

TNUoS Tariffs Five-Year View Webinar 2020/21 – 2024/25

Thursday 4 April 2019

13:30 – 14:30

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nationalgrid**ESO**

Agenda

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 - 4 Demand Forecasts & Tariffs
 - 5 Generation Tariffs
 - 6 Local Circuits
 - 7 Revenue
 - 8 Scenarios
 - 9 The July 2020/21 forecast
 - 10 Q&A
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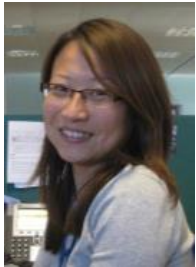
Revenue team



Paul Wakeley



Rebecca Yang



Forecasting, setting and billing TNUoS to recover £2.8bn of TO revenue per year from generators, demand and suppliers

Tom Selby



**Generation;
Offshore**

Jo Zhou



**Onshore Local
Circuits;
Revenue**

Alice Grayson



**Demand;
EET**

Tariff timetable

2020/21 TNUoS

- Quarterly forecast by 31 July
- Draft tariffs by 29 November
- Final tariffs by 31 January 2020

Changes to 2020/21 Methodology

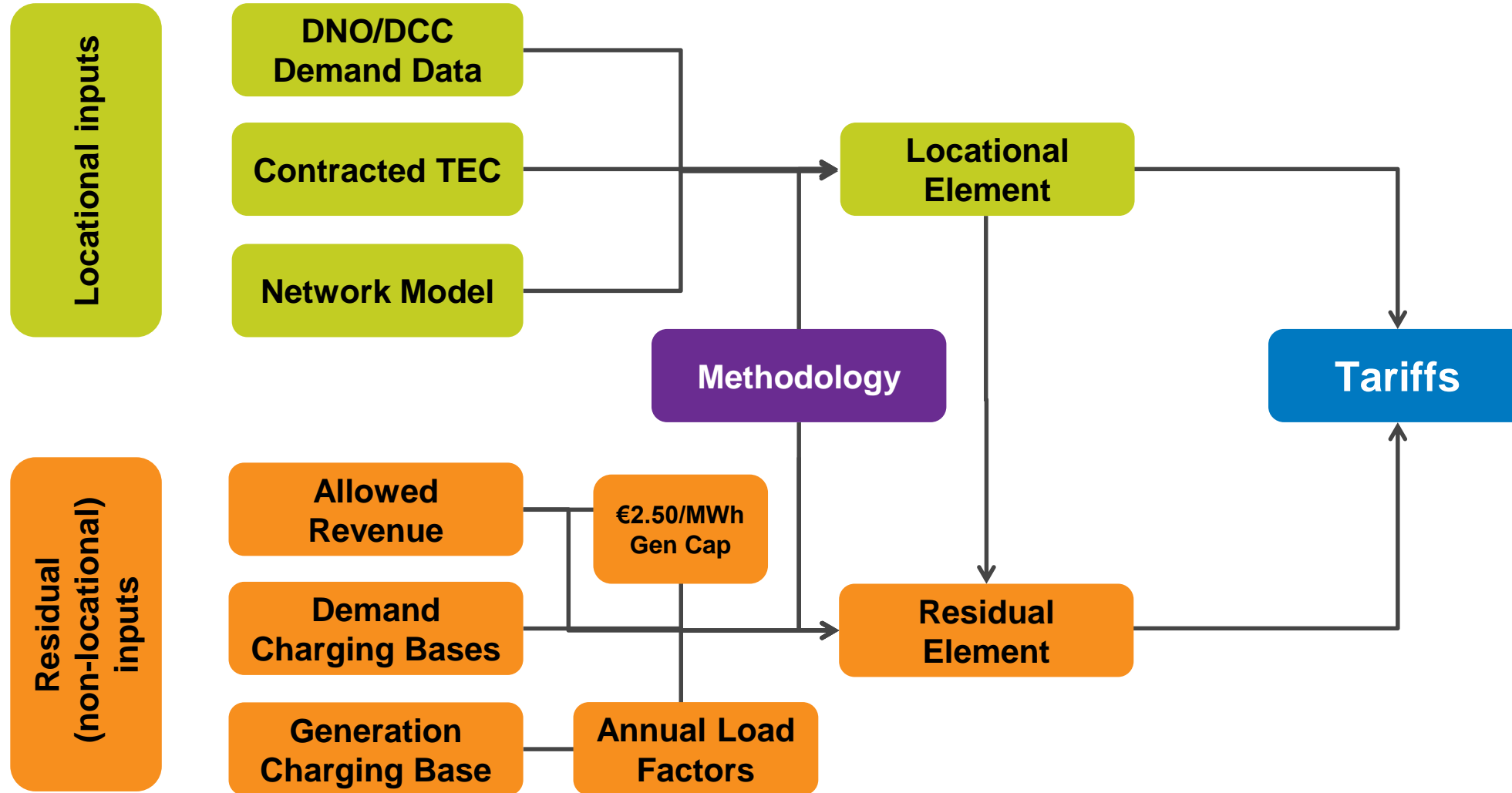
Modification in workgroup:

