Revenue & Charging Forum 2022

nationalgridESO

Recordings available below by following the links

1. Overview & Website Tour → Here
2. TNUoS Tariff Setting → Here
3. TNUoS Billing → Here
4. TNUoS TDR → Here
5. BSUoS Operational Billing → Here
6. BSUoS From April 2023 → Here
7. Connections Charging → Here

Welcome!

Nick George

ESO Revenue Manager - Billing and Charging

Housekeeping

Questions and Feedback

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

Join at:

slido.com

#Revenue

Today's agenda

Welcome and introduction to the day	09:30 – 09:40
Walkthrough of website	09:40 – 09:50
TNUoS Tariffs	09:50 – 10:45
TNUoS Billing	10:45 – 11:25
Refreshments break	*11:25 – 11:45*
BSUoS Billing	11:45 – 12:05
BSUoS Tariffs - the new methodology	12:05 – 12:35
Connection charging	12:35 – 12:55
Lunch	*12:55 – 13:30*
Workshops (2 x 30 min sessions)	13:30 – 14:30
STAR billing system update	14:30 – 14:45
Wrap Up / Q&A	14:45 – 15:00

Workshops

BSUoS New Methodology
TNUoS TDR
Reconciling BSUoS charges

Q&A: Slido.com → #Revenue

Meet the Revenue Team

Nick George
Revenue Manager – Charging and Billing

Andrew Havvas
TNUoS Billing Lead

Dan Hickman
TNUoS Billing Analyst

Matt Marriott
TNUoS Billing Analyst

Jheaunelle Thomas
TNUoS Billing Analyst

Heather Stratford
BSUoS Billing Lead

Davinder Sanghera
BSUoS Billing Analyst

Luke Craddock
Connections Charging Lead

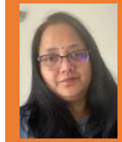
John Beezley
Connections Charging Analyst

Nick Everitt
Revenue Manager - Tariff Setting & Change Management

Sarah Chleboun
Revenue Tariff Lead

Ish Hussain
Revenue and Charging Analyst

Jo Zhou
Senior Revenue and Charging Analyst



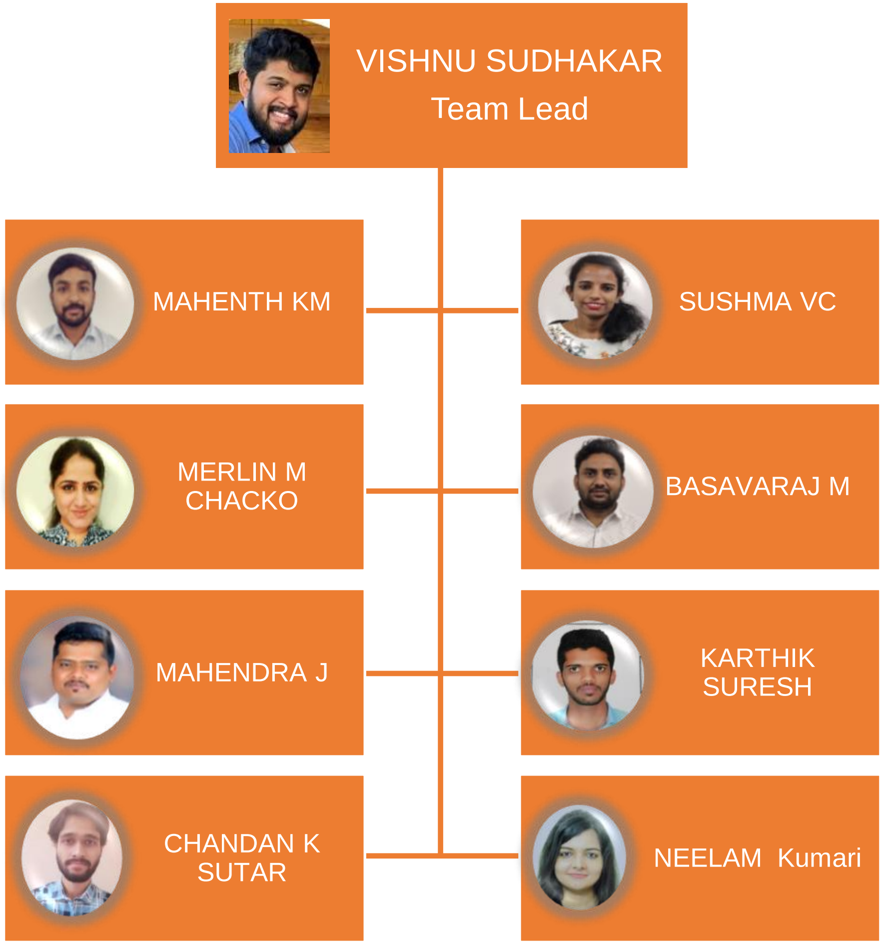
Rama Kodukula
Compliance Analyst

Malcolm Rowe
Charging System Development Lead

Offshore Team
(Team of 9)

Q&A: Slido.com → #Revenue

Meet the Revenue Team: Offshore



BSUoS Billing	Connection Charging and Billing	TNUoS Billing	TNUoS Tariff Setting
Neelam	Basavaraj	Mahendra	Chandan
Mahenth	Sushma	Sushma	Karthik
Mahendra	Chandan	Mahenth	Basavaraj
Merlin	Karthik	Neelam	
	Mahendra		

Our Charges

TNUoS

Transmission Network Use of System Charges
~ £3.6bn TO Revenue *

Connection Charges

Charges for connecting to the transmission network (inc one-off + cap cons)
~ £310m TO Revenue *

AAHEDC Charges

Assistance for Areas with High Electricity Distribution Costs
~ £100m SHEPD Revenue *

BSUoS

Balancing Services Use of System Charges
~ £5.5bn Revenue *

* Forecast for FY22/23, as at Sep 2022

How to Engage with Us

Transmission Charging Methodology Forum (TCMF)

A sub-group Further details can be found on the NGESO website

Operational Transparency Forum (OTF)

Useful for information on operational matters, including balancing costs. Details, including a link to receive regular reminders, on the data portal

Subscribe to our Charging mailing list

If you're not already subscribed to our mailing list you can subscribe here

Get in touch

tnuos.queries@nationalgrideso.com – TNUoS & AAHEDC queries

bsuos.queries@nationalgrideso.com – BSUoS queries

transmissionconnectioncharging@nationalgrideso.com – Connection Charge queries

https://www.nationalgrideso.com/contact-us - contact details for other matters

Website Tour

Nick George

ESO Revenue Manager - Billing and Charging

https://www.nationalgrideso.com/

TNUoS Tariffs Overview

TNUoS Tariff Forecasting & Setting Team

NGESO Revenue Team
TNUoS Tariff Forecasting & Setting

Q&A: Slido.com → #Revenue

Nick Everitt

Forecasting, setting and billing TNUoS to recover around £3.6bn of revenue per year from generators and demand

Sarah Chleboun

- Overall tariff setting
- Offshore local tariffs
- Local substation
- Generation
- ALFs

Jo Zhou

- Long term strategy development
- TGR
- Onshore Local Circuits
- TnT model and network

Ishtyaq Hussain

- Revenue
- Demand
- EET
- TDR

What is TNUoS and who pays

What is TNUoS?

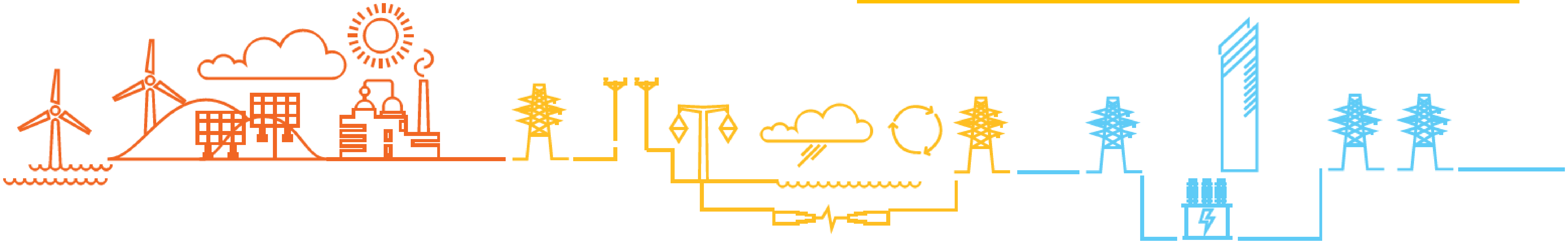
Q&A: Slido.com → #Revenue

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

Adjustment charge: used to ensure generation tariffs are compliant with EU legislation.

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



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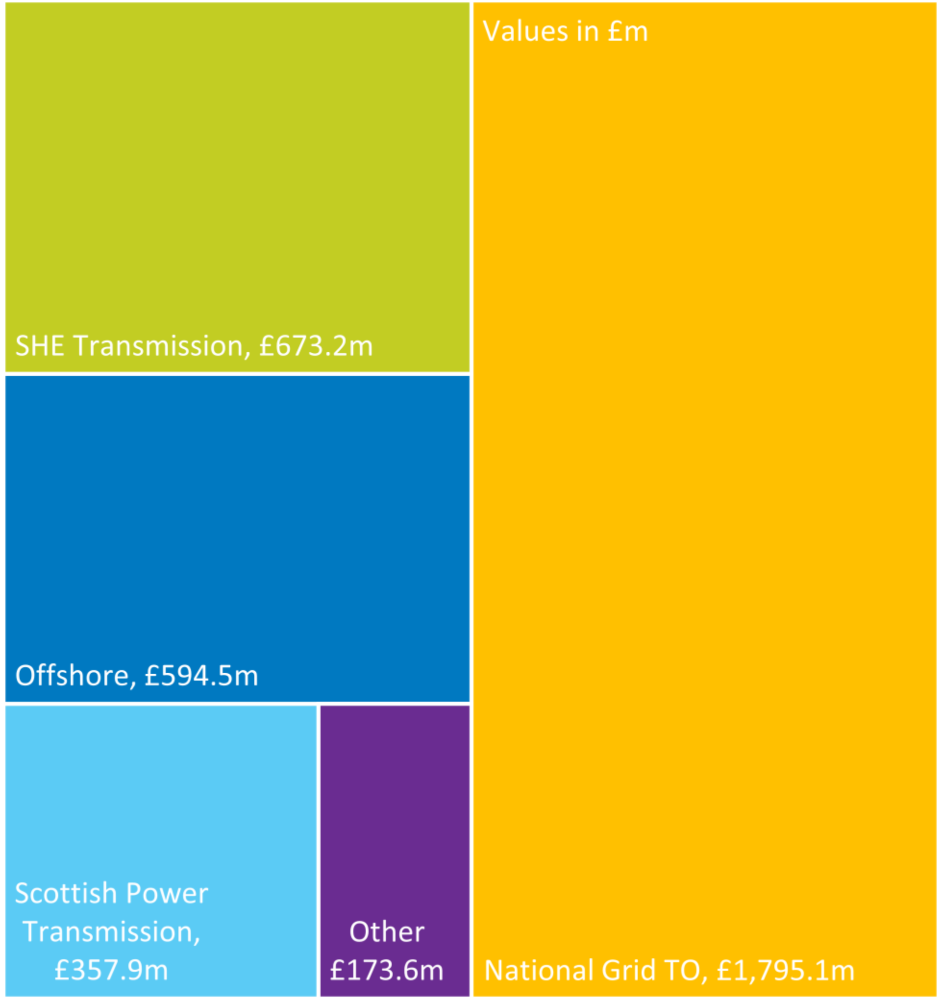
What makes up the TNUoS charge?

Q&A: Slido.com → #Revenue



Figures from [Final TNUoS Tariffs for 2022/23]

Recovers revenue for:

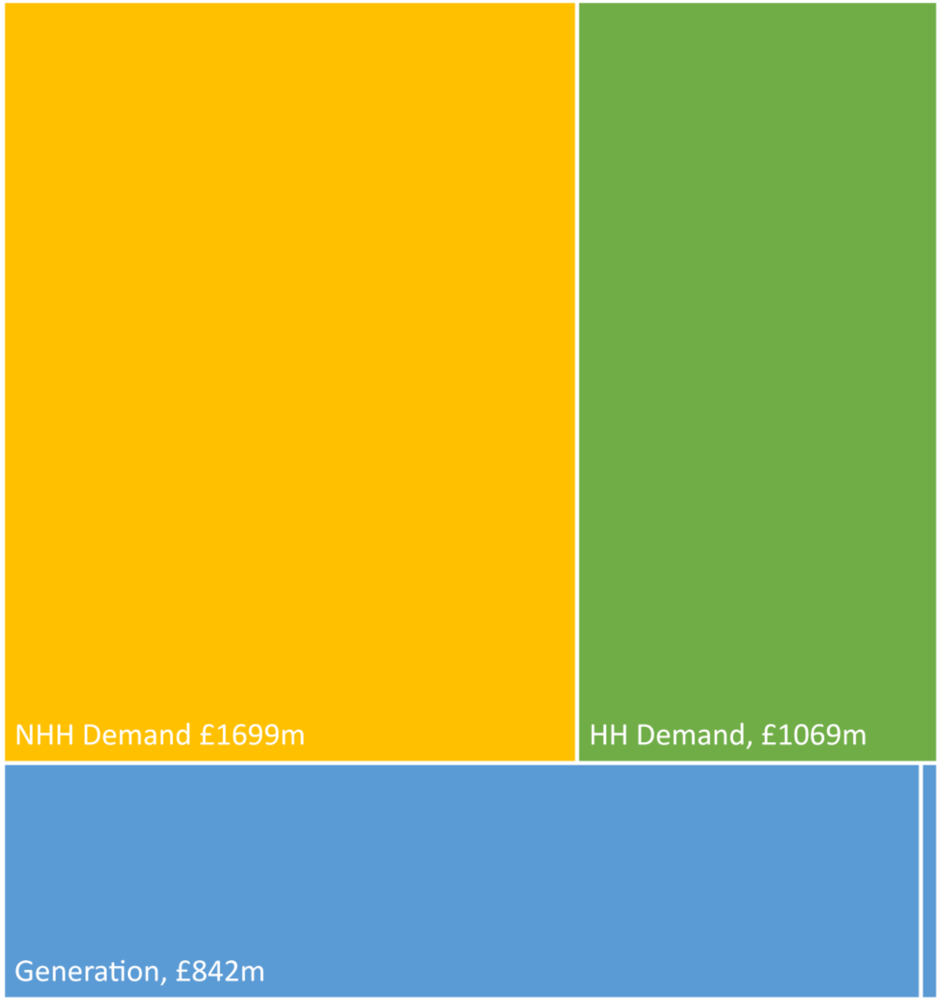
- Onshore TOs
  - National Grid TO
  - Scottish Power Transmission
  - Scottish Hydro Electricity Transmission
- Offshore TOs
- Other

Who Pays TNUoS?

Q&A: Slido.com → #Revenue

TNUoS Revenue paid by:

- Total TNUoS Revenue for 2022/23, £3,594m
- Demand Revenue £2,752m
  - HH Demand £1,069m
  - NHH Demand £1699m
  - Embedded Export -£16m
- Generation £842m



Figures from Final TNUoS Tariffs for 2022/23
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 net demand during the Triad*

*From 2023/24, Transmission Demand Residual (TDR) changes will be implemented

Who pays TNUoS? - Demand

Q&A: Slido.com → #Revenue

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

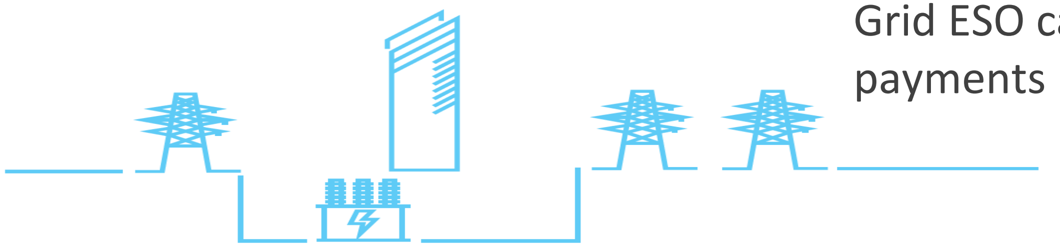
Half-Hourly metered demand on the basis of Triads	**Non Half-Hourly** demand, total 4pm-7pm annual consumption	**Embedded Export** credited for export over Triads

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

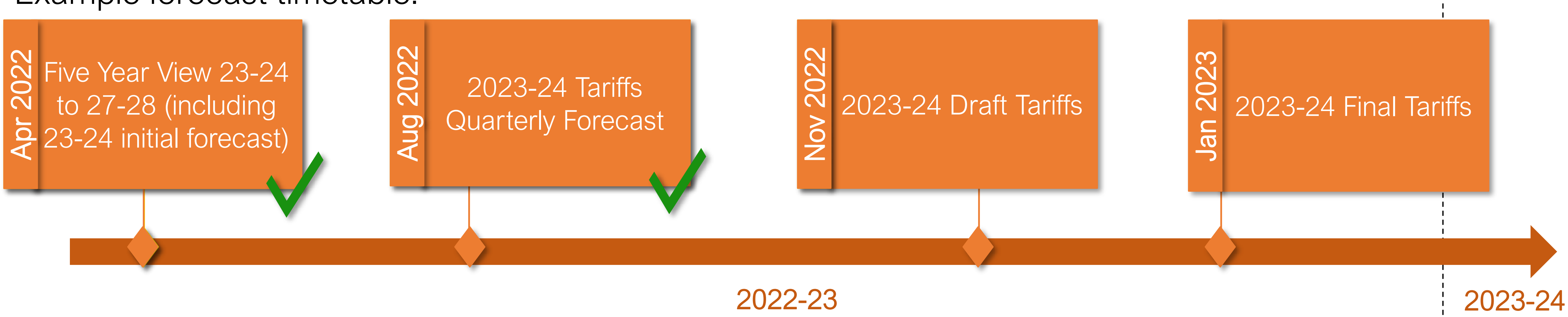


*From 2023/24, Transmission Demand Residual (TDR) changes will be implemented

Tariff Timetable

NGESO has a licence and CUSC obligation to publish quarterly TNUoS forecasts and a 5 year review annually, to enable market participants to make efficient operational and investment decisions.

