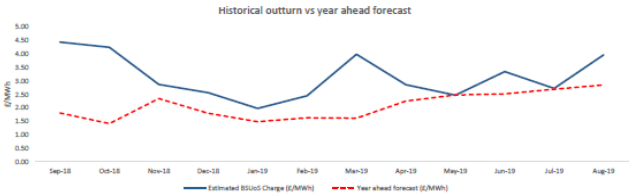
Average BSUoS charge	£/MWh
Aug-19	3.97
Past 12 months	3.11
2018/19	2.88

Outturn costs for August were higher than July due to an increase in constraint costs due to more adverse weather than July. Western Link was restricted to reduced levels at the end of the month and additional response was also held leading to an increase in costs.

The BSUoS volume down by 1.6TWh on July.

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	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19
Energy Imbalance	-0.7	0.0	2.5	-2.3	-5.5	-5.1	0.2	-0.8	0.0	2.2	-0.4	2.4
Operating Reserve	5.4	8.0	8.5	8.2	6.8	4.7	4.4	4.7	4.8	4.7	4.4	6.3
STOR	5.8	5.4	5.8	6.0	6.1	4.6	5.1	3.7	3.9	4.6	4.3	4.2
Constraints - E&W	77.7	71.0	29.8	26.5	9.3	21.2	23.3	16.8	14.8	43.4	24.0	41.7
Constraints - Cheviot	18.2	8.8	13.9	2.2	13.3	11.1	30.8	17.3	0.4	0.1	0.1	1.0
Constraints - Scotland	4.1	10.9	5.7	16.4	10.7	10.5	31.6	4.1	6.0	0.9	4.7	12.4
Constraints - AS	1.6	13.5	13.3	8.2	7.3	6.8	6.5	5.1	2.4	1.2	2.2	1.9
Negative Reserve	0.6	0.2	0.4	0.4	0.2	0.1	0.1	0.3	0.1	0.7	0.1	1.4
Fast Reserve	7.6	8.5	7.0	7.6	9.8	7.8	8.2	8.6	7.5	7.6	7.6	7.5
Response	11.4	10.5	12.1	11.8	9.7	9.1	11.5	9.6	10.9	10.0	10.0	13.7
Other Reserve	1.1	1.3	0.8	1.5	1.4	1.4	1.3	1.5	1.5	1.5	1.2	2.0
Reactive	6.1	6.8	6.9	7.9	7.5	6.1	6.0	3.8	6.6	6.0	5.5	5.4
Minor Components	1.5	0.6	1.1	1.8	1.3	2.0	12.6	3.3	1.6	2.0	2.7	4.4
Black Start	3.8	5.0	3.5	3.8	3.6	3.6	5.3	3.5	3.6	3.2	3.8	3.9
Total BSUoS	144.1	150.6	111.4	99.9	81.6	83.8	147.0	83.5	64.1	88.2	70.3	108.2
Estimated BSUoS Vol (TWh)	36.2	39.5	44.7	45.7	50.0	40.6	41.2	38.2	36.7	34.1	35.6	34.0
Estimated Internal BSUoS (£m)	15.6	16.1	15.6	16.1	16.1	14.5	16.1	24.9	25.7	24.9	25.7	25.7
ESO Incentive	1.2	1.3	1.2	1.3	1.3	1.2	1.3	1.0	1.0	1.0	1.0	1.0
ALoMCP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Estimated BSUoS Charge (£/MWh)	4.45	4.25	2.87	2.57	1.98	2.45	3.99	2.86	2.47	3.35	2.73	3.97
Year ahead forecast (£/MWh)	1.81	1.42	2.35	1.80	1.49	1.63	1.62	2.25	2.48	2.52	2.69	2.85

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BSUoS Forecast Error

June 2019

- Cost: +£24.1m
- Vol: -2.7 TWh
- Charge: +£0.88 (35%)