- **CMP280:** New Generator TNUoS Demand Tariff which Removes Liability for TNUoS Demand
- **CMP286 & CMP287:** Improving TNUoS Predictability through Increased Notice of TNUoS Inputs
- **CMP292:** Introducing a Section 8 cut-off date for changes to the Charging Methodologies
- **CMP301:** Expansion factors for HVDC and subsea circuits
- **CMP302:** Extend the Small Generator Discount
- **CMP303:** Improving local circuit charge cost-reflectivity
- **CMP310:** Changes in the event of no deal Brexit
- **CMP312:** Correcting erroneous legal text following implementation of CMP264/265

Forecast Inputs

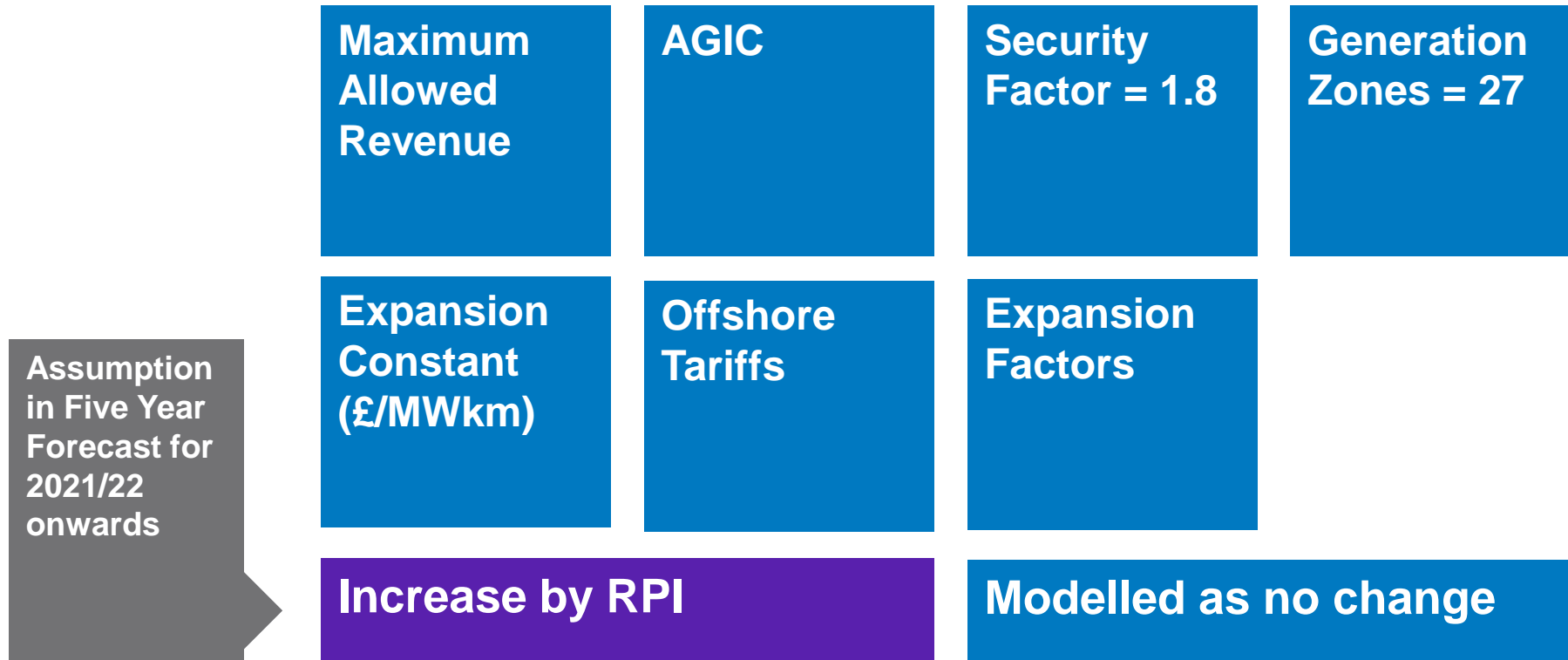


Inputs into the tariff forecast



Assumptions in this forecast for RIIO-T2

- The next RIIO-T2 price control is expected to start on 1 April 2021.
- The CUSC requires various parameters to be updated at that point for the 2021/22 tariffs, but are dependent on each TOs RIIO 'deal'