Example forecast timetable:



- The tariff forecasts are refined throughout the year
- The Final Tariffs are published by 31st January and take effect from the following 1st April.
- The forecast timetable for each year is published by the end of the preceding January.
- All of our tariff publications and webinar recordings can be found on our website: https://www.nationalgrideso.com/industry-information/charging/transmission-network-use-system-tnuos-charges

Generation TNUoS

Generation TNUoS

Generation TNUoS

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

Generation
£842m

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

Generation TNUoS Tariffs

Directly Connected Generators (BCAs) are liable for:

Wider generation Tariff + Local Substation tariff + Local Circuit tariff (if applicable)

Embedded generators (BEGAs) with TEC ≥ 100MW are liable for:

Wider generation Tariff

Embedded generators with TEC < 100MW are not liable for generation TNUoS charges but may be paid the Embedded Export Tariff (EET)

Always applies

May (or may not) apply

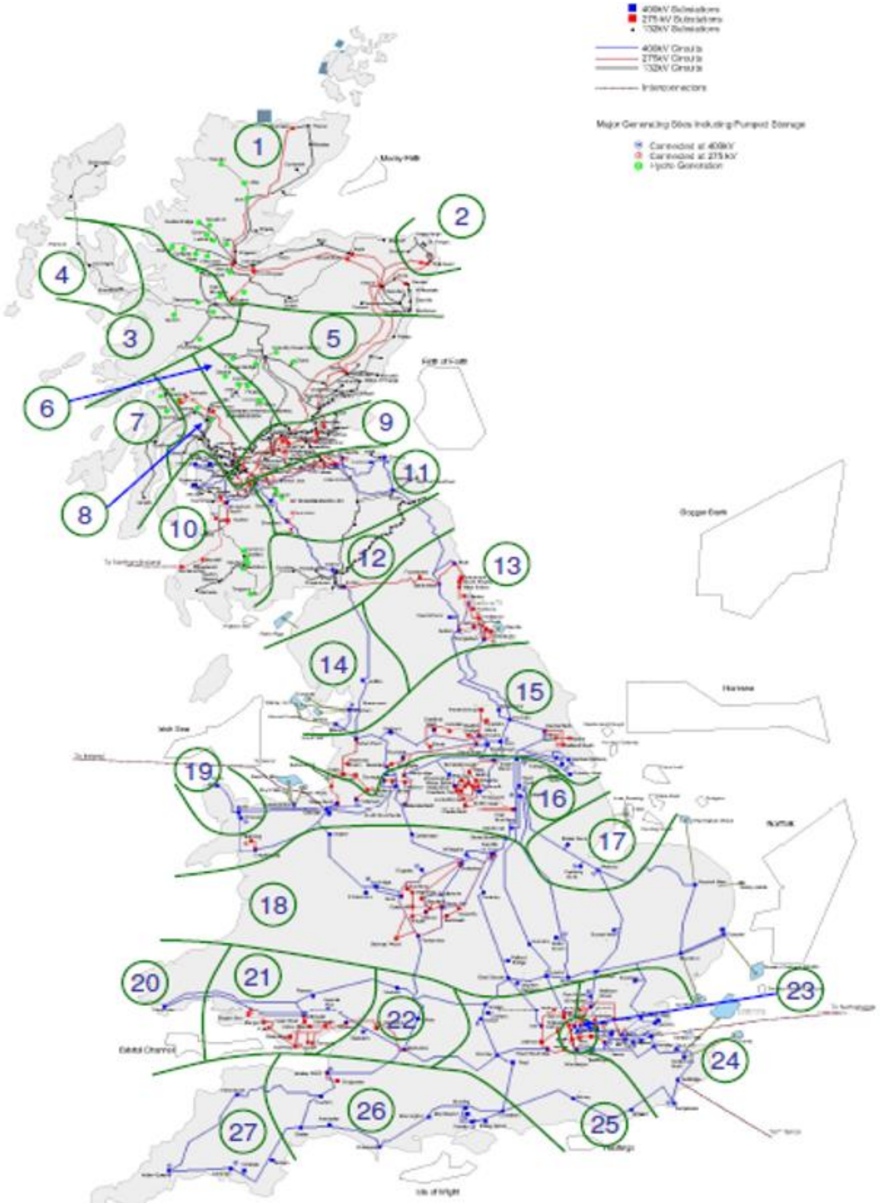
Generation Wider Tariffs

Q&A: Slido.com → #Revenue

- Wider tariffs are calculated per zone
- Currently 27 generation zones
- Components apply based on fuel type

Wider Tariff components:

Peak Security	Year Round Shared
Year Round Not Shared	Adjustment



Wider Generation Charging Categories

Q&A: Slido.com → #Revenue

Intermittent e.g. Wind, Tidal, Solar

Wider Tariff = [Annual Load Factor (ALF) × Year Round Shared] + Year Round Not Shared + Adjustment

Conventional Low Carbon, e.g. Nuclear, Hydro (run-of-river)

Wider Tariff = Peak + [ALF × Year Round Shared] + Year Round Not Shared + Adjustment

Conventional Carbon, e.g. Coal, CCGT, Biomass, Pump Storage, Battery

Wider Tariff = Peak + [ALF × Year Round Shared] + [ALF × Year Round Not Shared] + Adjustment

Annual Load Factors (ALFs)

- **ALFs** give a measure (over 5 years) of a generator's output compared to its capacity, using:
  - Higher of Metered Output (MO) and Final Physical Notifications (FPN)
  - Transmission Entry Capacity (TEC)
- **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**
  - Currently, the power station is charged according to the predominant fuel type
  - A guidance document is available on our website

- For each year in the past 5 years (where data is available):

Annual Load Factor for each of 5 years = Sum of Max (MO, FPN) for each settlement period ÷ [Sum of TEC for each settlement period × 0.5]

How to calculate an ALF….

Q&A: Slido.com → #Revenue

- **ALFs for 2022/23** are based on data from charging years 2016/17 - 2020/21

Charging Years used to set ALF

2016/17 ALF	2017/18 ALF	2018/19 ALF	2019/20 ALF	2020/21 ALF	2021/22 *Calculation*	2022/23 ALF is Applicable
~~40%~~	50%	45%	~~65%~~	60%		Average of remaining 3 years = (50+45+60)/3 = 51.6667%
Lowest			Highest			

- Where a Power Station has less than 5 years data available, then:
  - If 4 years of data – the lowest year is removed
  - If 3 years of data – all 3 years are used, none are removed
  - If < 3 full years of data – we use fuel-specific generic ALFs to complete the 3 years

Local Tariffs

What are Local TNUoS Tariffs?

- Onshore local circuit tariffs may be charged to generators which connect directly to the transmission network if they are not directly connected to the MITS
- Onshore local substation tariffs are charged to generators which connect directly to the transmission network

(Onshore) Local circuit tariff

(Onshore) Local substation tariff

- Offshore local tariffs are specific tariffs to cover the cost the OFTO pays for the offshore transmission infrastructure. They are calculated using actual project costs.

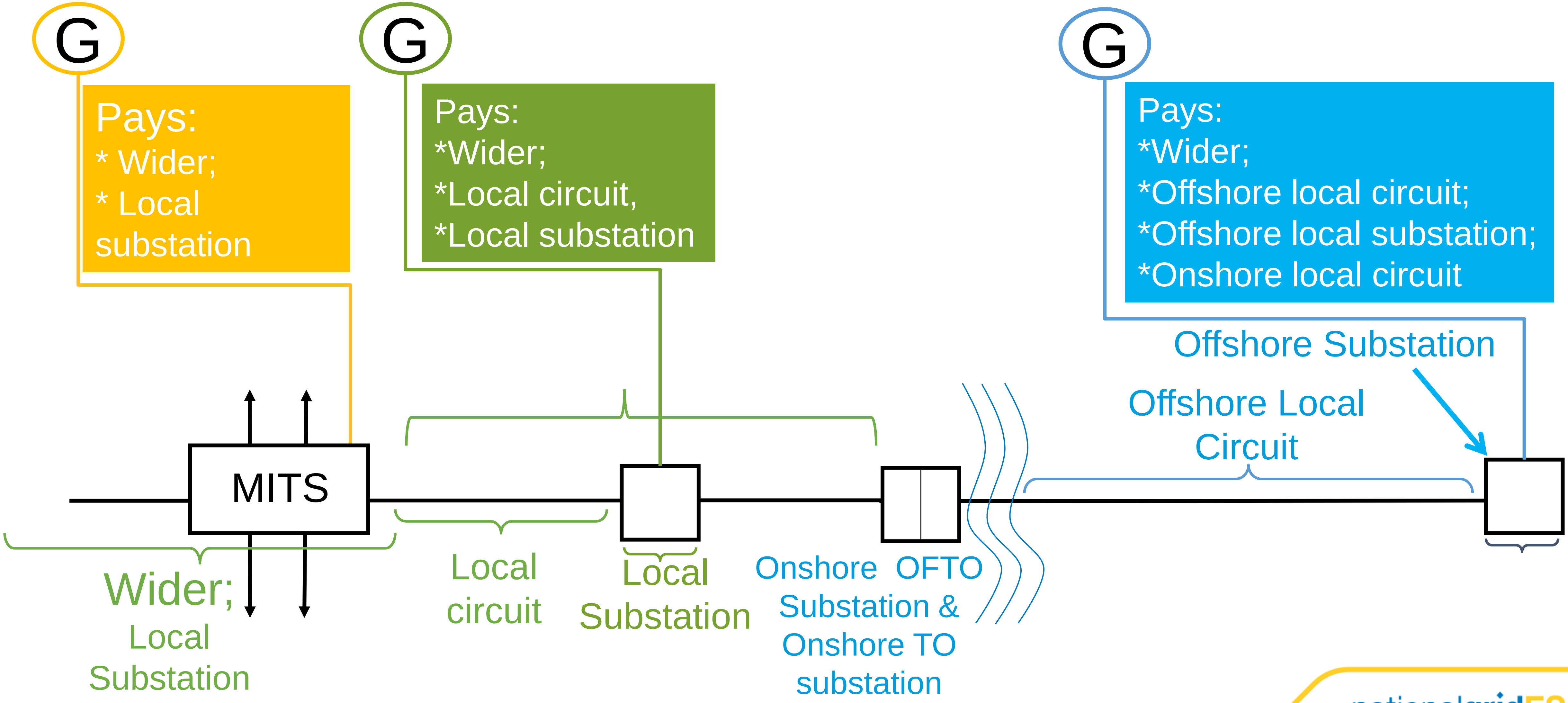
Offshore local circuit tariff

Offshore local substation tariff

ETUoS (if applicable)

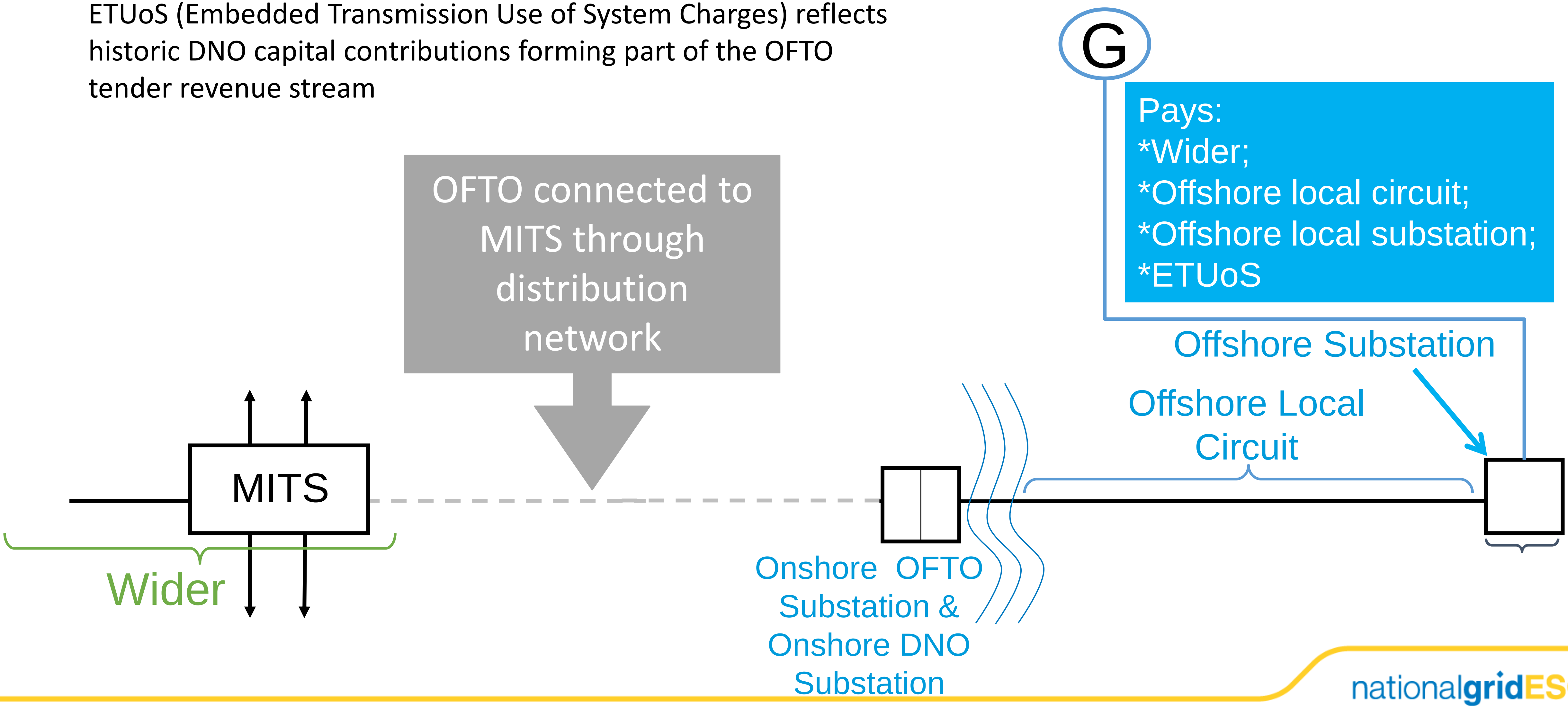
Generation tariffs: Directly connected generators

Q&A: Slido.com → #Revenue



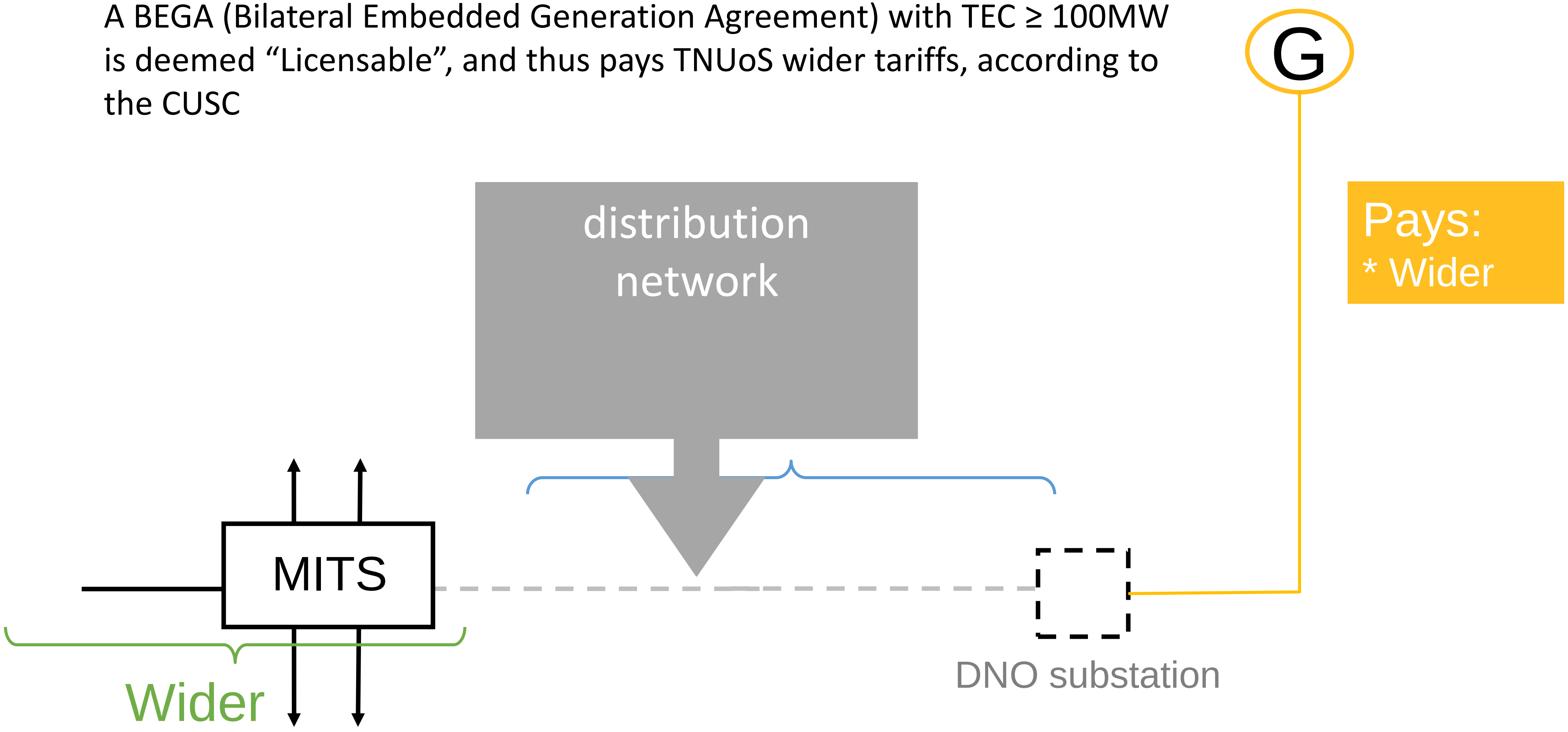
Directly connected offshore generators via "embedded" OFTO