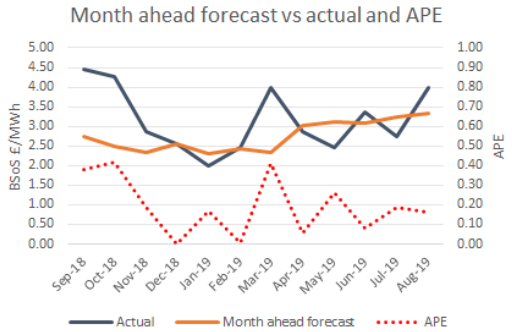
July 2019

- Cost: -£17.9m
- Vol: +1.6 TWh
- Charge: -£0.62 (19%)

August 2019

- Cost: +£37.9m
- Vol: -1.6 TWh
- Charge: +£1.25 (46%)

Month Ahead Forecast Error



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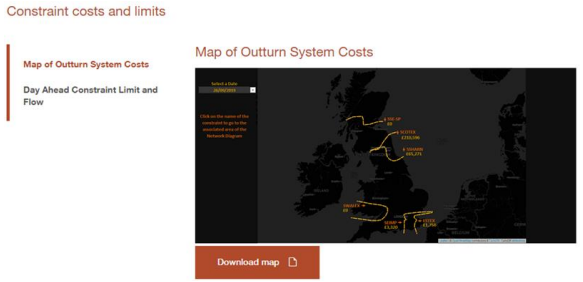
New and Future Reports

Operational Insights

- Sharing our insight on balancing actions and producing a map of outturn system costs for thermal constraint costs by region or constraint boundary.
- Publish day ahead information on constraint boundaries to share the limit and the expected flow at day ahead.



Upcoming Projects

- Sharing our insight on balancing actions and producing a map of outturn system costs for voltage constraints per region.
- New data portal:Q3 2019-20

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BSUoS Billing

Nick Everitt

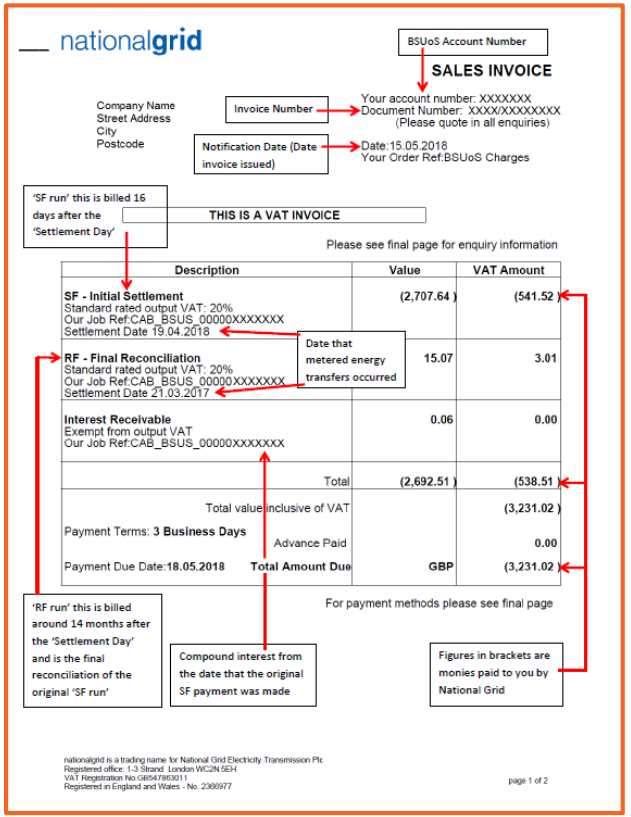
nationalgridESO

BSUoS Billing Agenda

1	Your bill
2	How to calculate your charge
3	BCR reporting improvement
4	BSUoS data sources

BSUoS Billing

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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The Balancing Services Charging Report (BCR)

- Cost categories updated
- Black start costs broken down to greater granularity
- Separate line for ESO incentive
- Placeholders for future costs

NGESO BALANCING SERVICES USE OF SYSTEM CHARGES — Page : 1
BALANCING SERVICES CHARGING REPORT(BCR)

Date: 08/10/2019

Settlement Day:13/09/2019

SAA Run Number:02 — Settlement Run Type:SF — NGESO Version Id:01

Internal Scheme Code:19/20 — Internal Scheme Name:2019/2020 — Internal Scheme Day: 166