- 7 • We will begin the process to recalculate inputs this month



Demand Forecasts

System Peak & HH/NHH demand forecast

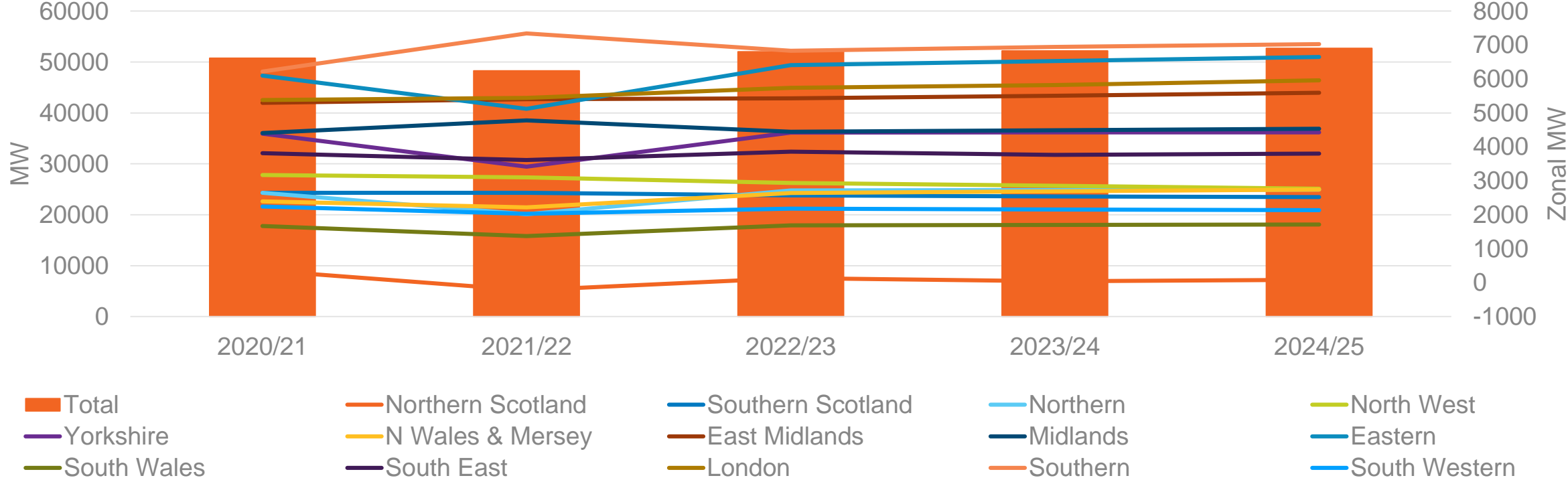
Table HH – Demand charging base and system peak

	2020/21	2021/22	2022/23	2023/24	2024/25
Average System Demand at Triad (GW)	50.25	50.03	50.13	50.24	50.36
Average HH Metered Demand at Triad (GW)	19.16	19.05	19.09	19.13	19.15
NHH Annual Energy between 4pm and 7pm (TWh)	24.13	23.97	23.96	23.91	23.86

- **Overall decline in Transmission net demand forecast due to:**
 - Distributed generation
 - “Behind the meter” microgeneration
 - Revised economic projections
 - Impact of smart meters
 - Revised peak assumptions for Demand Side Response
- **Consumption from electrification of heating and transport remains broadly flat but expected to start increasing from 2022 onwards**
- **No significant demand shift between NHH and HH expected, broadly flat from 2020/21**

Modelled Demand – Week 24 Data

Week 24 DNO Zonal Demand Forecast



- Contracted demand at GSP used within transport model for locational signals for future energy consumption
- Based on transmission demand forecasts from DNO's & directly connected users (week 24 data)