ETUoS (Embedded Transmission Use of System Charges) reflects historic DNO capital contributions forming part of the OFTO tender revenue stream



Embedded generators with TEC >=100MW

A BEGA (Bilateral Embedded Generation Agreement) with TEC ≥ 100MW is deemed "Licensable", and thus pays TNUoS wider tariffs, according to the CUSC



Summary: Generation Tariff Structure

Q&A: Slido.com → #Revenue

TNUoS Chargeable Onshore Generators

Onshore Generation Tariff = Wider Tariff + Local Circuits (onshore) + Local Onshore Substation

Local Circuits (onshore): Specific to local network

Local Onshore Substation: Specific to the transmission substation

Directly connected offshore generators

Offshore Generation Tariff = Wider Tariff + Local Circuits (onshore) + Local Offshore Circuit & Substation + ETUoS

Local Offshore Circuit & Substation: OFTO Specific

ETUoS: If OFTO is in a distribution network

Always applies (solid orange box)

May (or may not) apply (dashed blue box)

Demand TNUoS

Demand TNUoS agenda

Q&A: Slido.com → #Revenue

1	Demand TNUoS Tariffs (HH & NHH)
2	What are Triads
3	Embedded Export Tariffs
4	Transmission Demand Residual

Demand TNUoS Tariffs

Q&A: Slido.com → #Revenue

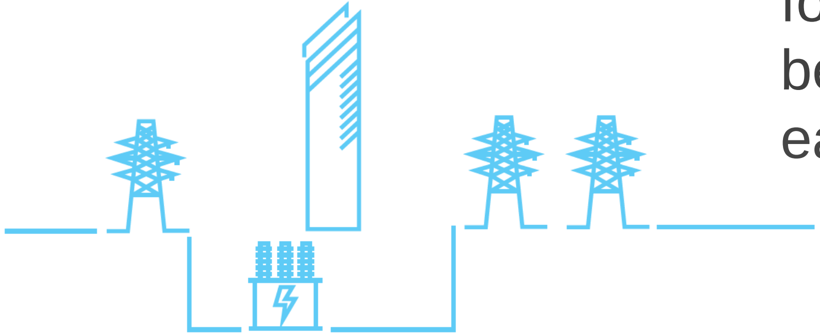
- Existing TNUoS demand charges recover both the locational and residual elements.
- Demand TNUoS recovered £2.75bn of revenue. This accounted for 77% of total TNUoS revenue of £3.6bn in 2022/23.
- There are two demand tariffs for each of the 14 demand zones

Half-Hourly (HH) Demand

Non Half-Hourly (NHH) Demand

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

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



Demand TNUoS: HH & NHH Tariffs

Q&A: Slido.com → #Revenue

Zonal HH Tariff (£/kW) = Demand Locational + Residual

Residual methodology to change post April-23

Zonal NHH Tariff (p/kWh) = [Revenue Required per zone − Revenue recovered from Gross HH] ÷ NHH Volume (kWh)

Triads – what are they?

Q&A: Slido.com → #Revenue

Three half hour settlement periods of highest GB net demand

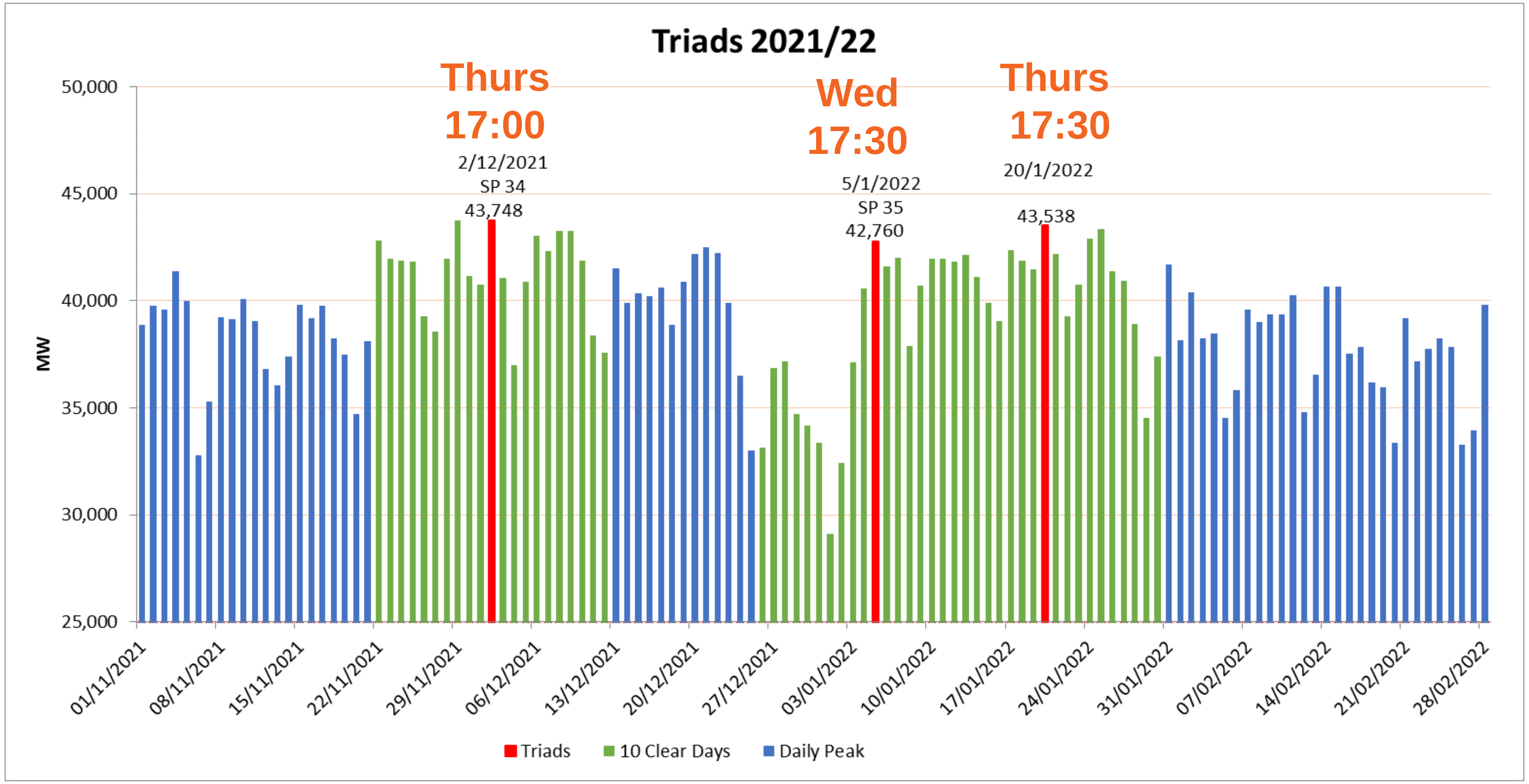
- Separated by a minimum of 10 clear days
- Determined after the event using settlement metering data reported in March
- Impact of Triads will dampen down post April 2023 as the new TDR methodology is implemented

November

February

Triads for Winter 2021/22

Q&A: Slido.com → #Revenue



- The Triads are used to calculate charges for those who are half hourly (HH) metered. This tends to be industrial and commercial customers. If they don't consume electricity in the three Triad periods, they don't pay HH TNUoS charges for the entire financial year

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

Q&A: Slido.com → #Revenue

EET (£/kW) = **Demand Locational** + **AGIC* (£2.34/kW)**

- Based on the forecast of Embedded Generation output, this will cost £15.6m in 2022/23.
- 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 CPIH each year.**

Transmission Demand Residual - Background

- Changes were directed by Ofgem after the Targeted Charging Review (TCR) Significant Code Review (SCR).
- TCR covered a whole range of changes, Transmission Demand Residual (TDR) was only one aspect.
- Is a significant change from the current approach using Triads (Triads will still exist but only apply to the ‘locational’ element of the charge, not residual).
- Residual charges are deemed to be ‘cost recovery’ and so shouldn’t send a behavioural signal or be avoidable.
- ‘Banded’ methodology, which results in a £/site/day charge, directed by Ofgem for both DUoS and TNUoS.
- TNUoS implementation of this is April 2023.

How are bands created

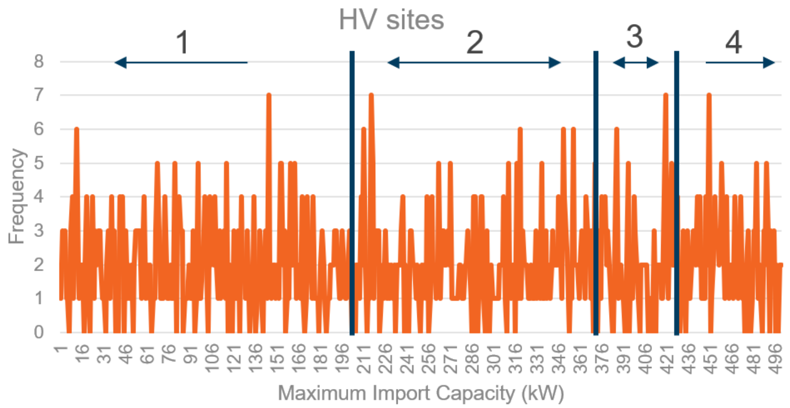
- The bands are defined in the DCUSA and CUSC by percentiles.
- At the beginning of each TO price control, NGESO convert these percentiles in to ‘real’ values. This includes DNO bands too as per our obligations as the ‘Banding Agent’ in DCUSA Schedule 32.
- DNO bands based on Max Import Capacity (MIC) or Consumption (kWh) for sites with no MIC
- All Transmission bands based on Consumption (MWh)
- These bands are the same across TNUoS and DUoS charges
- DNO sites subject to DUoS and TNUoS charges
- Transmission sites only subject to TNUoS

1. How will the bands be determined?

An example banding situation with 1000 HV demand sites using randomised data between 1kW and 500kW

≥85th percentile
70th ≤ x < 85th percentile
40th ≤ x < 70th percentile
<40th percentile

HV Band 4	≥428kW
HV Band 3	357kW – <428kW
HV Band 2	206kW – <357kW
HV Band 1	<206kW



What do these bands look like

Q&A: Slido.com → #Revenue

	Band	Tariff	Percentile	Threshold (kWh/MWh or kVA)	
				Lower	Upper
	Domestic	£/Site per Annum			
kWh	LV_NoMIC_1		<= 40%	-	<= 3,571
	LV_NoMIC_2		40 - 70%	> 3,571	<= 12,553
	LV_NoMIC_3		70 - 85%	> 12,553	<= 25,279
	LV_NoMIC_4		> 85%	> 25,279	∞
kVA	LV1		<= 40%	-	<= 80
	LV2		40 - 70%	> 80	<= 150
	LV3		70 - 85%	> 150	<= 231
	LV4		> 85%	> 231	∞
	HV1		<= 40%	-	<= 422
	HV2		40 - 70%	> 422	<= 1,000
	HV3		70 - 85%	> 1,000	<= 1,800
	HV4		> 85%	> 1,800	∞
	EHV1		<= 40%	-	<= 5,000
	EHV2		40 - 70%	> 5,000	<= 12,000
	EHV3		70 - 85%	> 12,000	<= 21,500
	EHV4		> 85%	> 21,500	∞
MWh	T-Demand1		<= 40%	-	<= 23,800
	T-Demand2		40 - 70%	> 23,800	<= 68,099
	T-Demand3		70 - 85%	> 68,099	<= 128,292
	T-Demand4		> 85%	> 128,292	∞
Unmetered demand					
	Unmetered	p/kWh			

- The bands and process to create them are hard-coded in the CUSC/DCUSA.
- Whilst the percentiles are fixed, the MVA/kWh values these percentiles represent will change each price control.
- The bands are consistent across GB and between Distribution & Transmission.
  - I.e. A site in EHV Band 3 will be in the same band regardless of where it's located.

TDR – Calculation of Tariffs

Q&A: Slido.com → #Revenue

2. Work out the consumption and site count per band;

3. Smear the TDR across bands based on proportion of consumption.

4. Divide the total band recovery (from 3) by the number of sites and days to create a £/site/day tariff.

	Band	Tariff	Percentile	Threshold (kWh/MWh or kVA)		Consumption (GWh)	Consumption Proportion %	Site Count	TDR Tariff £/(Site Day)
				Lower	Upper				
	Domestic	£/Site per Annum				96,083	36.44%	28,963,532	0.11
kWh	LV_NoMIC_1		<= 40%	-	<= 3,571	1,239	0.47%	910,718	0.04
kWh	LV_NoMIC_2		40 - 70%	> 3,571	<= 12,553	5,322	2.02%	691,868	0.25
kWh	LV_NoMIC_3		70 - 85%	> 12,553	<= 25,279	6,509	2.47%	343,040	0.60
kWh	LV_NoMIC_4		> 85%	> 25,279	∞	20,272	7.69%	338,129	1.91
kVA	LV1		<= 40%	-	<= 80	7,739	2.94%	80,893	3.05
kVA	LV2		40 - 70%	> 80	<= 150	11,641	4.42%	64,781	5.72
kVA	LV3		70 - 85%	> 150	<= 231	7,213	2.74%	24,709	9.30
kVA	LV4		> 85%	> 231	∞	19,738	7.49%	29,762	21.13
kVA	HV1		<= 40%	-	<= 422	4,124	1.56%	9,321	14.10
kVA	HV2		40 - 70%	> 422	<= 1,000	12,425	4.71%	7,754	51.05
kVA	HV3		70 - 85%	> 1,000	<= 1,800	9,591	3.64%	3,064	99.74
kVA	HV4		> 85%	> 1,800	∞	27,545	10.45%	3,415	256.96
kVA	EHV1		<= 40%	-	<= 5,000	1,881	0.71%	374	160.24
kVA	EHV2		40 - 70%	> 5,000	<= 12,000	4,870	1.85%	250	620.65
kVA	EHV3		70 - 85%	> 12,000	<= 21,500	5,438	2.06%	132	1,312.55
kVA	EHV4		> 85%	> 21,500	∞	14,811	5.62%	139	3,394.62
MWh	T-Demand1		<= 40%	-	<= 23,800	317	0.12%	26	388.88
MWh	T-Demand2		40 - 70%	> 23,800	<= 68,099	874	0.33%	20	1,391.71
MWh	T-Demand3		70 - 85%	> 68,099	<= 128,292	953	0.36%	10	3,037.19
MWh	T-Demand4		> 85%	> 128,292	∞	2,513	0.95%	9	8,894.52
Unmetered demand									**p/kWh per day**
	Unmetered	p/kWh				2,566	0.97%		0.00319
								TDR Value	3,074.41

Note - Transmission Connected banding thresholds maybe subject to change/update.