BALANCING SERVICES USE OF SYSTEM CHARGE	TODAY COMPONENTS(£)	YEAR TO DATE(£)
System Operator Balancing Mechanism Costs	+1,469,476.780	+242,375,242.430
Balancing Services Contract Cost	+1,190,177.805	+147,033,856.239
Balancing Services Cost Variable	+241,600.570	+59,157,893.145
ESO Incentive Recovery Costs	+40,983.610	+6,803,279.260
Black Start Capital Costs	+.000	+.000
Black Start Testing Costs	+.000	+.000
Black Start Availability Costs	+114,936.360	+19,092,235.280
Black Start Other Costs	+.000	+.000
System Operator Internal Costs	+824,071.040	+136,795,792.640
System Innovation Costs	+.000	+.000
Prior Year Cost Recovery	+.000	+.000
EMR Incentive Revenue	+4,128.420	+685,317.720
Placeholder Column2 30 Charact	+.000	+.000
Placeholder Column3 30 Charact	+.000	+.000
Wind Forecast Incentive	+.000	+.000
Provision Of Balancing Services to Others	+.000	+.000
Total Internal Costs	+824,071.040	+136,795,792.640
Total External Costs	+3,061,303.545	+475,147,824.074
Total Adjusted Energy Volume (MWh)	+1,162,571.746	

BSC Party Charging Advice (BPA)

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

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				

BM UNIT SETTLEMENT PERIOD DATA:

BM UNIT ID: 2_AABCD

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

How to calculate your BSUoS Charge

Example

Charges are calculated by individual settlement period per BMU

BCR Reporting Improvement

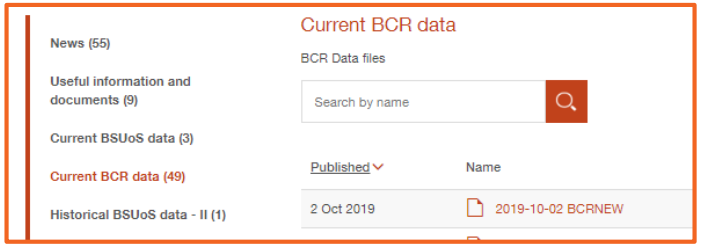
We now have a new price file which is issued alongside the existing reports via the FTP server. The price file contains II, SF and RF daily price data.

The Balancing Services Charging Report (BCR) now includes:

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.



We also upload the latest BCR report to our webpage daily

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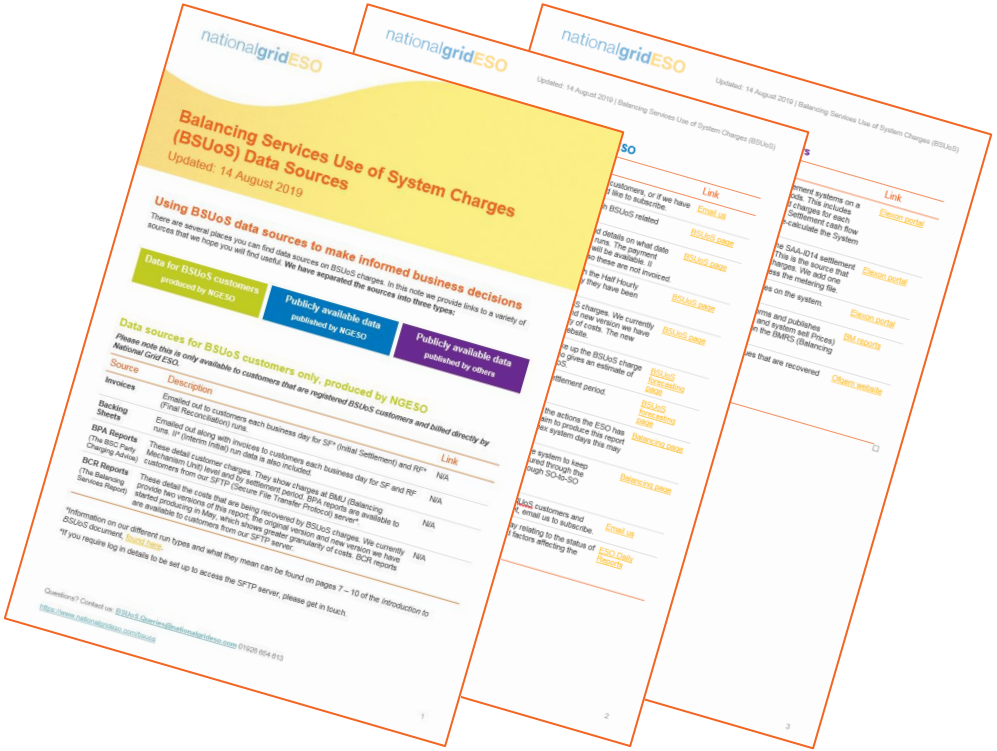
BSUoS Data Sources