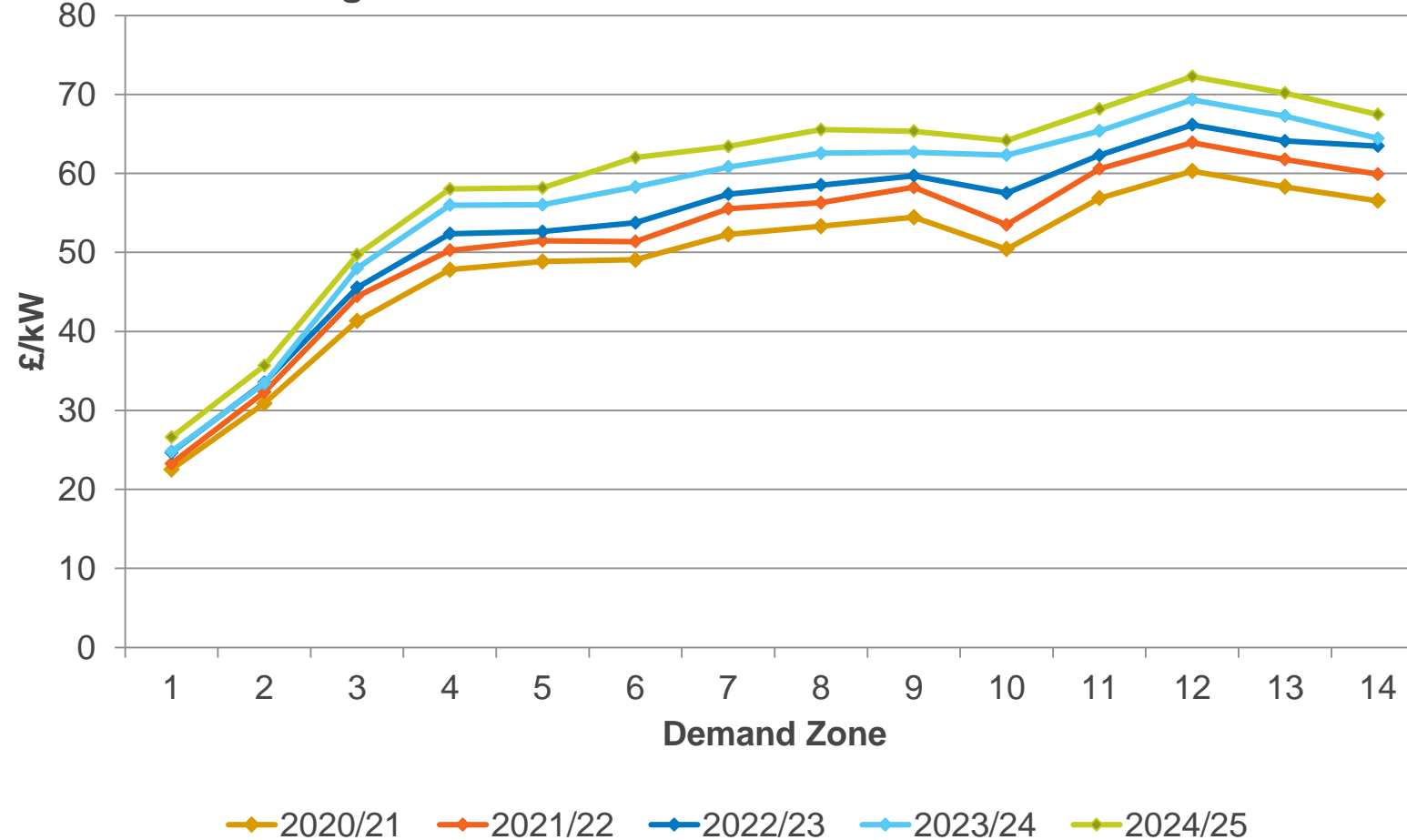
Demand Tariffs



HH Gross Demand Tariff

Half Hour Demand Tariffs

Table B & Figure D



Average tariff is £51.11/kW rising to £61.71/kW in 2024/25, increase year on year due to:

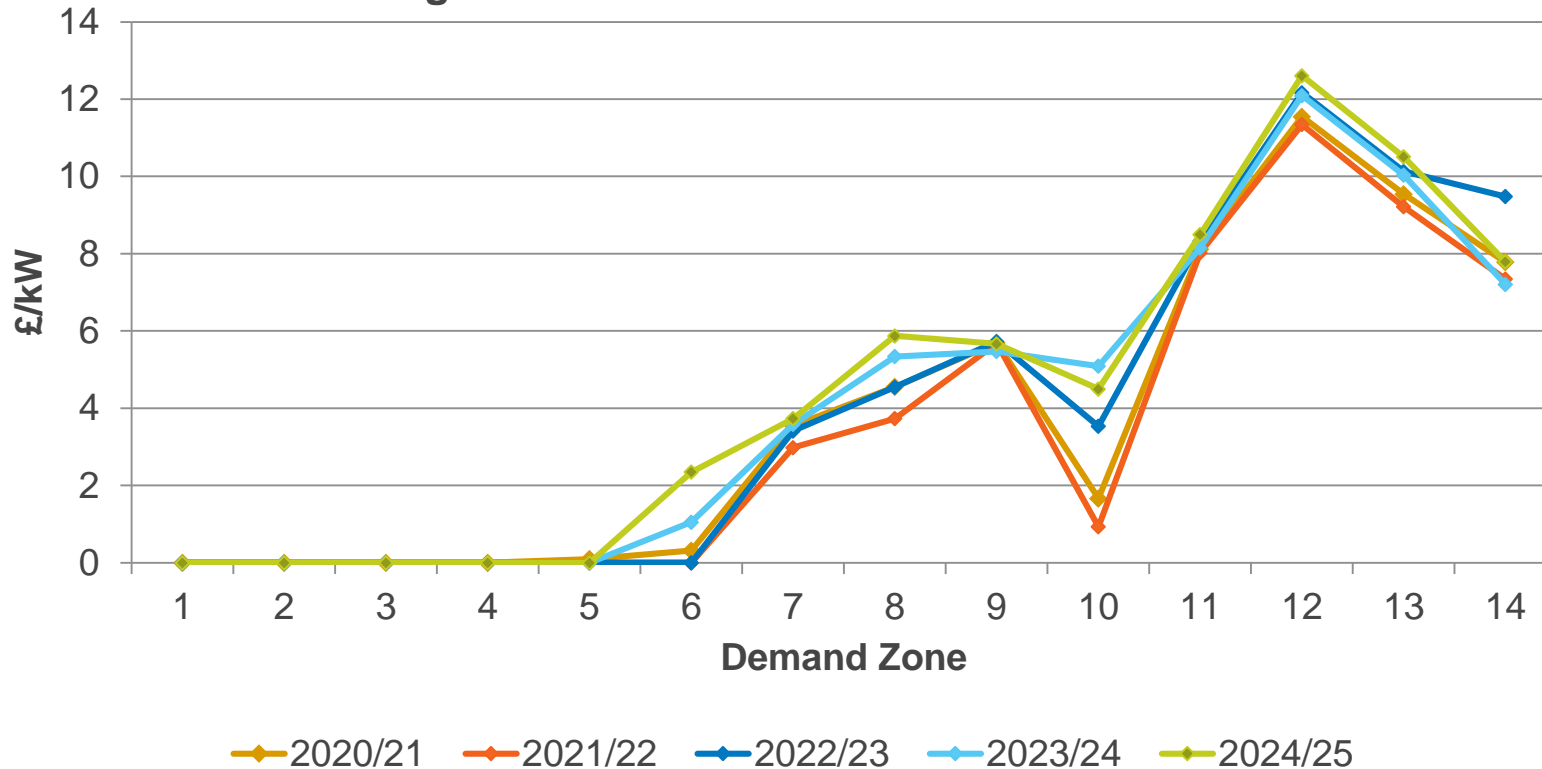
- declining charging base for system peak and HH demand
- increasing proportion of total revenue to be recovered from demand

HH Tariffs	2020/21	2021/22	2022/23	2023/24	2024/25
Average Tariff (£/kW)	51.11	54.13	56.09	59.14	61.71
Residual (£/kW)	52.18	56.09	57.61	60.97	63.53

Embedded Export Tariff

Embedded Export Tariffs

Table B and Figure F



From 2020/21 the phased residual is set at zero.

Volumes and EET are broadly flat across the 5 years.