1. Work out the total value of the TDR

Changes to Tariffs post April 2023

Q&A: Slido.com → #Revenue

2022/23 Final Tariffs

Zone	Zone Name	HH Demand Tariff (£/kW)	NHH Demand Tariff (p/kWh)	Embedded Export Tariff (£/kW)
1	Northern Scotland	27.446662	3.558626	-
2	Southern Scotland	35.465718	4.395158	-
3	Northern	44.681931	5.280945	-
4	North West	51.407508	6.382111	-
5	Yorkshire	51.839430	6.199445	-
6	N Wales & Mersey	53.406721	6.460609	-
7	East Midlands	55.528462	6.954272	1.011210
8	Midlands	57.193871	7.145603	2.676619
9	Eastern	57.953489	7.696135	3.436237
10	South Wales	58.461967	6.630234	3.944715
11	South East	60.199079	8.057826	5.681827
12	London	63.687789	6.457749	9.170537
13	Southern	62.263662	7.854326	7.746409
14	South Western	63.747665	8.671244	9.230413

Residual charge for demand:	56.861767

2023/24 August Forecast Tariffs

HH Demand Tariff (£/kW)	NHH Demand Tariff (p/kWh)	Embedded Export Tariff (£/kW)
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	0.812237
-	-	2.505729
0.933038	0.124251	3.473330
2.493406	0.281869	5.033698
3.520830	0.467587	6.061122
7.145918	0.741324	9.686210
5.712609	0.726061	8.252901
7.499372	1.027589	10.039664

Residual charge for demand:	-

	Band	TDR Tariff £/(Site Day)
	Domestic	0.11
kWh	LV_NoMIC_1	0.04
	LV_NoMIC_2	0.25
	LV_NoMIC_3	0.60
	LV_NoMIC_4	1.91
kVA	LV1	3.05
	LV2	5.72
	LV3	9.30
	LV4	21.13
	HV1	14.10
	HV2	51.05
	HV3	99.74
	HV4	256.96
	EHV1	160.24
	EHV2	620.65
	EHV3	1,312.55
	EHV4	3,394.62
MWh	T-Demand1	388.88
	T-Demand2	1,391.71
	T-Demand3	3,037.19
	T-Demand4	8,894.52
	Unmetered (p/KWh)	0.00319

Potential Future Changes

Potential Future Changes

Q&A: Slido.com → #Revenue

Cost Reflectiveness

- CMP315/375 (Review of the expansion constant/ expansion factors)
- CMP316 (Co-located generation sites)
- CMP331 (Site specific ALFs)
- CMP393/394 (Electricity storage)

Significant Code Review and Future Developments

- TNUoS taskforce
- HND (Holistic Network Design)
- Net Zero Market Reform

Tariff Stability and Predictability

- CMP286/287 (Increase notice of input data)
- CMP344 (revenue adjustment)

Charging Parameters

- Price Control
- HVDCs and undersea cables

The CUSC mods listed here are non-exhaustive, and are examples of the relevant group themes

Q&A: Slido.com → #Revenue

Q&A

nationalgridESO

TNUoS Charging and Billing

Andrew Havvas

Daniel Hickman

Agenda

1	TNUoS charges overview
2	TNUoS charges for generation
3	TNUoS charges for demand
4	Security requirements
5	Transmission Demand Residual Charging
6	Q&A

What is TNUoS charge?

TNUoS charge 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.

TNUoS Charges for Generation

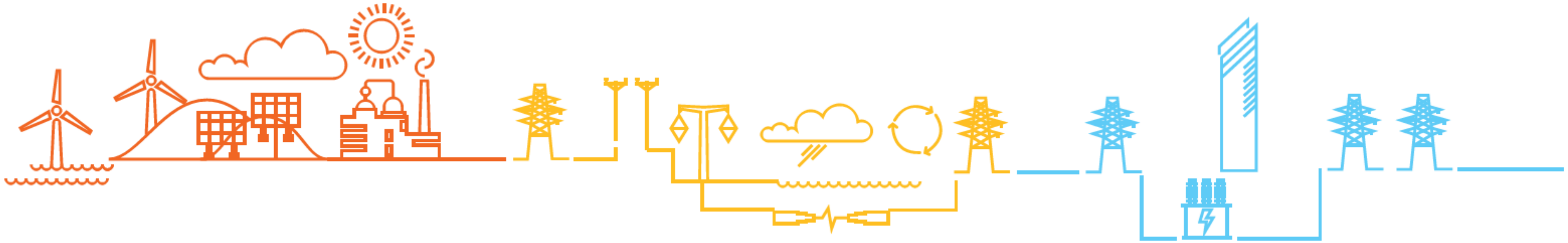
- **Transmission Connected Generation**
- **Large embedded generation (>100MW)**

TNUoS Charges for Demand

- **Half-Hourly metered demand**
- **Non Half-Hourly metered demand**
- **Embedded export benefit**
- **Transmission Demand Residual**

TNUoS charges are calculated using the Final Tariffs published in the preceding January.

The Final Tariffs for 2022/23 are available on our website.



TNUoS Generation Charging

TNUoS Generation Billing Timeline

Monthly Invoices

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

Reconciliations

Generation charges are reconciled annually

Generation Reconciliation
(April)

Charging year + 1 month

Generation Charging

TNUoS charges are applicable to transmission connected generators and embedded generators with TEC >100MW

Generator monthly invoice

[Maximum TEC (kW) x sum of applicable tariffs (£/kW) − Invoices issued to date] ÷ Number of months remaining (in the charging year)

Generation Liabilities

- Generations with positive tariff - based on the maximum amount of TEC effective during the charging year
- Generators with negative tariff – based on the average three highest export during winter season

Wider Generation Charging Categories

Intermittent e.g. Wind, Tidal, Solar

Wider Tariff = [Annual Load Factor (ALF) × Year Round Shared] + Year Round Not Shared + Adjustment Tariff

Conventional Low Carbon, e.g. Nuclear, Hydro (run-of-river)

Wider Tariff = Peak + [ALF × Year Round Shared] + Year Round Not Shared + Adjustment Tariff

Conventional Carbon, e.g. Coal, CCGT, Biomass, Pump Storage, Battery

Wider Tariff = Peak + [ALF × Year Round Shared] + [ALF × Year Round Not Shared] + Adjustment Tariff

Generation Charges - Backing Sheet

Generators receive a backing sheet, along with the monthly invoice, which contain the following details for each station:

- Annual Load Factor
- Plant type
- Generation zone
- Wider tariff and any local circuit and substation tariffs
- Transmission Entry Capacity (TEC)
- Charge calculation
- Invoices issued to date
- Current month invoice value

TNUoS Generation Reconciliation Overview

TNUoS generation reconciliation is issued at end of the April for the previous charging year

Recalculated Liability (1) + Compare Output vs TEC (2) + Calculate Demand (3) − Monthly invoice = Reconciliation Invoice

(1) The liability for each station is recalculated, to ensure all charges have been invoiced correctly

(2) Stations with a negative tariff: the liability is calculated where the peak station output is less than TEC

(3) Stations that take net demand over Triads are charged the half-hourly gross demand tariff

Historical Values

The value of the reconciliation peaked in 2020/21 and is expected to remain relatively low from 21/22 due to changes to the tariff setting methodology.

	2021/22	2020/21	2019/20	2018/19	2017/18
Generation Reconciliation (£m)	**9.21**	**42.94**	**22.08**	**15.09**	**13.21**

TNUoS Ex-Post Reconciliation

Q&A: Slido.com → #Revenue

TNUoS Generation charges should be within a range of €0-2.50/MWh to comply with the Limiting Regulation – "gen cap".

€0/MWh ≤ [TNUoS Gen Revenue £m ÷ Exports ÷ Exchange Rate] ≤ €2.50/MWh

If charges are outside the range, an **Ex-Post Reconciliation** will take place to ensure compliance with the range. For example:

- Out-turn = €2.75/MWh, indicating too much TNUoS Generation revenue has been recovered,
- Calculate amount, £X, that reduces TNUoS Generation revenue so that out-turn = €2.50/MWh,
- Issue total **credits** of £X to Generators and total **invoices** of £X to Suppliers.

If out-turn is below €0/MWh, the ex-post reconciliation would require an additional amount to be charged Generators, and that same amount to be credited to Suppliers.

TNUoS Demand Charging

TNUoS Billing Timeline

Monthly Invoices

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

Reconciliations

Demand charges are reconciled twice (Initial / Final metering)

Initial Demand Reconciliation (June) → Final Demand Reconciliation (Autumn)

Charging year + 3 months — *Charging year + ~18 months*

TNUoS Demand Charges – 2022/23

The existing TNUoS Demand charges recover the locational **and** residual elements of TNUoS

Half-hourly (HH) Gross Demand, kW

Non Half-hourly Consumption, kWh

TNUoS Demand Charges – 2023/24

From 1st Apr 23, current HH & NHH charging methodology will recover **only locational** TNUoS revenue (embedded generation benefit is unchanged)

Half-hourly (HH) Gross Demand, kW

Non Half-hourly Consumption, kWh

The following new charges will be introduced, from 1st April 2023, to recover residual TNUoS revenue:

TDR – Sites, No. of sites

TDR – Unmetered Supplies (UMS), kWh

TNUoS Demand Forecast

Q&A: Slido.com → #Revenue

TNUoS Locational Demand charges are based on the Supplier forecast

- Mandatory requirement in CUSC to submit a forecast by 10th March
- Forecasts should be revised by the 10th of the month if there are significant changes in demand/consumption
- It also affects the calculation of security requirement

What to include in the forecast?

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 charging year, summed by BM Unit level (kWh)

DEMAND FORECAST SUBMISSION

Used for Calculating 2022/23 Monthly TNUoS Charges

Company Name: Z EXAMPLE LIMITED

Company Registered No: 10000000

Contact Name (in case of query):

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		5,566,630
2__JEXAM000	South East	479		4,426,747
2__KEXAM000	South Wales	334		2,195,350
2__LEXAM000	South Western	955		4,592,799
2__MEXAM000	Yorkshire	579		3,824,910
2__NEXAM000	Southern Scotland	945		1,644,185
2__PEXAM000	Northern Scotland	301		3,904,759

Half-Hourly Demand

Q&A: Slido.com → #Revenue

Within year, Suppliers are charged based on their forecast of HH Gross Demand and Exports over the Triads

Supplier monthly invoice

[[Forecast Gross Demand at Triad x HH Demand Tariff (£/kW) – Forecast Gross Export at Triad x Embedded Export Tariff (£/kW)]] – Invoices issued to date] ÷ Number of months remaining (in the charging year)

HH exports will be netted off against HH demand at BMU level, so that monthly chargeable values cannot result in a credit to the supplier.

Net credits are settled at the annual reconciliation.

Non Half-Hourly Consumption

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

Supplier monthly invoice

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

Embedded Export Payments

Payment calculation

- Based on average exports over the 3 Triads x Embedded Export tariff

Embedded generation registered under Supplier Volume Allocation (SVA):

- Settled directly with the Supplier
- Forecast of HH exports can be provided in Supplier demand forecast
- HH exports included in monthly billing
- Further settlement at the initial and final reconciliations

Embedded generation registered under Central Volume Allocation (CVA):

- Settled directly with the Generator
- Forecast is not provided and no monthly billing
- Settlement is at this initial and final demand reconciliations
- Embedded generation is also liable for demand taken over Triads, charged using the HH gross demand tariff

TNUoS Demand Reconciliation

The initial reconciliation invoice/credit issued by 30th June, in respect of their TNUoS demand liability for the previous year. Final demand reconciliation issued in autumn the year after.

Demand reconciliation calculation

Out-turn Liability − **Monthly Invoice** + **Payment for Embedded Generation** = **Reconciliation Invoice**

Note: a customer may be liable for demand charges and/or be eligible for payments for embedded generation

Historical values

Following regulatory changes effective from 2018/19 the value of the initial demand reconciliation has reduced considerably, as shown in the table below for historical demand reconciliation values.

	2021/22	2020/21	2019/20	2018/19	2017/18
Initial Demand Reconciliation (£m)	+6.06	-17.75	-0.77	-64.27	-146.81
Final Demand Reconciliation (£m)	To be issued autumn 2023	+0.78	+2.76	-0.31	-3.09

Security Requirement

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

Supplier security requirement

- BSUoS: security is equal to 32 days of Supplier BSUoS charges
- TNUoS: is equivalent to a percentage of your annual demand liability

Generation security requirement

- BSUoS: security is equal to 29 days of BSUoS charges
- TNUoS: no security requirement for generators

Payment History Allowance (PHA)

- One of three forms of Users Allowed Credit (Approved credit rating or independent credit assessment)
- Accrued for each months invoice(s) paid by the due date, up to a maximum of 60 months
- Reduced by 50% for late payment, and set to zero for second late payment
- Can be used to reduce security requirement for Suppliers and Generators

Transmission Demand Residual (TDR) Charging

Transmission Demand Residual

Current HH and NHH demand charges include both the locational and revenue recovery tariff

- cost reflective charges for the 14 demand zones are calculated

  added to this is

- a non locational residual revenue recovery tariff

  to give the final tariff in each region

From 1st April 2023 there will be a new set of non locational site based charges

- Residual revenue will be collected through a separate set of tariffs
- These tariffs are not consumption based
- The majority of TNUoS demand revenue will be collected through site based charges
- HH and NHH charges will still collect the locational charges

Future TNUoS structure

Q&A: Slido.com → #Revenue

14 HH Locational Tariffs (£/kW based on consumption over Triad)

14 NHH Locational Tariffs (£/MWh) based on 4-7pm consumption

+

Residual		
Transmission connected Demand Residual	Band 4	Band 3
	Band 2	Band 1
EHV connected Demand Residual	Band 4	Band 3
	Band 2	Band 1
HV connected Demand Residual	Band 4	Band 3
	Band 2	Band 1
LV non-dom (MIC) Demand Residual	Band 4	Band 3
	Band 2	Band 1
LV non-dom (No MIC) Demand Residual	Band 4	Band 3
	Band 2	Band 1

Domestics Demand Residual

21 nationwide residual tariffs (£/site/day)

Unmetered Supplies (UMS) – p/kWh

TNUoS Demand Charges from 1st April 2023

The existing TNUoS Demand charges will recover only locational TNUoS revenue (embedded generation benefit calculation remains the same)

Half-hourly (HH) Gross Demand, kW

Non Half-hourly Consumption, kWh

From 1st April 2023, the following new charges will be introduced to recover residual TNUoS revenue in addition to the above locational charges:

TDR – Sites, No. of sites

TDR – Unmetered Supplies (UMS), kWh

TNUoS NHH & HH Demand Tariffs 22 vs 23

Q&A: Slido.com → #Revenue

From 1st April 2023, target revenue recovery from NHH & HH tariffs accounts for <5% of total TNUoS Demand revenue

2022/23 Final Tariffs

Zone	Zone Name	HH Demand Tariff (£/kW)	NHH Demand Tariff (p/kWh)	Embedded Export Tariff (£/kW)
1	Northern Scotland	27.446662	3.558626	-
2	Southern Scotland	35.465718	4.395158	-
3	Northern	44.681931	5.280945	-
4	North West	51.407508	6.382111	-
5	Yorkshire	51.839430	6.199445	-
6	N Wales & Mersey	53.406721	6.460609	-
7	East Midlands	55.528462	6.954272	1.011210
8	Midlands	57.193871	7.145603	2.676619
9	Eastern	57.953489	7.696135	3.436237
10	South Wales	58.461967	6.630234	3.944715
11	South East	60.199079	8.057826	5.681827
12	London	63.687789	6.457749	9.170537
13	Southern	62.263662	7.854326	7.746409
14	South Western	63.747665	8.671244	9.230413

Residual charge for demand:	56.861767

2023/24 Forecast Tariffs

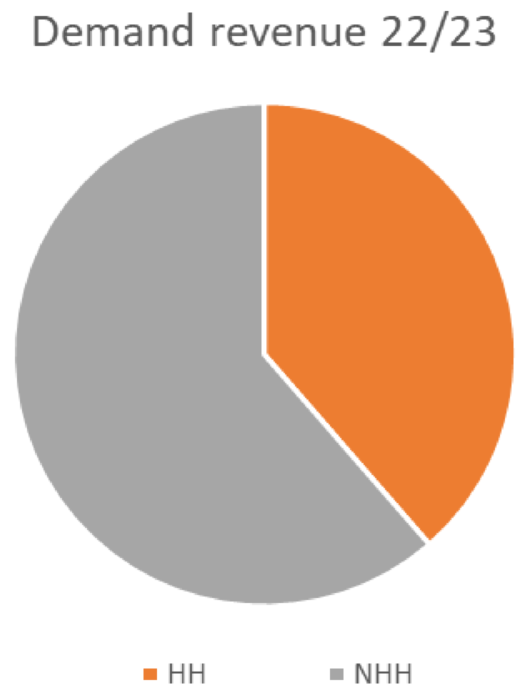
Zone	Zone Name	HH Demand Tariff (£/kW)	NHH Demand Tariff (p/kWh)	Embedded Export Tariff (£/kW)
1	Northern Scotland	-	-	-
2	Southern Scotland	-	-	-
3	Northern	-	-	-
4	North West	-	-	-
5	Yorkshire	-	-	-
6	N Wales & Mersey	-	-	-
7	East Midlands	-	-	0.812237
8	Midlands	-	-	2.505729
9	Eastern	0.933038	0.124251	3.473330
10	South Wales	2.493406	0.281869	5.033698
11	South East	3.520830	0.467587	6.061122
12	London	7.145918	0.741324	9.686210
13	Southern	5.712609	0.726061	8.252901
14	South Western	7.499372	1.027589	10.039664

TNUoS NHH & HH Demand Tariffs 22 vs 23

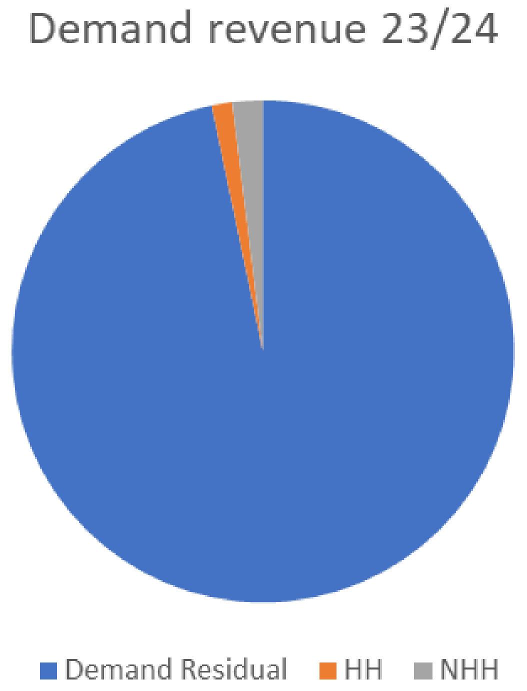
Q&A: Slido.com → #Revenue

From 1st April 2023, target revenue recovery from NHH & HH tariffs accounts for <5% of total TNUoS Demand revenue