- Guidance document with links to various data sources
- Will use some of the sources in the workshop later



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Connection Charges

Anthony Tichivangana

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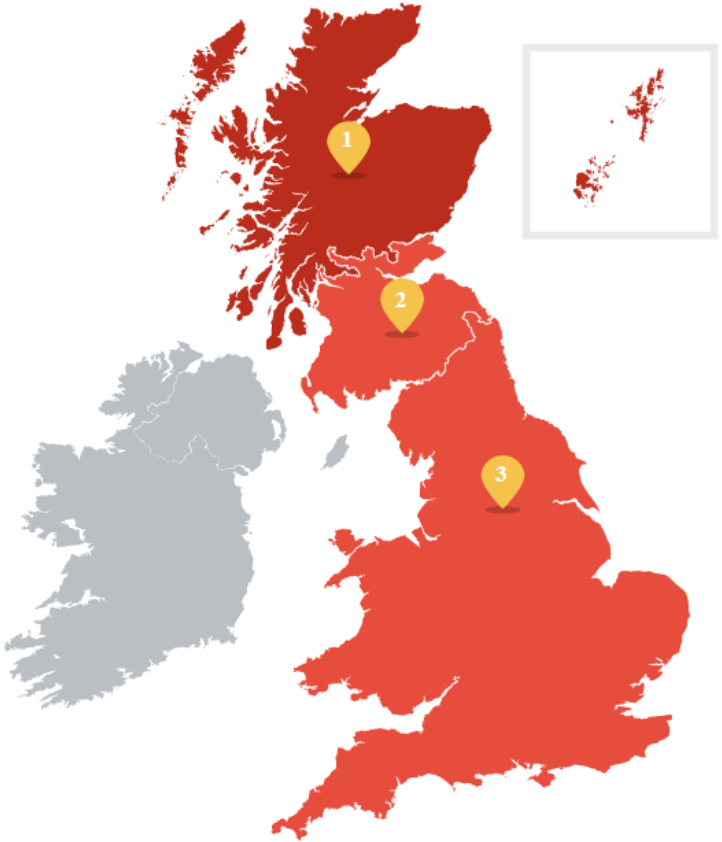
Connection charges

Connection Charging Team calculate and recover Connection Charges **on behalf of the Transmission Owner.**

Connection charges cover installing and maintaining **sole use assets** which connect users to the National Electricity Transmission System (NETS).