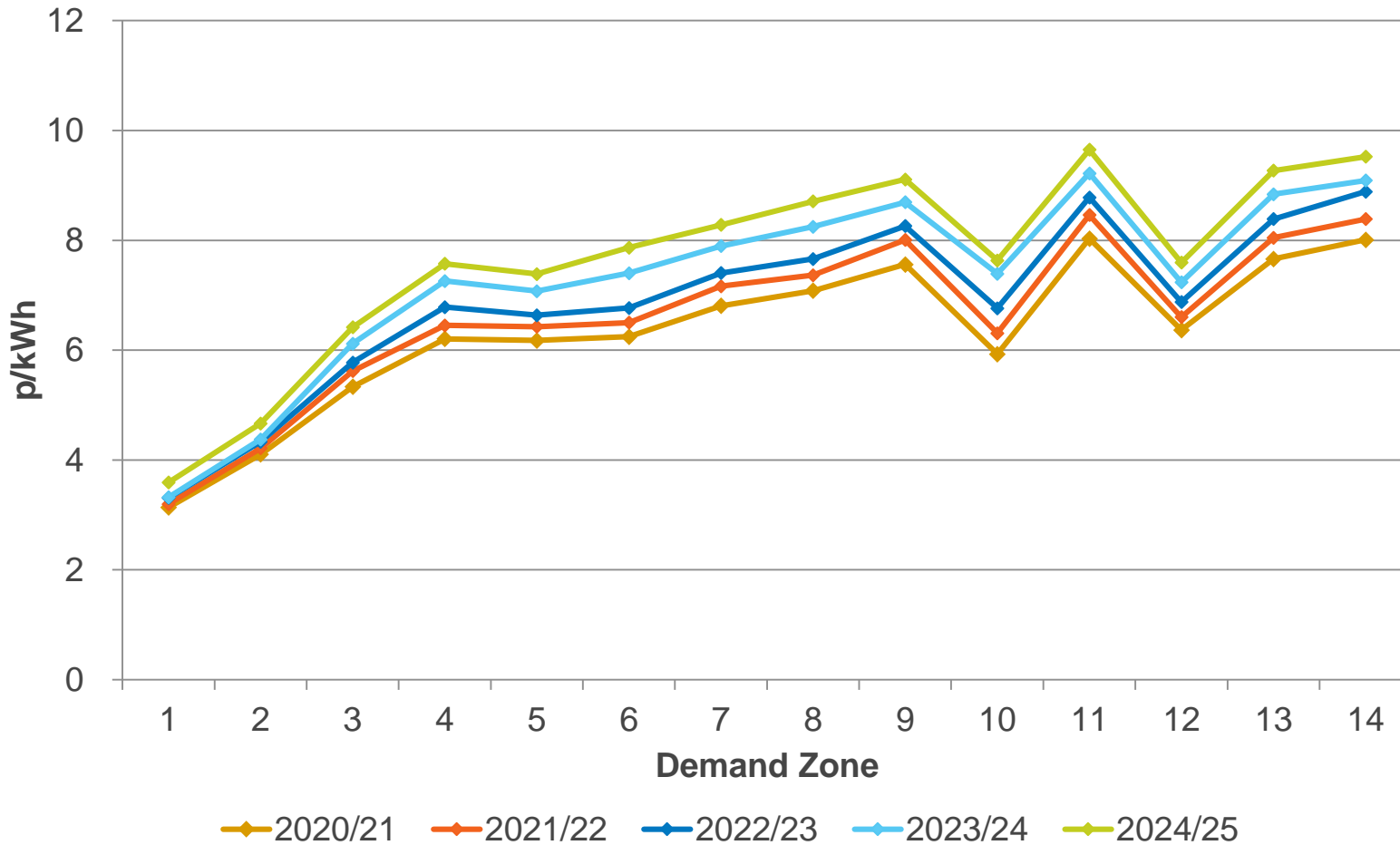
Total Credit is expected to increase from 2020/21 onwards.

EET	2020/21	2021/22	2022/23	2023/24	2024/25
Average Tariff (£/kW)	2.52	2.32	2.65	2.88	2.91
Phased residual (£/kW)	-	-	-	-	-
AGIC (£/kW)	3.43	3.53	3.64	3.74	3.86
Total Credit (£m)	17.90	15.83	17.86	19.35	19.46

NHH Tariffs

Table B and Figure H

Non-Half Hour Demand Tariffs



Tariff gradually increases between 0.1-0.6p/kWh zonally due to:

- Proportion of revenue collected increases following HH recovery
- Declining charging base of 0.3 TWh over 5 year period

NHH Tariffs	2020/21	2021/22	2022/23	2023/24	2024/25
Average (p/kWh)	6.52	6.93	7.21	7.62	8.00



Generation Tariffs

Headline changes to generation

**Changes to the G/D
split calculation:**

**Error margin &
exchange rate data**

**Increases in renewable
generation and gas**

**Closures of coal and
nuclear plant**

G/D Split: Generation inputs 2020/21

$$\begin{array}{l} \text{€2.50 per MWh} \\ \text{x 16\% Error Margin} \end{array} = \text{€2.10/MWh}$$

$$\begin{array}{l} \text{€2.10} \div \\ \text{£:€ exchange rate of €1.12} \end{array} = \text{£1.88/MWh}$$

(FES Generation Forecast)
221TWh

X

£1.88/MWh

= £415.1m Revenue to be recovered from generation

G/D split over the five year period

Table FF – Generation and demand revenue proportions

	2020/21	2021/22	2022/23	2023/24	2024/25
Limit on generation tariff (€/MWh)	2.50	2.50	2.50	2.50	2.50
Error Margin	16.0%	16.0%	16.0%	16.0%	16.0%
Exchange Rate (€/£)	1.12	1.11	1.09	1.08	1.08
Total Revenue (£m)	2,950.8	3,083.2	3,177.4	3324.2	3,459.2
Generation Output (TWh)	221.2	213.6	207.0	201.3	200.6
% of revenue from generation	14.1%	13.2%	12.5%	11.7%	11.2%
% of revenue from demand	85.9%	86.8%	87.5%	88.3%	88.8%
Revenue recovered from generation (£m)	415.1	405.7	397.4	390.1	388.9
Revenue recovered from demand (£m)	2535.7	2677.5	2780.0	2934.0	3070.3