2022/23 Final Tariffs



2023/24 Forecast Tariffs



TNUoS Forecast Tariffs from 1st April 2023

Q&A: Slido.com → #Revenue

Forecast locational Tariffs

Zone	Zone Name	HH Demand Tariff (£/kW)	NHH Demand Tariff (p/kWh)	Embedded Export Tariff (£/kW)
1	Northern Scotland	-	-	-
2	Southern Scotland	-	-	-
3	Northern	-	-	-
4	North West	-	-	-
5	Yorkshire	-	-	-
6	N Wales & Mersey	-	-	-
7	East Midlands	-	-	0.812237
8	Midlands	-	-	2.505729
9	Eastern	0.933038	0.124251	3.473330
10	South Wales	2.493406	0.281869	5.033698
11	South East	3.520830	0.467587	6.061122
12	London	7.145918	0.741324	9.686210
13	Southern	5.712609	0.726061	8.252901
14	South Western	7.499372	1.027589	10.039664

Forecast Non-Locational Tariffs

Band		2023/24 Forecast
Domestic	Tariff - £/Site/Annum	38.68
LV_NoMIC_1		15.86
LV_NoMIC_2		89.70
LV_NoMIC_3		221.24
LV_NoMIC_4		699.06
LV1		1,115.50
LV2		2,095.33
LV3		3,404.11
LV4		7,733.21
HV1		5,158.96
HV2		18,682.91
HV3		36,504.86
HV4		94,048.97
EHV1		58,649.49
EHV2		227,158.76
EHV3		480,393.67
EHV4		1,242,430.80
T-Demand1		142,329.16
T-Demand2		509,364.26
T-Demand3		1,111,611.30
T-Demand4		3,255,395.15
Unmetered demand	**p/kWh**	
Unmetered		1.17
Demand Residual (£m)		**3,074.4**

Site Counts by Band

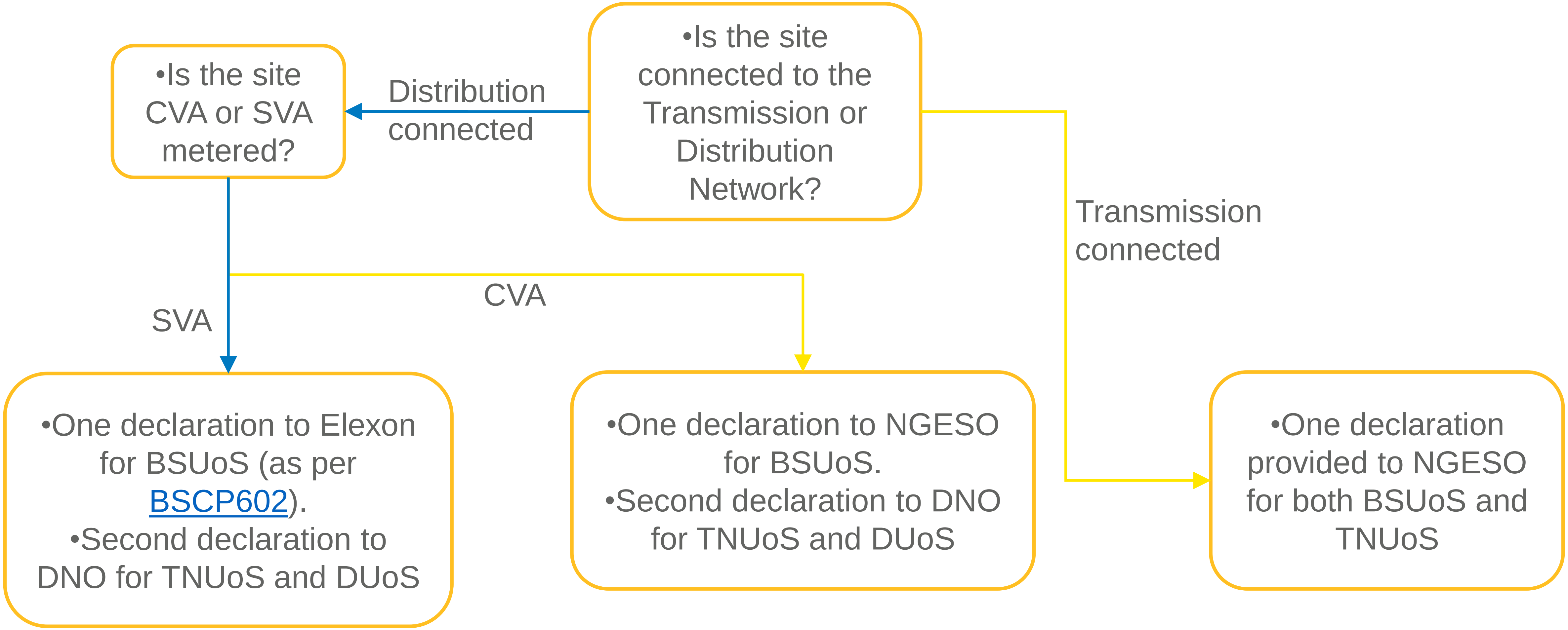
BSC Modification P402 introduced a data flow between the DNOs and NGESO to provide the site counts by band and supplier that are needed to bill suppliers

There will **not** be a requirement for suppliers to forecast sites per band

Demand residual charges only apply to sites with final demand consumption

Non-final Demand Declarations

Non-final demand will be required to have submitted a declaration



Non-final Demand Declarations

Pre populated forms will be sent out for CVA sites

Annex 1

Site Number	Site Name	Site Address	BMU IDs and meters registered at address	BCA reference number	Tech Type	Transmission connected	Declaration ID (where known)	Does the BMU contain any Final Demand? If yes, please also complete Annex 2 for this site;
Unique referance number for the site if transmission connected	*Unique name for the site*	*Address that identifies the geographical location of the site, rather than its administrative address, if different)*	*The Balancing Mechanism Unit (BMU) ID(s) for the CVA site (e.g. T_XXXX)*	*Reference number associated with the Bilateral Connection Agreement made for this site.*	*Short description of the technology employed at the site*	*Is the BMU connected to the National Electricity Transmission System? Delete as appropriate*	*Unique ID determined by NGESO following the initial declaration of a facility. This field should only be filled in when updating or ceasing an existing declaration*	*Does the BMU consume any energy for purposes other than Electricity Storage, Electricity Generation or provision of an Eligible Service. Delete as appropriate. If yes, please also complete Annex 2 for this site;*
Example – simple site S0001	Oak Road Energy	4 Oak Road, Testville, O14 6BZ	T_OAKRO-1		CCGT	Yes		No
Example – mixed site S0002	Acacia Avenue Energy Park	1 Acacia Avenue, Testington, AB12 3C	T_ACCAV-1		Factory with Wind generation and Battery Storage	Yes		No
Example – mixed site S0002	Acacia Avenue Energy Park	1 Acacia Avenue, Testington, AB12 3C	T_ACCAV-2		Factory with Wind generation and Battery Storage	Yes		No
Example – mixed site S0002	Acacia Avenue Energy Park	1 Acacia Avenue, Testington, AB12 3C	T_ACCAV-D		Factory with Wind generation and Battery Storage	Yes		Yes
	Poplar Energy Storage	1 Poplar Cresent, Testville, O12 5BN	E_POPLR-1		Battery Storage	No		No

Transmission Demand Residual - Sites

Q&A: Slido.com → #Revenue

Within year, Suppliers are charged based on the latest actual site counts in each band, which is provided by DNOs/iDNOs, and connection agreements

Supplier monthly invoice

[**Number of Sites in each band x relevant TDR tariff (£/site/day)** − **Invoices issued to date**] ÷ **Number of months remaining (in the charging year)**

Example – Forecast Total Annual Site Count Days

- April – total SCD is 34 to end April →
- Latest number of sites being supplied, based on the actual data, is **2** (based on actuals for 30th April 2023)
- Therefore, the forecast of total annual SCD is:

34 + (2 per day, for days with no actual data)

= 34 + (2 x (365-30))

= 34 + 670

= 704

Date	Sites Supplied
01/04/2023	1
02/04/2023	1
03/04/2023	1
04/04/2023	1
05/04/2023	1
…	
…	
25/04/2023	1
26/04/2023	1
27/04/2023	2
28/04/2023	2
29/04/2023	2
30/04/2023	2
Total	34

Transmission Demand Residual - UMS

Within year, Suppliers are charged based on the latest actual settlement metering data from Elexon for their unmetered consumption (kWh).

Supplier monthly invoice

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

Q&A

Refreshments Break

We will return at 11.45

BSUoS Billing

Heather Stratford & Davinder Sanghera

What are BSUoS charges and who pays them?

What is the charge for?

- To recover the cost of balancing the system

How is it charged?

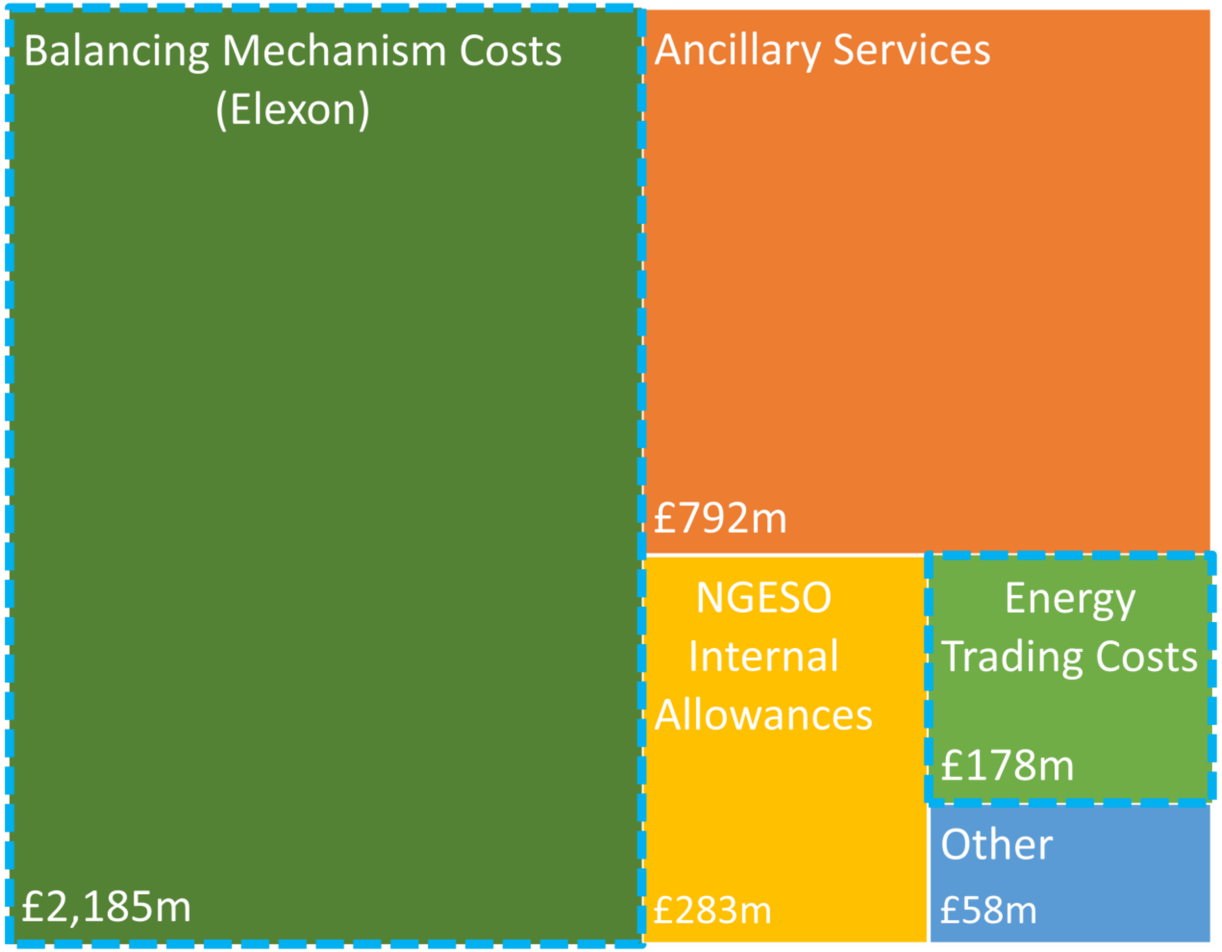
- Half hourly £/MWh applied proportionately on your portfolio share

Who pays?

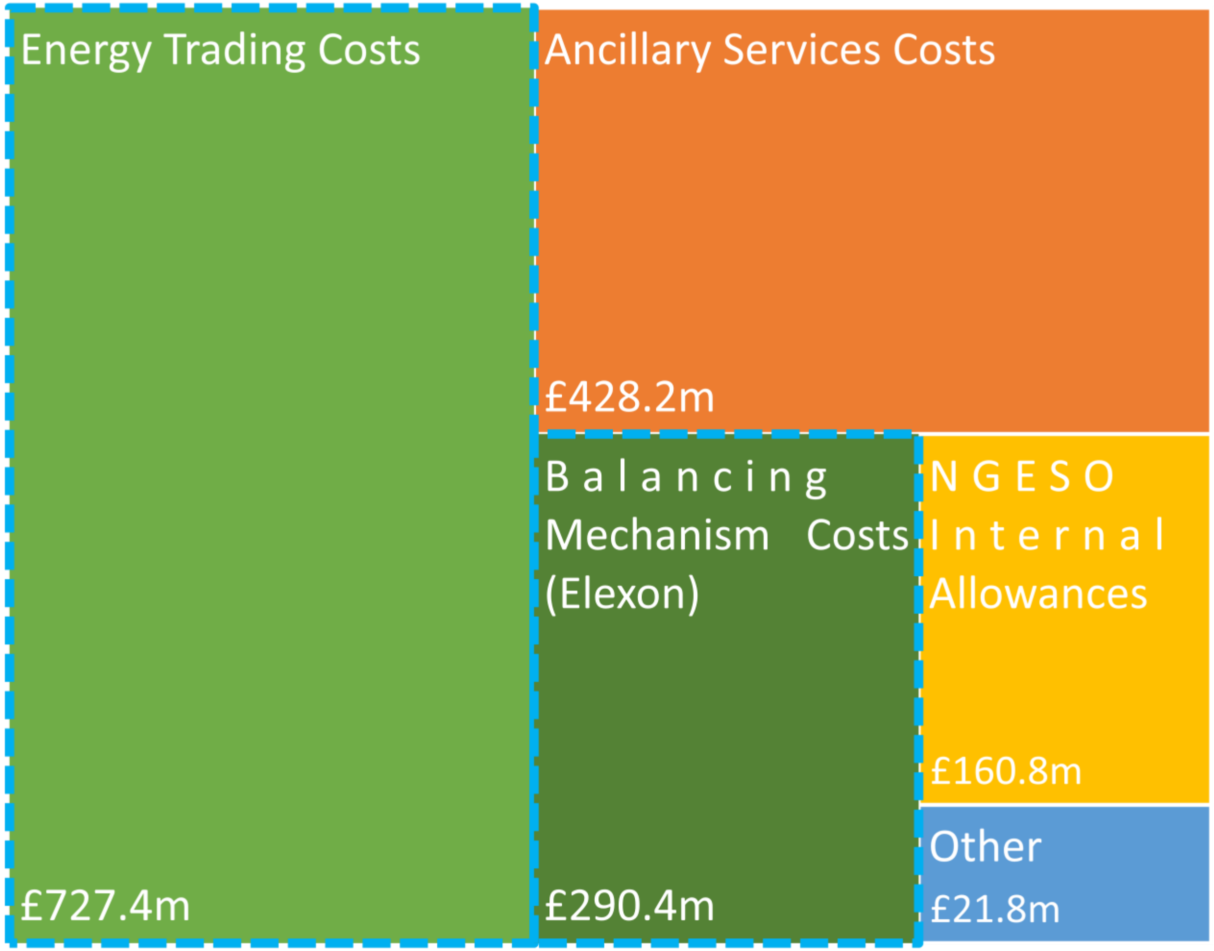
- Suppliers
- Generators (until April 2023)

What are the charges comprised of?