1 Scottish & Southern Electricity Networks

2 SP ENERGY NETWORKS

3 nationalgrid

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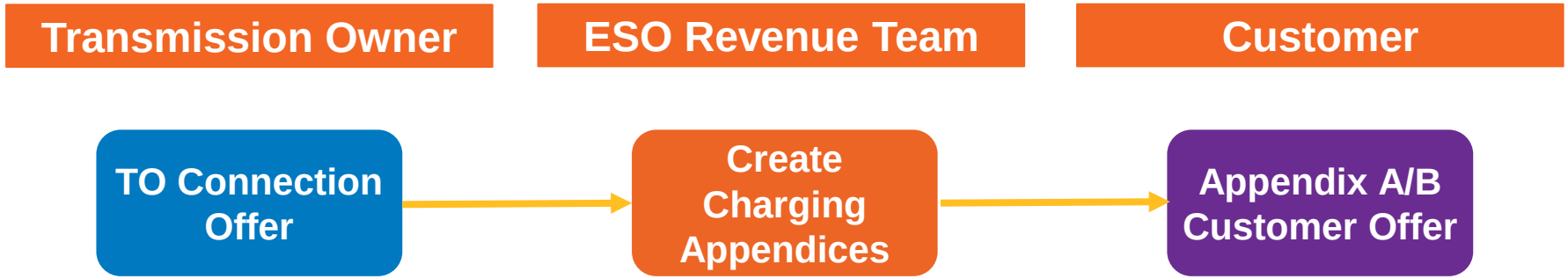
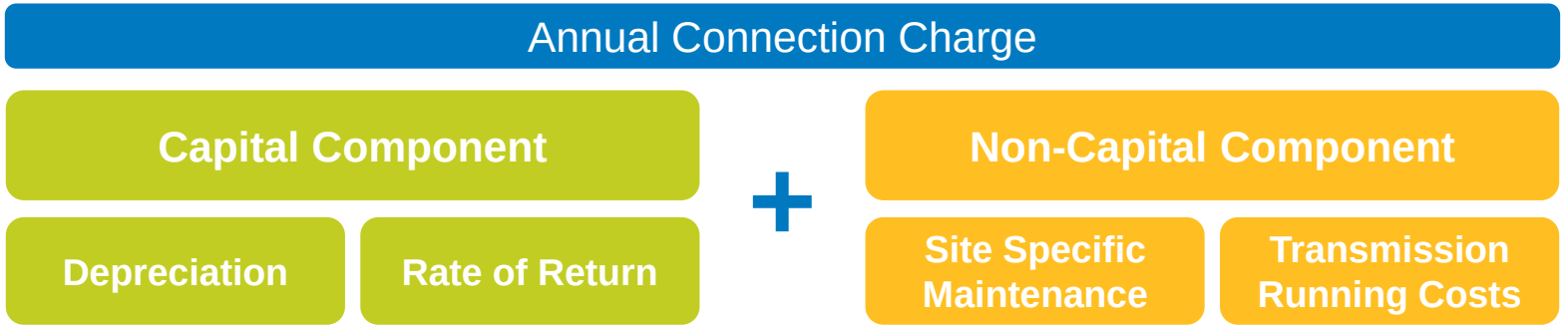
Connection Offer Process



- The Transmission Owner provide the ESO with the cost of the connection asset.
- We then apply our charging methodology to create a connection charge for customer offers.
- The ESO has contract in place with the TOs and customers for each connection

Connection charges

The connection charge is calculated annually and payable monthly. It's made up of the following elements:



- Customers can choose to pay the capital component in full to reduce the monthly connection charge. This is called a capital contribution.
- Non Capital Component is payable for as long as the site is operational, even after the capital component has been paid off.
- Customers are required to place post commissioning security for as long as the site is operational

After lunch

- Workshops
- Q&A
- Feedback

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Workshops

How and why we monitor your credit (TNUoS and BSUoS)

All customers receive a credit statement from us each month.

In this session, we'll explain what it's all about and why it's important.

How and why we monitor demand forecasts (TNUoS)

TNUoS demand charges are based on the supplier forecast.

We'll go through what makes up the half-hourly and non-half hourly forecast.

How and why we reconcile your TNUoS charges

At the end of the charging year, you will have either underpaid or overpaid for TNUoS.

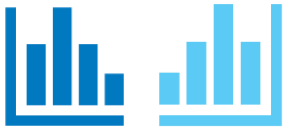
In this session we'll go take you through how we reconcile the charge.

Workshops continued

Connection charges explained

In the session we will take you through how connection charges are calculated and explain what post-commissioning securities are.

Ways to reconcile your BSUoS charges



We will take you through how to use different data sources as a way of reconciling the BSUoS charge.

Code development updates and Q & A

We will talk through current code modifications which may have an impact on the transmission charging regime.