Generation TNUoS Tariffs

Peak Security

Year Round Shared

Year Round Not Shared

Generator Residual

We publish wider tariff components by zone

We also publish example wider tariffs for 3 types of generator with example load factors

Conventional Carbon 80%	Conventional Low Carbon 80%	Intermittent 40%
Biomass CCGT/CHP Coal OCGT/Oil Pumped storage (including battery storage)	Nuclear Hydro	Offshore wind Onshore wind Tidal

Generation tariffs – Conventional Carbon

Scotland – consistent with increase in renewable generation (except zone 4)

England & Wales – tariffs get more negative in line with the gradual reduction of the residual

Wider Tariffs for a Conventional Carbon 80% Generator

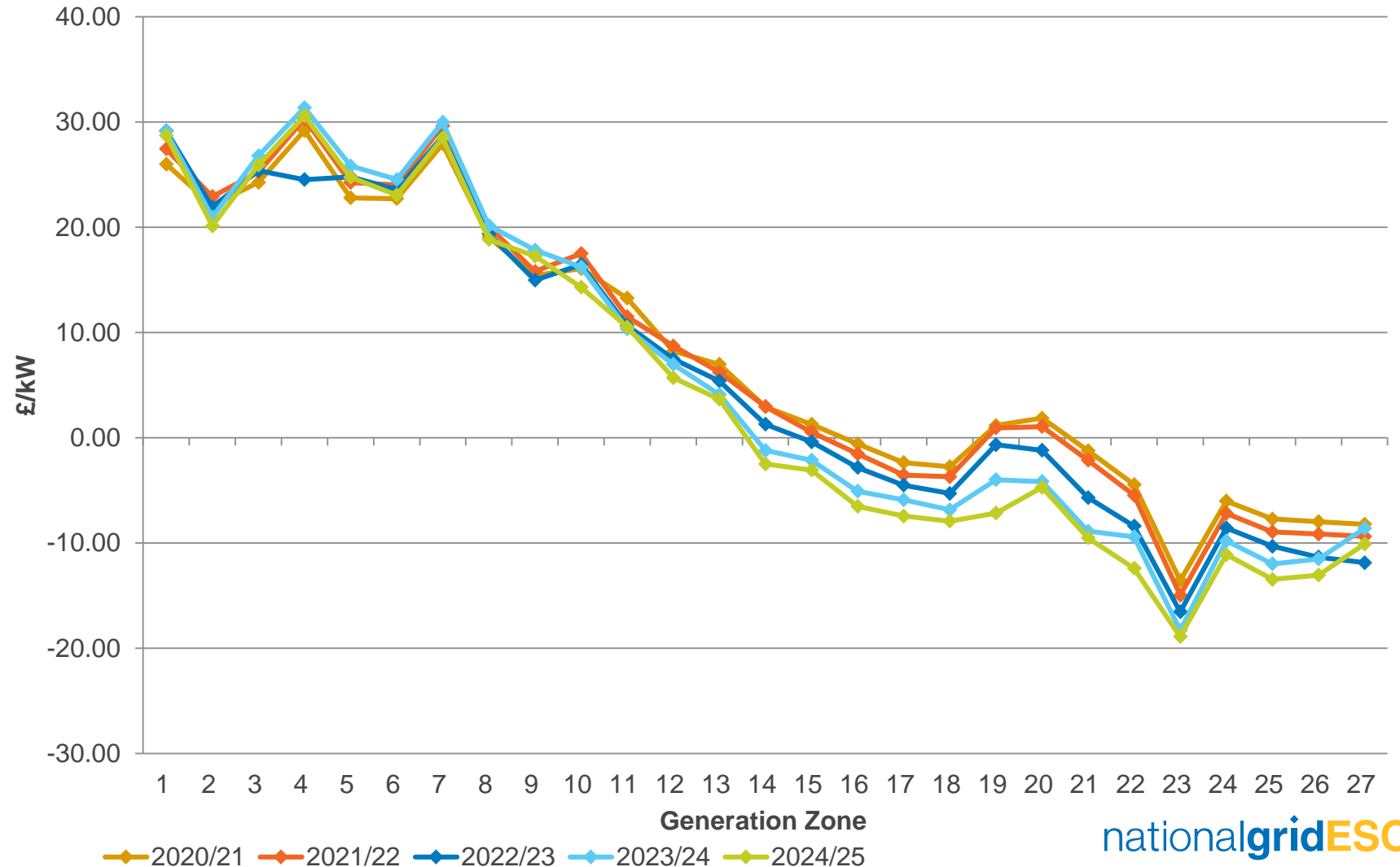


Figure Q

Generation tariffs – Conventional Low Carbon

Similar to CC: more extreme due to paying/receiving full Year Round Not Shared tariff