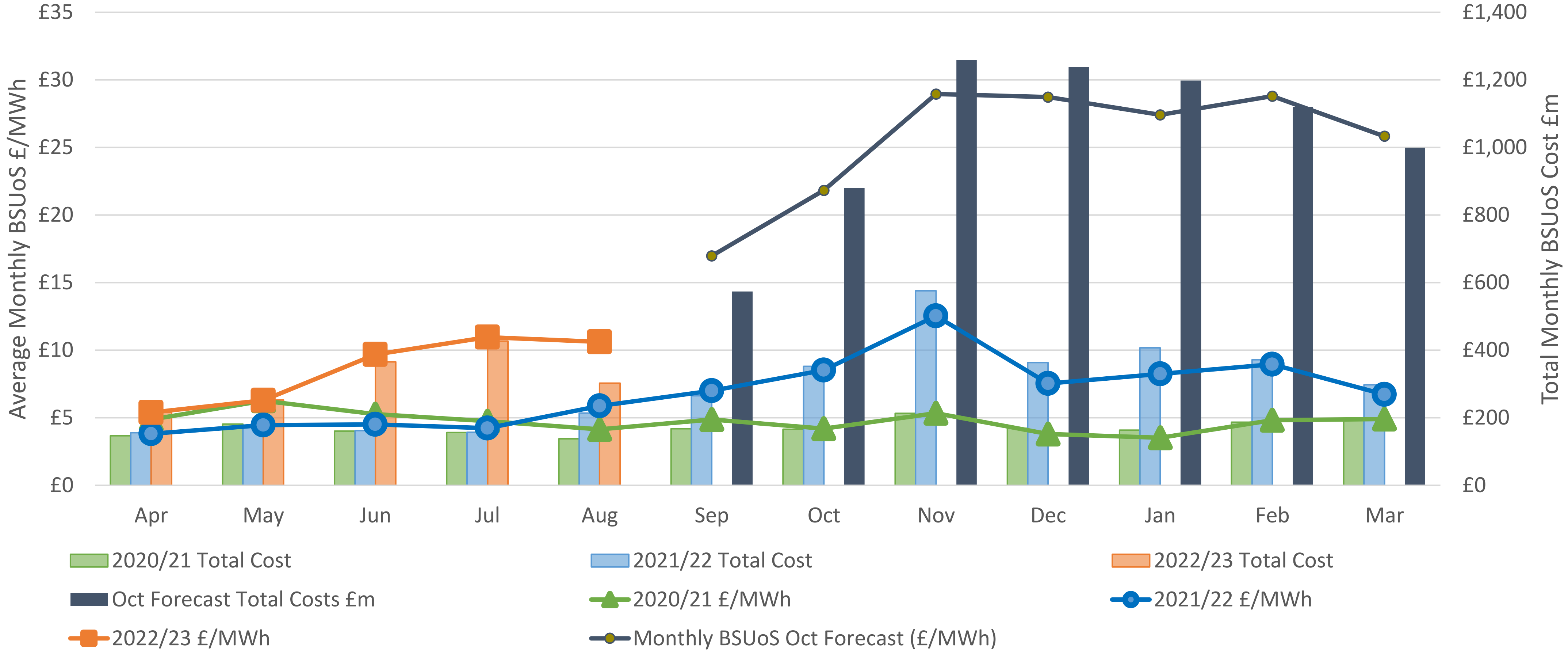
2021/22 BSUoS charges (£3.5bn)



2022/23 **Apr-Aug** BSUoS charges (£1.6bn)



High BSUoS Costs



BSUoS Charging

CMP 333

Transmission connected BMUs are charged BSUoS based on the net position of their trading units in a settlement period

Supplier BM Units are charged BSUoS on a gross demand basis per settlement period

Export Exempt BM Units same as supplier BMUs

CMP 281

Storage facilities apply to be exempt on BSUoS import volumes

How to calculate your BSUoS charge as a **Supplier**

BSUoS tariff £/MWh × BMU Chargeable Energy Volume (MWh) × Transmission Loss Multiplier = BSUoS Charge

Example

£4.778 × 2.007 × 0.9965153 = £9.56

How to calculate your BSUoS charge as a **Generator**

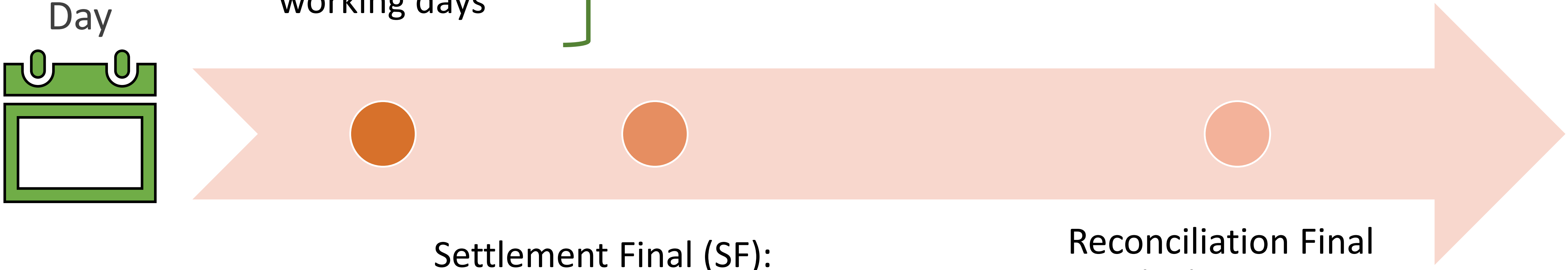
BSUoS tariff £/MWh × BMU Metered Energy Volume (MWh) × Transmission Loss Multiplier × Trading Unit Delivery Mode (+1 or -1) = BSUoS Charge

Example

£4.778 × 2.007 × 0.9965153 × +1 = £9.56

What will you receive?

Settlement Day



Interim Initial (II): not billed Settlement Date + 5 working days

II: Notification Files, BPA, BCR and Web prices

Settlement Final (SF): Daily, Settlement Date +16 working days

Reconciliation Final (RF): Daily, Settlement Date + 14 months

SF & RF: BPA, BCR, Web prices and Invoice

CMP395: Cap BSUoS costs and Defer payment to 2023/24 to protect GB customers

- Cap of £40/MWh per Settlement Period to be recouped in 2023/24
- The scheme is limited to £250m
- 6th October 2022 to 31st March 2023 or when the fund reaches it's liability

Scheme Month	Last day of Settlement Month	II Processing Date for last Settlement Day of month	SF Processing Date for last Settlement Day of month	Credit Note Issue Date	Payment Date
Oct-22	31/10/2022	09/11/2022	23/11/2022	02/12/2022	07/12/2022
Nov-22	30/11/2022	08/12/2022	23/12/2022	10/01/2023	13/01/2023
Dec-22	31/12/2022	10/01/2023	25/01/2023	03/02/2023	08/02/2023
Jan-23	31/01/2023	08/02/2023	23/02/2023	06/03/2023	09/03/2023
Feb-23	28/02/2023	08/03/2023	23/03/2023	03/04/2023	06/04/2023
Mar-23	31/03/2023	12/04/2023	27/04/2023	09/05/2023	12/05/2023

Reports available on our data portal

Monthly Balancing Services Summary (here)

Provides the costs and volumes of BSUoS by month and service

Daily Balancing Services Use of System (BSUoS) Forecast (here)

Released daily and provides day-ahead forecast of BSUoS

Daily Balancing Costs (here)

Insightful report detailing likely BSUoS costs

BSUoS monthly Forecast Report (here)

Monthly forecast for month-ahead and a rolling 24 month period

Credit Monitoring

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

- Generators secure 29 days of BSUoS charges
- Suppliers secure 32 days of BSUoS charges
- NGESO calculate the value based on historical billing

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

Q&A

Q&A: Slido.com → #Revenue

BSUoS charging from April 2023

Nick Everitt

nationalgridESO

BSUoS Mods for 2023/24

CMP308	• Removal of BSUoS charges from Generation • Charges to be levied on final demand only • Final demand declaration process, CVA v SVA
CMP361/362	• Introduction of an ex ante fixed BSUoS tariff • Likely introduction of a BSUoS fund • Consequential definitions update
CMP395	• Per CMP308, generators will no longer pay BSUoS in the 2023/24 charging year but we will be running a manual monthly process to recover the portion of deferred costs they are liable for from the 2022/23 BSUoS charging year • The Supplier CMP395 deferral cost will be built into the fixed tariff price

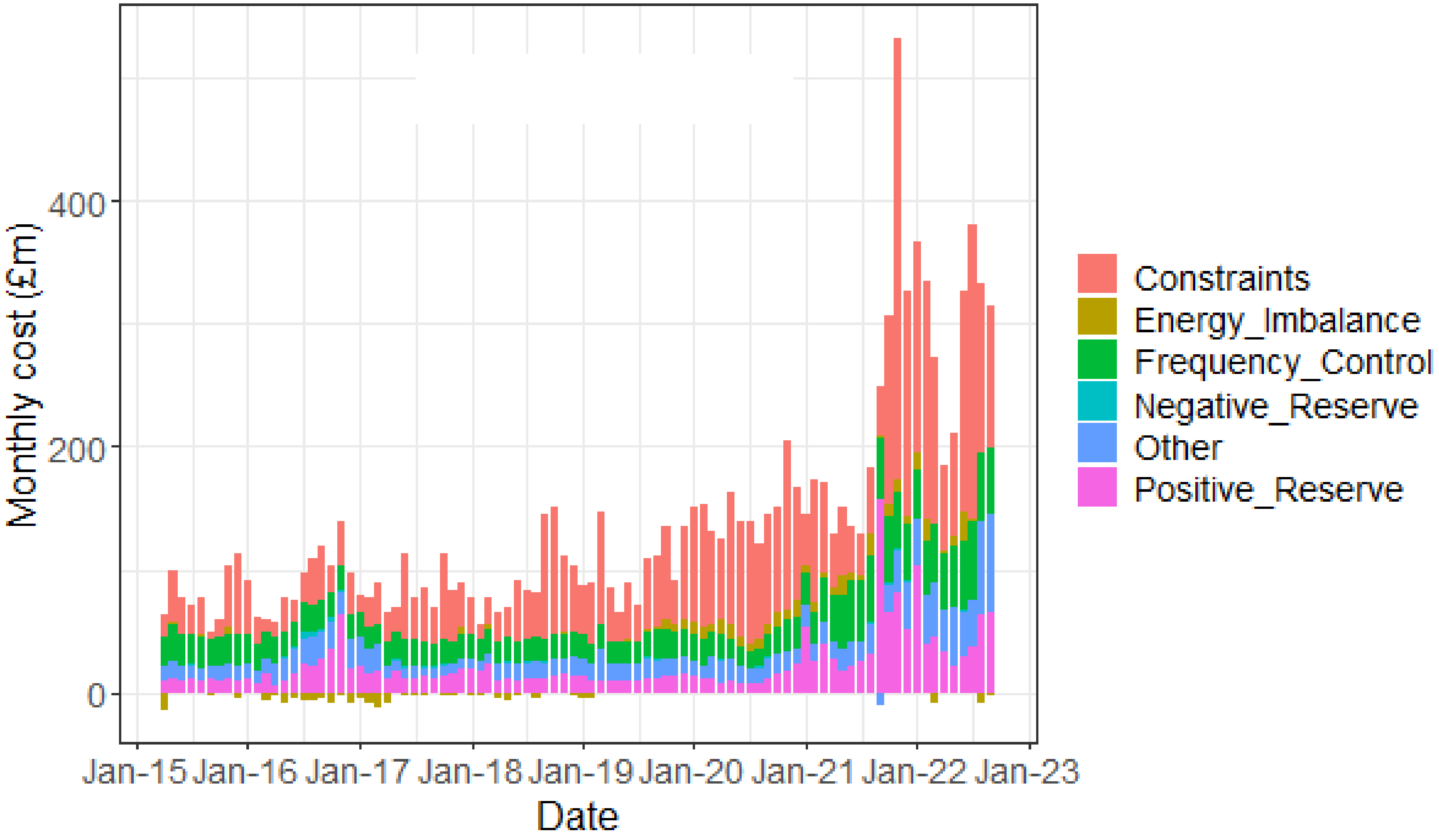
What's the same

- Invoiced daily on SF and RF settlement data
- Information provided daily on II settlement data
- 3 day payment terms for invoices
- Chargeable on volume at the BMU level at a price per MWh
- Aggregated at BSC party level for invoicing
- We will continue to provide web prices
- BPA report will see minimum changes, still delivered via SFTP

What's different

- The price/tariff will be fixed rather than changing every settlement period
- Additional to the main tariff there will likely be a fund tariff
- BSUoS charges will be levied on final demand only
- There will be no change of cost at the RF stage, volume only adjustment
- BCR will be a new report
- We will report regularly on the variance between the recovery and the actual balancing spend
- Tariff forecasts will be produced on a quarterly basis

Historic Balancing Costs



Modelling approach

- Previous model unresponsive to drivers of variability.
- The aim of the new model is to produce a forecast with explanatory power:
  - Identify drivers for changes in balancing costs in historic data.
  - Explicit drivers capturing what we know about future changes to the system.
- Forecast is at monthly resolution with a horizon of 24 months.
- Forecast individual cost components and then combine to find total costs.
- Forecast is probabilistic to quantify the level of uncertainty.
- Forecast covers a wide range of lead times therefore we use a blended approach
  - Combines the output of different models
  - Capture the variability over different time scales
- Modelling Webinar:- Document Video Recording Slides Q&A Document

Drivers of variability

Driver	Impact
NGESO policies	Uncertainty in future regulatory changes or government and ESO policies affect potential future costs
Government Regulation and Policy	
Network Changes	Network improvements alter constraint costs
Wholesale electricity price	Cost of balancing services linked to wholesale electricity price
Weather variability	Costs dependent on level of renewable generation.
Network and generator outages	Major outages of generators, interconnectors or transmission equipment leads to higher management costs
Large unexpected events	Large unexpected impacts

BSUoS Reporting

We have committed to providing industry with visibility of upcoming costs and the potential for tariffs to be reset, through providing the following reporting:

1. Quarterly forecasts of the upcoming BSUoS tariff
    - This would include information on model inputs (inc. data sources and availability) and their values
2. Monthly updates on the tariff and usage of funds available (ESO WCF & BSUoS Fund);
    - Model inputs (inc. data sources and availability) and their values
    - What the ESO has spent on balancing costs this period
    - What the ESO has recovered this period
    - Use of WCF and BSUoS fund (*subject to Ofgem decision*)
    - Narrative to support figures
3. Monthly publications of balancing service forecast cost over a 2-year time horizon (as today)
4. In the event that 80% of total funds available have been used, the ESO will provide updates on the tariff and usage of funds each working day

So what happens now?

- Ofgem response deadline 19th October 2022
- Draft tariff by the end of October + webinar to explain
- Ofgem decision and publication of non confidential responses expected October/November
- Potential seasonal tariff mod being investigated
- We are continuing work on the forecasting model
- Working with our billing system integration team to implement a solution that will be ready for April 2023 go live
- Final Tariff by end of December 2022
- New methodology goes live 1st April 2023
- New system development and integration post go live
- Changeover from existing to new system date tbc

The Seasonal challenge

- A fixed BSUoS charge applied on a £/MWh basis means the value of BSUoS recovered across a financial year by the ESO is directly related to BSUoS volume. However, the BSUoS costs incurred are not related to this and are relatively flat across a year

- With a single fixed £/MWh charge, for some years and under some forecast scenarios this may result in the ESO significantly under-recovering during the summer months with this shortfall recovered over winter

- Given the higher than expected BSUoS costs in 2022/23 so far, there is a risk the industry BSUoS fund will be fully utilised in the summer months before it is rebuilt over the winter, requiring a mid year tariff change to prevent the fund being empty

- A proactive solution to prevent this happening could be a summer tariff (1 April – 30 September) and a winter tariff (1 October – 30 March). Both would be finalised before 1 January per the WACM5 CMP361/2 solution

- We would ensure any solution is ‘cash neutral’ across the whole financial year v. CMP361 WACM5 (i.e. it shouldn’t cost the industry more or less)

- These changes would apply until April 2028 when the industry BSUoS fund is fully funded before reverting to a single tariff rate for the year