Charging Forum Workshops

13:20 – 15:20

Time	Main room (L17)	L 10	L 9	Kitchen area
13:20 – 14:00	Ways to reconcile your BSUoS charges	How and why we monitor your credit (TNUoS and BSUoS)		Networking and refreshments
14:00 - 14:40	Code development updates and Q & A	How and why we monitor demand forecasts (TNUoS)	Connection charges explained	
14:40 – 15:20	Ways to reconcile your BSUoS charges	How we reconcile your TNUoS charges	Connection charges explained	

Lunch

(Room L9)

Any questions?

Go to: www.slido.com
Event code: #Charging1

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Question and Answer session

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Your feedback on today

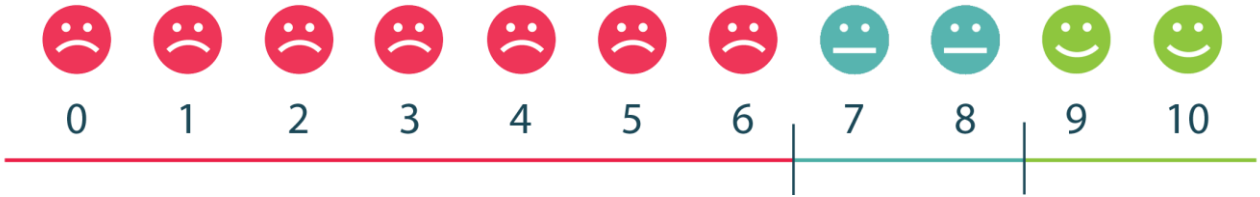
1. How likely is it that you would recommend the Transmission Charging Forum to a friend or colleague?

2. What did you like about this event?

3. How could we improve this event?

Poll questions

Go to: www.slido.com
Event code: #Charging1
Respond to 3 questions



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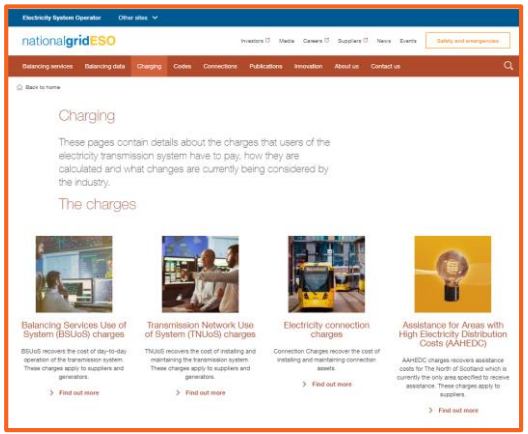
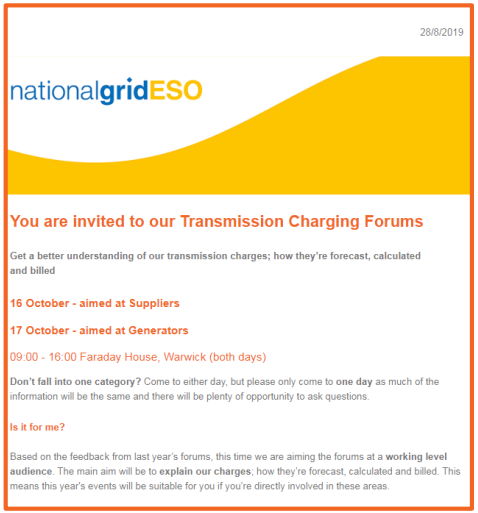
Our engagement channels



Website



Newsletter

Guidance materials

www.nationalgrideso.com/charging
Join our mailing list

Upcoming events

- **2020/2021 Draft Tariffs Webinar** 5 December 10:30 - 11:30am
- **TNUoS Transport & Tariff Model training** 11 December 10:00am - 3:00pm

Contact us

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www.nationalgrideso.com/charging

Customer Satisfaction Surveys - coming soon

We donate £10 to City Year UK for every survey response

We're asking for your feedback on:

- our overall service as a transmission charging team (covering BSUoS and TNUoS charges),
- our service as National Grid ESO as a whole.

Thank you

BMG Research

An independent research organisation

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