Q&A: Slido.com → #Revenue

Q&A

Q&A: Slido.com → #Revenue

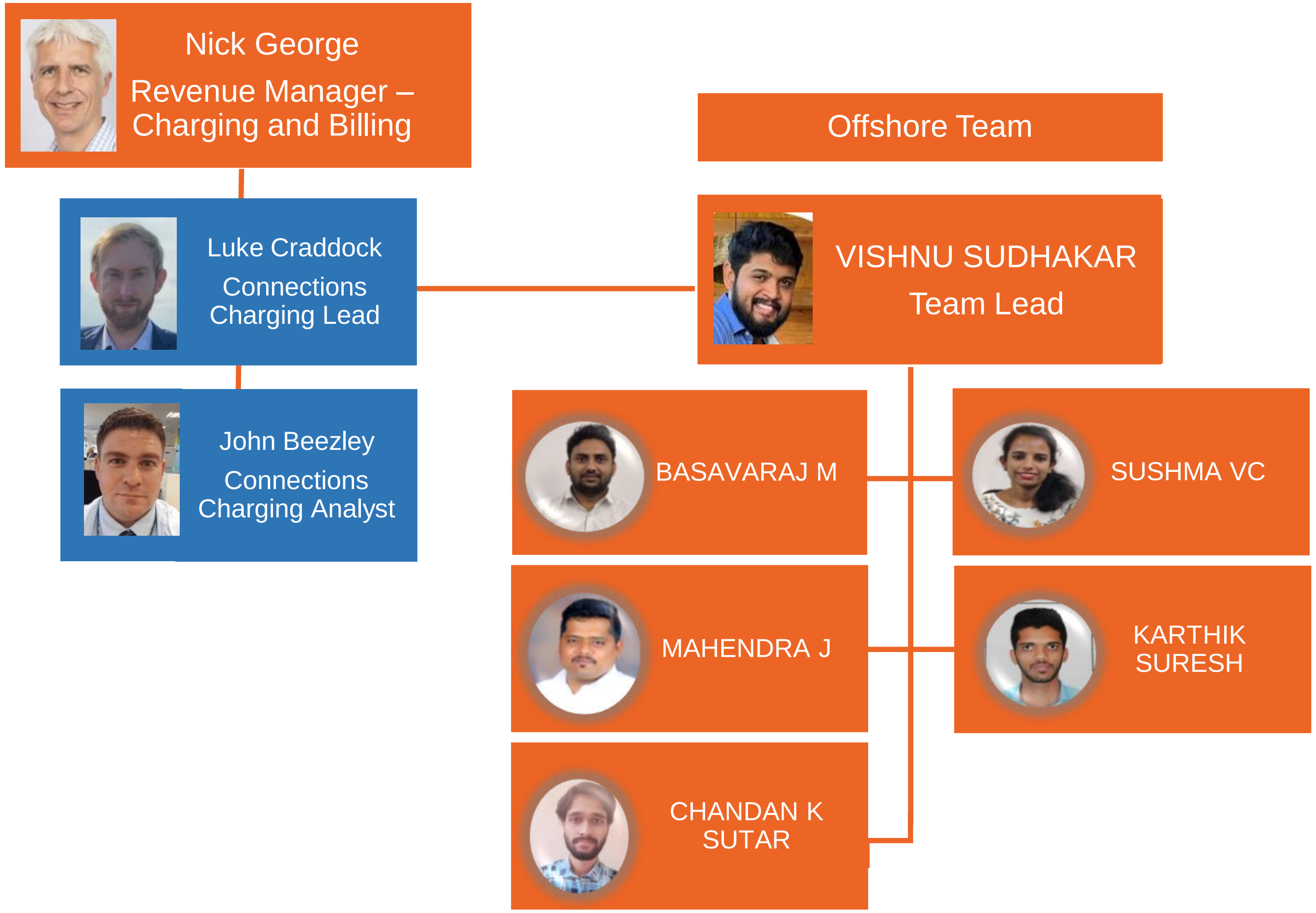
Connection Charging Overview

Luke Craddock & John Beezley

nationalgridESO

Q&A: Slido.com → #Revenue

Meet the Connection Charging Team

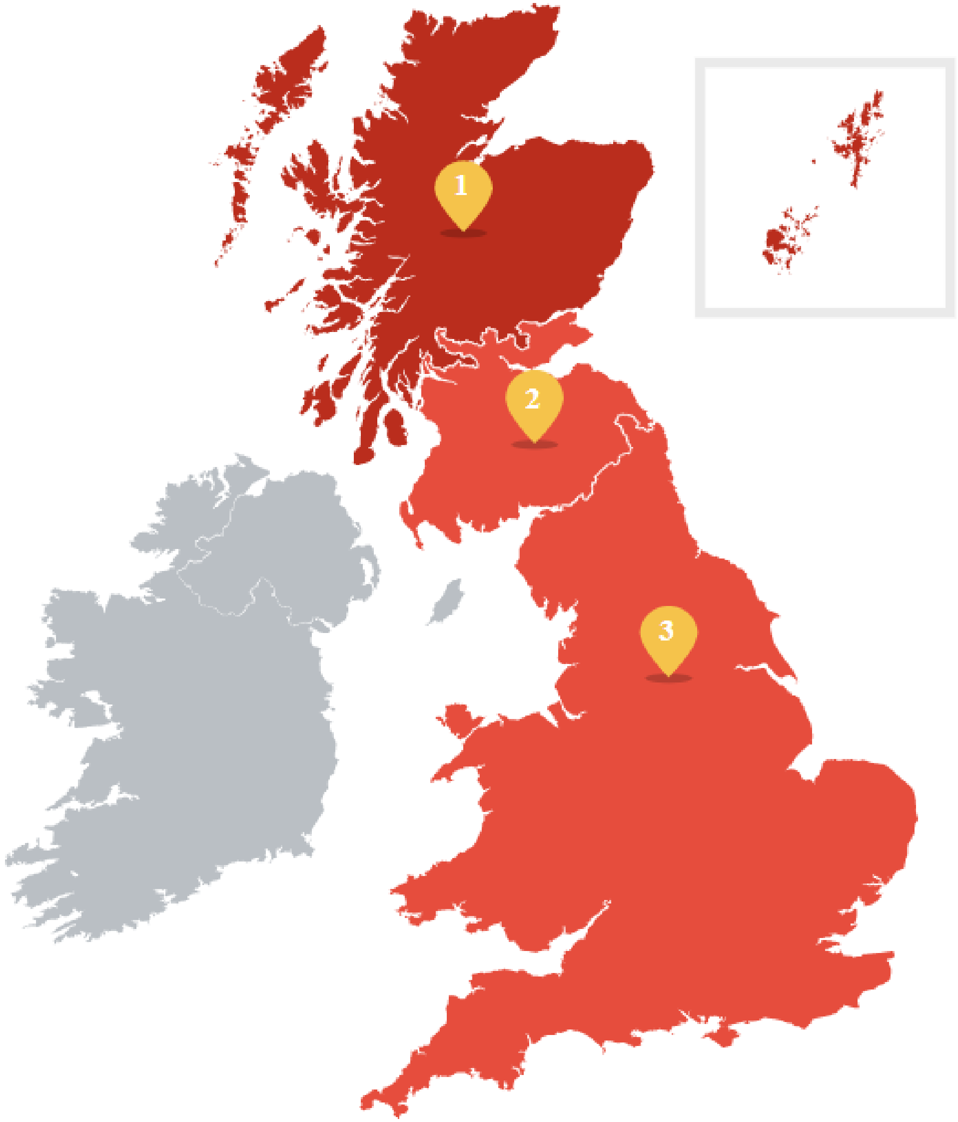


What are connection charges?

Connection charges recover the costs incurred by the Transmission Owner (TO) to design, build and maintain your connection to the transmission system.

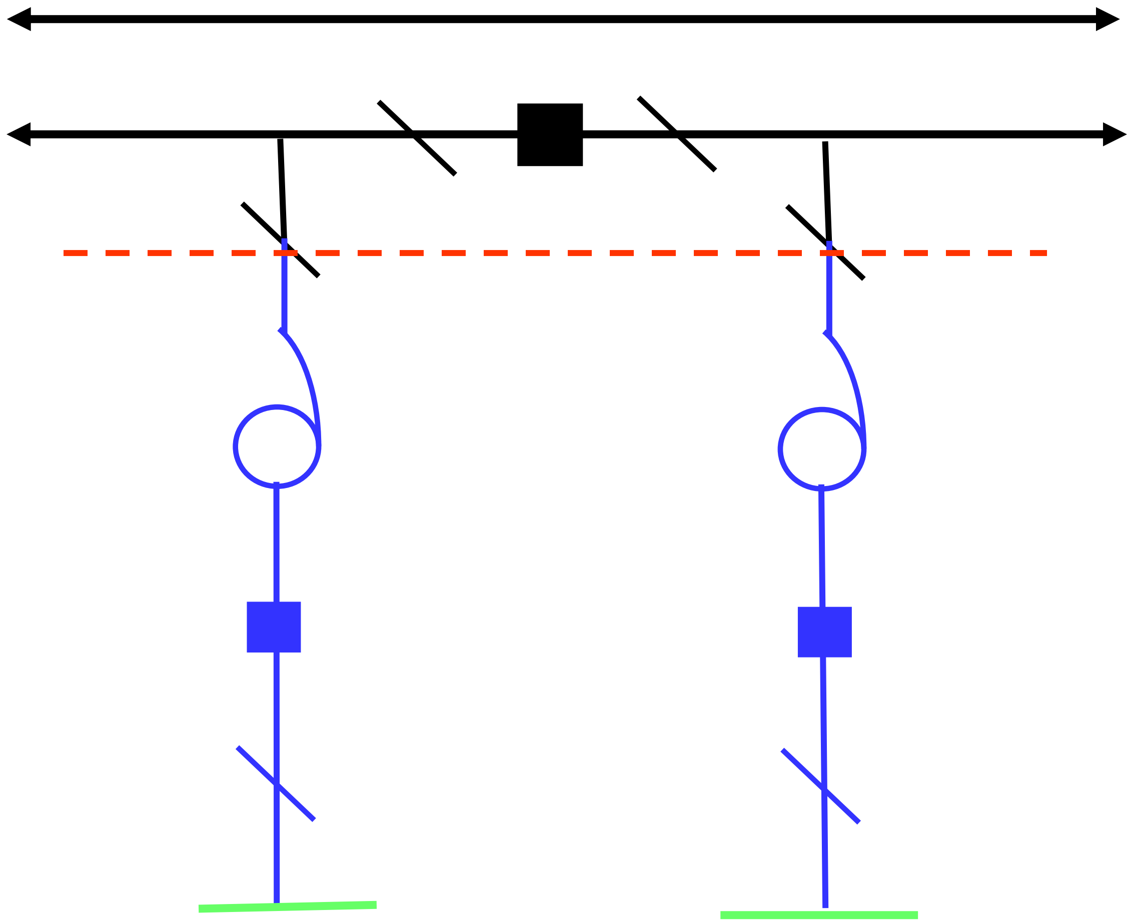
We recover these costs on behalf of:

1. Scottish & Southern Electricity Networks
2. SP ENERGY NETWORKS
3. nationalgrid



What is a connection asset?

Teed connection example



Infrastructure assets
TO owned connection assets
Users Assets

What are connection charges?

Annual Connection Charge

Capital Component + Non-Capital Component

- Capital Component
  - Depreciation
  - Rate of Return
- Non-Capital Component
  - Site Specific Maintenance
  - Transmission Running Costs

Connection charges are calculated annually but are payable monthly. 1/12 of the annual amount will be invoiced monthly, with the invoices issued via email on the 1st of each month.

Q&A: Slido.com → #Revenue

Connection charges

Annual Connection Charge Breakdown – Year 1 - 2022

	Connection Cost	Net Asset Value	Depreciation	RoR	SSM	TRC	Annual Charge
	GAV*n*	NAV	GAV/40 or 15	NAV*RoR	GAV*SSM	GAV*TRC	
Asset 1 – 40 Year	£500,00	£493,750	£12,500	£16,195	£1,900	£5,300	£35,895
Asset 2 – 15 Year	£15,000	£14,500	£1,000	£476	£57	£159	£1,692

Acronyms

Gross Asset Value for year n (GAV*n*)

Total cost of asset including:
- Construction costs
- Engineering
- Interest during construction
- Liquidated damages premium

Net Asset Value (NAV)

Mid year depreciated GAV of the asset

Rate of Return (RoR)

Transmission Owner Rate of Return

(Example **3.28%**)

Site Specific Maintenance (SSM)

Recovers a proportion of the cost and overheads with the maintenance activities.

0.38%

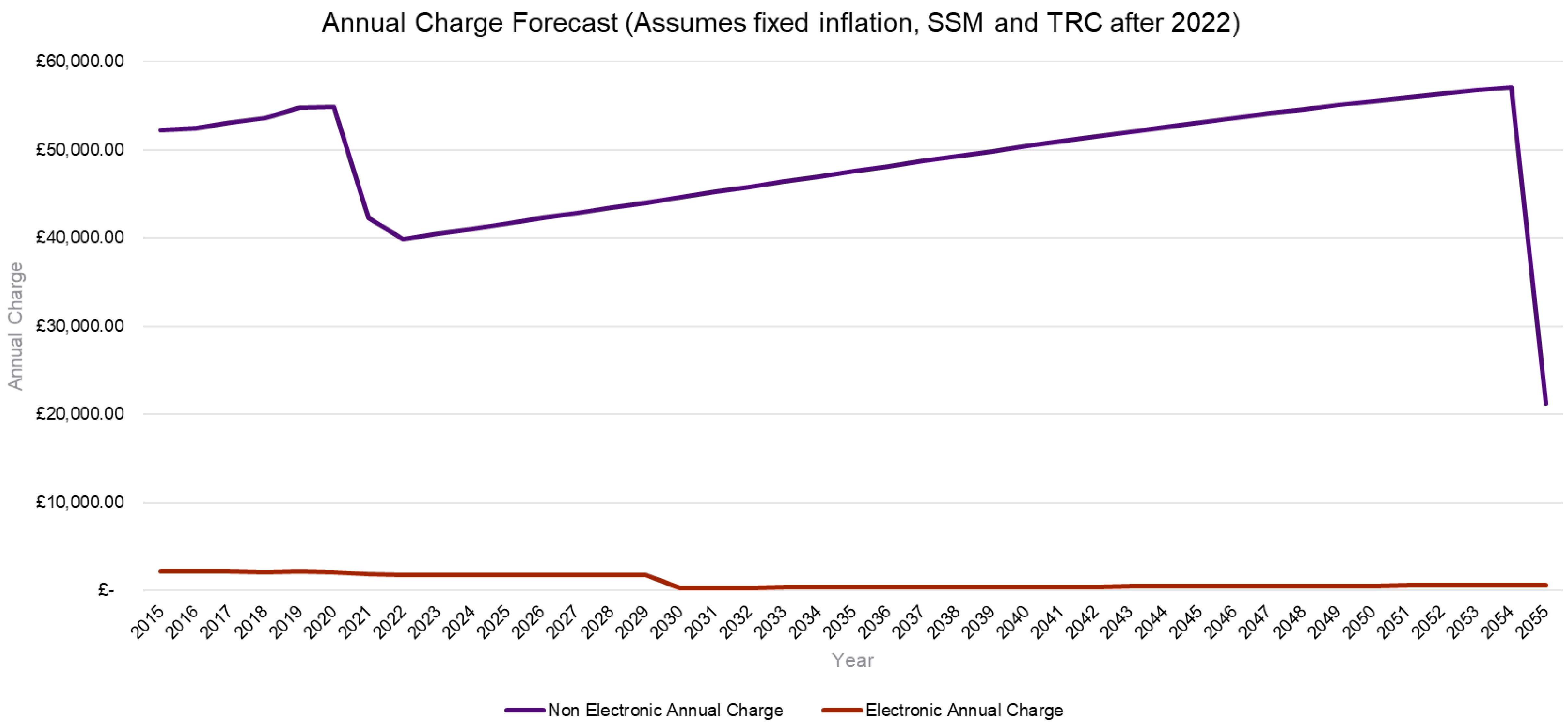
Transmission Running Costs (TRC)

Rates, operation, indirect overheads incurred by the transmission licensees

1.06%

Example of Annual Charge over time

Q&A: Slido.com → #Revenue



Capital Contribution Payments

Some customers chose to reduce their annual connection charges by making a capital contribution payment towards financing the capital costs. Only maintenance charges (SSM & TRC) are payable and secured when the charge's capital element is paid.

This reduces your security requirements and monthly charges.

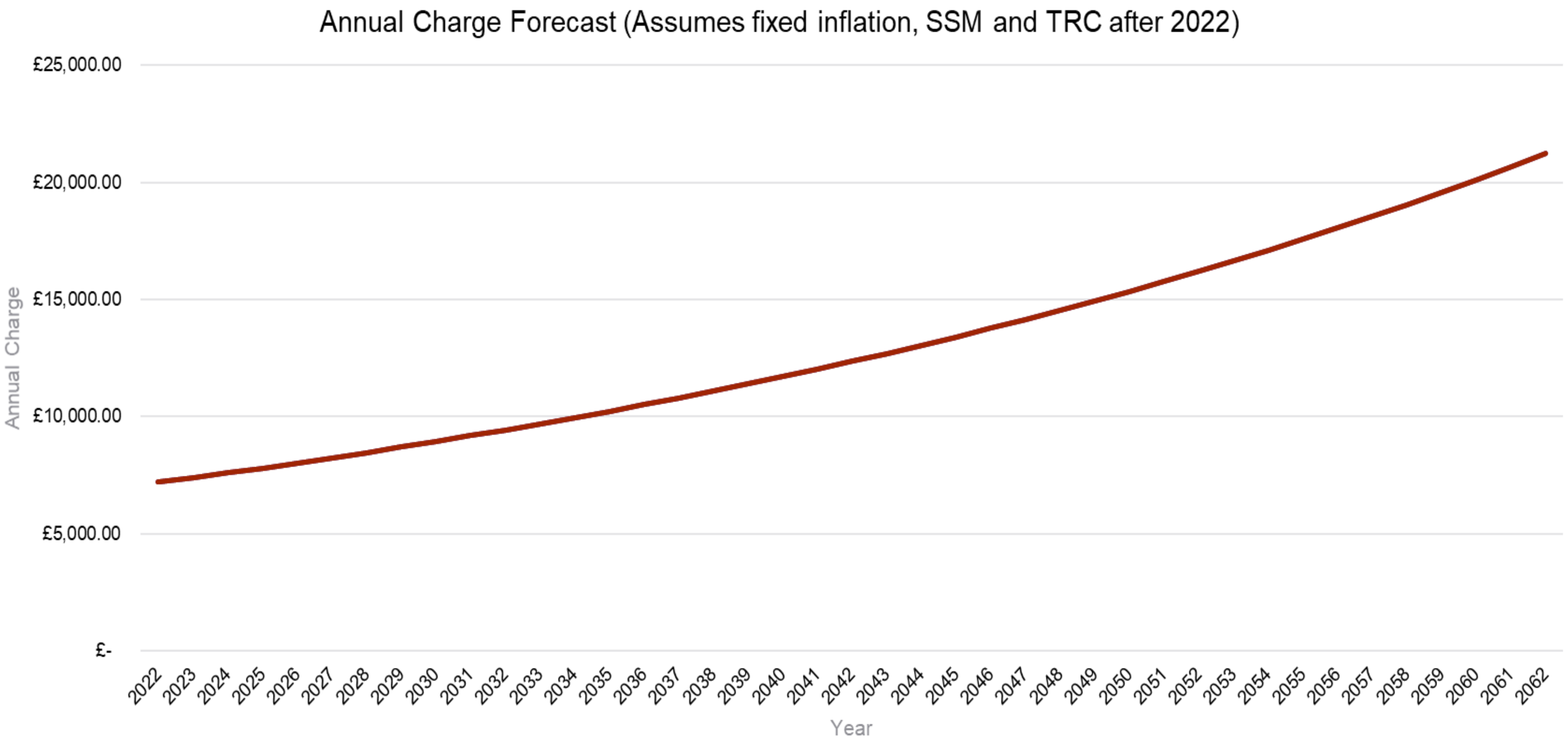
A Capital Contribution payment can be a lump sum or multiple payments per year.

- Option 1 – Payments alongside the TO's investment to build and install your assets.
- Option 2 – Single payment upon completion of the work.
- Option 3 – Full or partial payments during the lifetime of your connection. (Minimum 10% of the NAV)

You can opt into Capital Contributions via your Connection Application.

Example of Capital Contribution Annual Charges

Q&A: Slido.com → #Revenue



Asset Replacements

If the TO considers connection assets are required to be replaced before the end of their normal lifetime, the replacement costs will be borne by the TO.

You will continue to pay your existing annual charges within the remaining lifetime of your original assets. Upon the total depreciation of the original asset, your annual charge will be updated to reflect the costs of the replacement asset with the updated depreciation and maintenance. This is called ‘Ghost Charging’.

If you terminate your asset before the end of its economic life, a termination charge will be payable.

Charging Appendices Example (Appendix A)

Q&A: Slido.com → #Revenue

APPENDIX A
TRANSMISSION CONNECTION ASSETS/CONNECTION SITE

User:	JB Renewables
Connection Site:	Windy 1
Type:	Entry

Part 1 - Pre-Vesting Assets

Description	Age (As at 01/04/2022)	Year
There are no Pre-Vesting Assets associated with this agreement		

Part 2a - Existing Post-Vesting Assets

Description	Age (As at 01/04/2022)	Year
There are no Existing Post-Vesting Assets associated with this agreement		

Part 2b - New Post-Vesting Assets

Description	Age (As at 01/04/2022)	Year
120MVA 275/33kV	0	2022
120MVA Cable	0	2022

Part 3a - Existing Energy Metering Systems (*)

Description	Age (As at 01/04/2022)	Year
There are no Existing Energy Metering Systems associated with this agreement		

Part 3b - New Energy Metering Systems (*)

Description	Age (As at 01/04/2022)	Year
Electronic Metering	0	2022
Non Electronic Metering	0	2022

(*) FMS, Energy Metering Systems. The Electronic Components have a 15 year replacement period.
The Non-Electronics components have a 40 year replacement period.
All the above are inclusive of civil engineering works. At double busbar type substations, ownership of main and reserve busbars follows ownership of section switches.

Key Points:

- Pre-vesting assets are assets that commissioned pre 1990
- Electronic assets usually have a 10/15 year depreciation where as Non Electronic have 40

Charging Appendices Example (Appendix B)

Q&A: Slido.com → #Revenue

APPENDIX B
CONNECTION CHARGES/PAYMENT

User: JB Renewables
Connection Site: Windy 1
Type: Entry

(1) Connection Charges

The Connection Charges set out below may be revised in accordance with the terms of this Bilateral Connection Agreement and/or the Construction Agreement and/or the CUSC and/or the Charging Statement.

Part 1 - Pre-Vesting Assets

There are no Pre-Vesting charges for this agreement

Part 2a - Existing Post-Vesting Assets

There are no Existing Post-Vesting charges for this agreement

Part 2b - New Post-Vesting Assets

For indication only, the Connection Charge for those assets installed after 31st March 1990 and as specified in Appendix A Part 2b will be at an annual rate for the period 01/04/2022 to 31/03/2023 of £80,107.20, in April 2022 prices, where

Rate of Return 3.41%

Transmission Costs

Part A Site specific maintenance element = £21,139.40
Part B Other transmission costs element = £58,967.80

Asset Values

Asset Description	Gross Asset Value
120MVA 275/33kV	£4,014,000.00
120MVA Cable	£1,549,000.00

Key Points:

- You are invoiced monthly for the annual charge

Post Commissioning Security

What are post-commissioning securities?

Post-commissioning securities are required to cover the owed amount if the user disconnects from the transmission system during the period that the transmission assets are chargeable to the user.

- The Transmission Owners have invested in assets which generally are charged to users over a 40-year life span. (Can be less subject to agreement from the TO)
- Should the user disconnect from the network the Transmission Owners would not be able to recover the costs of the assets which have been provided.

How are they Calculated?

April to March

£1,000,000.00 (EOY NAV) + £100,000 (12 months connection charge) = £1,100,000 (Security Requirement).

October to March

£1,000,000.00 (EOY NAV) + £50,000 (6 months connection charge) = £1,050,000 (Security Requirement).

Security is calculated based on the End of Year Net Asset Value (NAV). Plus 6 or 12 months of connection charges, depending on when the statements are issued

Illustration of Security

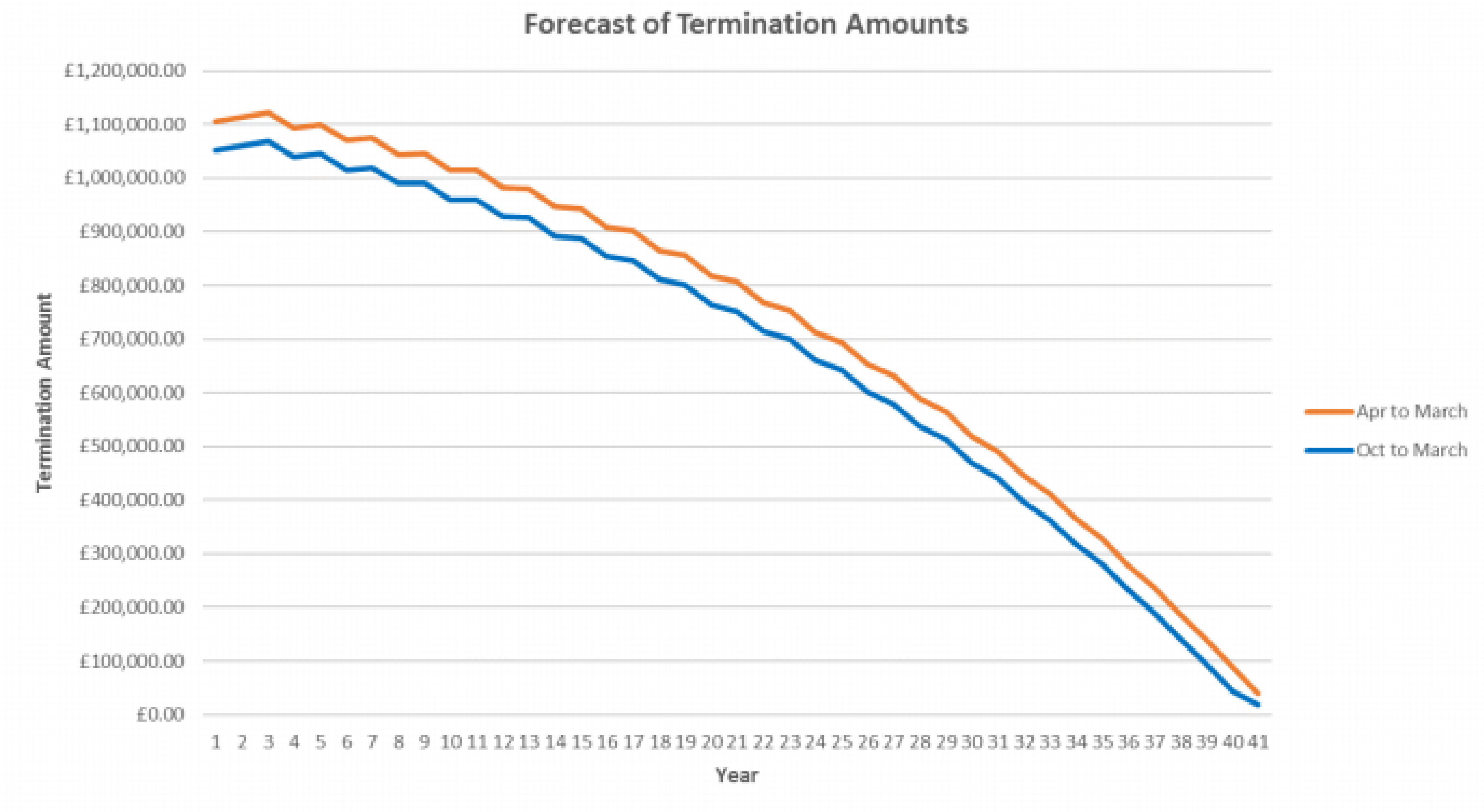
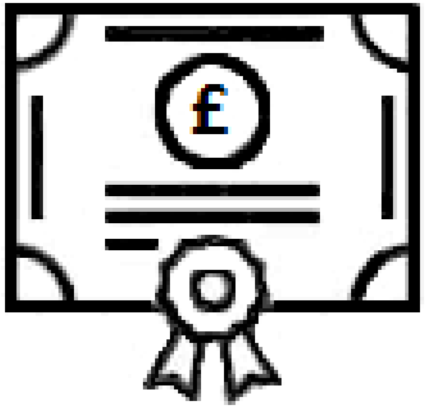


Figure 1: How the Termination Amounts vary over time assuming an initial GAV of £1,025,641.03 with constant inflation 1.33%, SSM of 0.45% and TRC of 1.47%. After the 40 year depreciation, there is no capital charge.

How do customers provide this?

Customers will generally provide security in one of the following forms:

Bank guarantee



Bond

Letter of credit

Cash payment to be held in a National Grid ESO escrow account

Q&A

Lunch

We will return at 13:30

Workshops

- Please follow the links provided in the Teams Chat to your chosen webinar
- There will be opportunity to attend 2 (30 minutes per webinar)
- We will return to the presentations at 14:30

STAR Update

Malcolm Rowe

STAR – ESO's New Settlement and Billing System

- What is STAR?
  - STAR is a programme of works to transform the technology landscape used in Settlements services and Revenue billing
- Why?
  - To support the ever increasing complexity and frequency of regulatory changes and market changes at a lower cost
- When?
  - STAR programme will move billing services from existing technology onto STAR in a phased approach
  - Due by March 2023 – AAHEDC, TNUoS TDR demand
  - Future releases – TNUoS generation, Connections, BSUoS

STAR – Benefits for Customers

- Backing sheets will no longer be produced in PDF format
- Backing sheets will be produced in CSV format with data that would support processing into a system
- New invoice csv file with data that would support processing into a system
- IDDs will be produced to support each invoice and backing sheet csv file
- Any changes to these files will be controlled in a governance process and advertised to industry before changes implemented

Sample AAHEDC Invoice csv file (DRAFT)

	A	B	C	D	E	F	G	H	I	J
1	AAA	AAHDIN01	D	20210926000000	SO	NG	BP	QUEENS	1	OPER
2	SCHDR	InvoiceDetails								
3	INHD1	THIS IS NOT A VAT INVOICE								
4	INHD2	AAHEDC Charge								
5	BLANK									
6	SCTTL	Type	Company	Account	InvoiceNumber	InvoiceDate	YourOrderReference	OurBillingReference		
7	INTTL	SALESINVOICE	Acme GB Limited	3333333	8300000	15.02.2022	AAHEDC Quarterly	MSM_AAHD_123456789		
8	BLANK									
9	SCDET	Description	ValueExclVAT	VATAmount						
10	DINV1	AAHEDC Scheme Energy Consumption Charge	2753.25	550.65						
11	BLANK									
12	SCTOT	TotalExclVAT	TotalVATAmount	TotalIncVAT						
13	INTOT	2753.25	550.65	3303.90						
14	BLANK									
15	SCFTR	PaymentDueDate								
16	INFTR	15.03.2022								
17	ZZZ	17								
18										

Sample AAHEDC Backing Sheet csv file (DRAFT)

	A	B	C	D	E	F	G	H	I	J
1	AAA	AAHDBS01	D	2.02E+13	SO	NG	BP	ACME	1	OPER
2	SCHDR	BackingDetails								
3	BSHDR	Backing Information for Quarterly AAHEDC Scheme Charges								
4	CNAME	ACME GB Limited								
5	INVNO	8300000								
6	BLREF	MSM_AAHD_123456789								
7	QRSTR	01.10.2021								
8	QREND	31.12.2021								
9	BLANK									
10	SCSET	SettlementChargeCycle	SettlementChargePeriod	RunType	DateFrom	DateTo				
11	BSSET	2021/22	Q3	R2	01.10.2021	13.10.2021				
12	BSSET	2021/22	Q3	R1	14.10.2021	15.10.2021				
13	BSSET	2021/22	Q3	SF	16.12.2021	31.12.2021				
14	BLANK									
15	SCTRF	AAHEDCTariffEffectiveDate	OverallAAHEDCSchemeTariff(p/kWh	ShetlandTariff(p/kWh)	AAHEDCTariffExclShetlandAssistanceAmount(p/kWh)					
16	BSTRF	01.04.2021	0.040427	0.012049	0.028378					
17	BLANK									
18	SCDET	BMUnitID	QuarterlyConsumption(kWh)	ShetlandQuarterlyCharge(£)ExclVAT	AAHEDCQuarterlyChargeExclShetlan	TotalQuarterlyCharge(£)ExclVAT				
19	BSDET	2__AXYZZ000	1324771	159.62	375.94	535.56				
20	BSDET	2__BXYZZ000	984336	118.6	279.33	397.93				
21	BSDET	2__CXYZZ000	504867	60.83	143.27	204.1				
22	BSDET	2__DXYZZ000	583051	70.25	165.46	235.71				
23	BSDET	2__EXYZZ000	1025726	123.59	291.08	414.67				
24	BSDET	2__FXYZZ000	618366	74.51	175.48	249.99				
25	BSDET	2__GXYZZ000	992072	119.53	281.53	401.06				
26	BSDET	2__HXYZZ000	1204597	145.14	341.84	486.98				
27	BSDET	2__JXYZZ000	1024264	123.41	290.67	414.08				
28	BSDET	2__KXYZZ000	291621	35.14	82.76	117.9				
29	BSDET	2__LXYZZ000	479522	57.78	136.08	193.86				
30	BSDET	2__MXYZZ000	869766	104.8	246.82	351.62				
31	BSDET	2__NXYZZ000	706474	85.12	200.48	285.6				
32	BSDET	2__PXYZZ000	287306	34.62	81.53	116.15				
33	BSTOT	Total	10896739	1312.94	3092.27	4405.21				
34	BLANK									
35	SCFTR	ForQueriesPleaseContact								
36	BSFTR	TNUoS.queries@nationalgrideso.com								
37	ZZZ	37								

Q&A

Glossary (1 of 3)

Term	Description
AGIC	Avoided GSP (Grid Supply Point) Infrastructure Credit
ALF	Annual Load Factor
BCA	Bilateral Connection Agreement
BCR	Balancing Services Reporting
BEGA	Bilateral Embedded Generator Agreement
BMU	Balancing Mechanism Units
BPA	Balancing Services Charges (BSC) Party Charging Advice
BSUoS	Balancing Services Use of System
CUSC	Connection and Use of System Code
DNO	Distribution Network Operator
EET	Embedded Export Tariff
ETUoS	Embedded Transmission Use of System
FPN	Final Physical Notifications

Glossary (2 of 3)

Term	Description
FPVAR	Forecasting Performance Value at Risk
HH / NHH	Half-Hourly / Non Half-Hourly
II	Interim Initial
LDTEC	Limited Duration Transmission Entry Capacity
MITS	Main Interconnected Transmission System
NETS	National Electricity Transmission System
NIC	Network Innovation Competition
OFGEM	Office of Gas and Electricity Markets
OTNR	Offshore Transmission Network Review
PCFM	Price Control Financial Model
RF	Reconciliation Final
SCR	Significant Code Review
SF	Settlement Final

Glossary (3 of 3)

Term	Description
SQSS	Security and Quality of Supply Standard
STTEC	Short Term Transmission Entry Capacity
T&T	Model Transport and Tariff Model
TCR	Targeted Charging Review
TDR	Transmission Demand Residual
TEC	Transmission Entry Capacity
TGR	Transmission Generation Residual
TNUoS	Transmission Network Use of System
TO / OFTO	Transmission Owner / Offshore Transmission Owner
Triads	Three half-hour settlement periods with highest system demand between November and February 3 days apart
UMS	Unmetered Consumption
WACM	Workgroup Alternative CUSC Modification