Scotland – consistent except for ‘flip’ in zone 4

England & Wales – tariffs get more negative in line with the gradual reduction of the residual

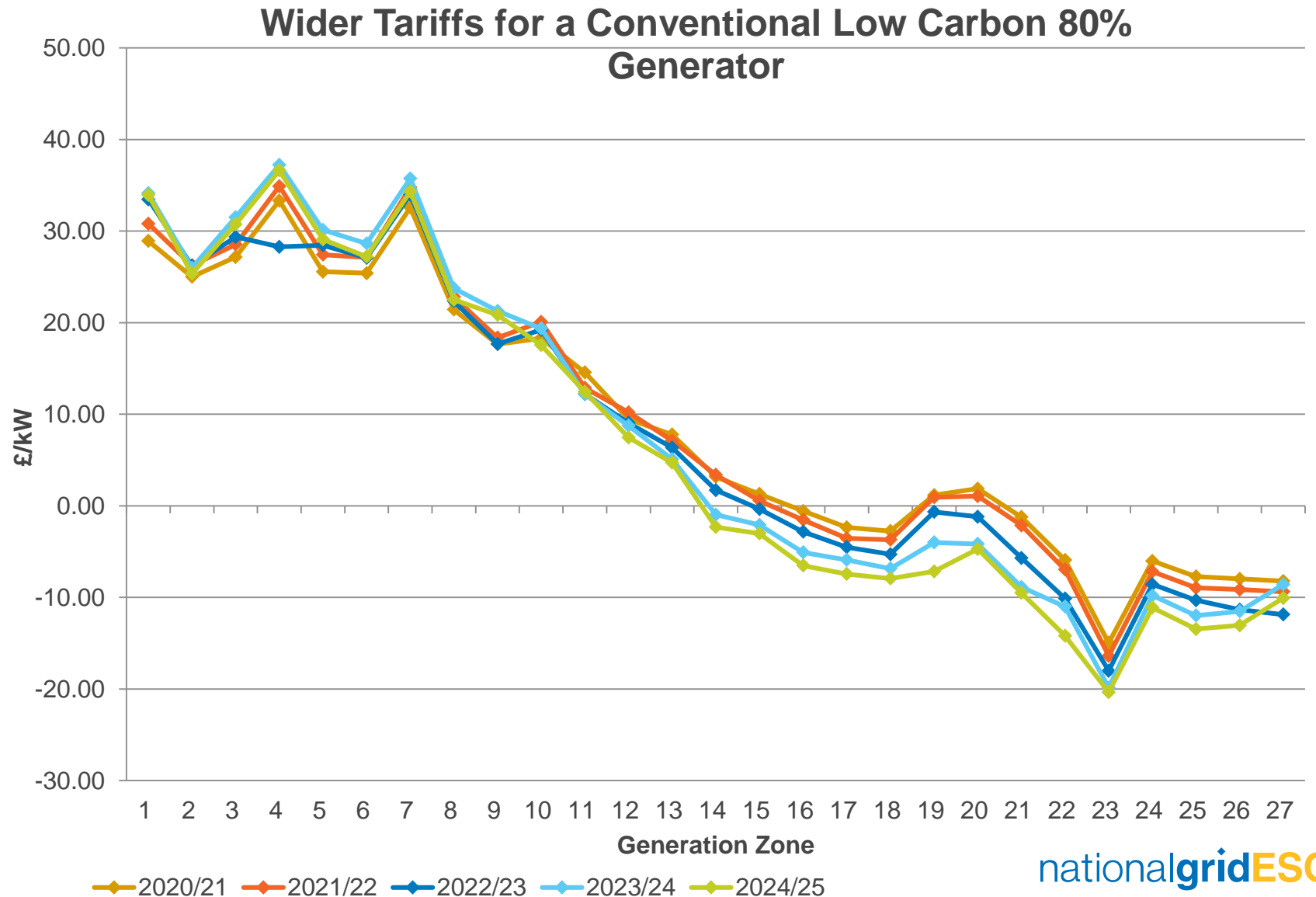


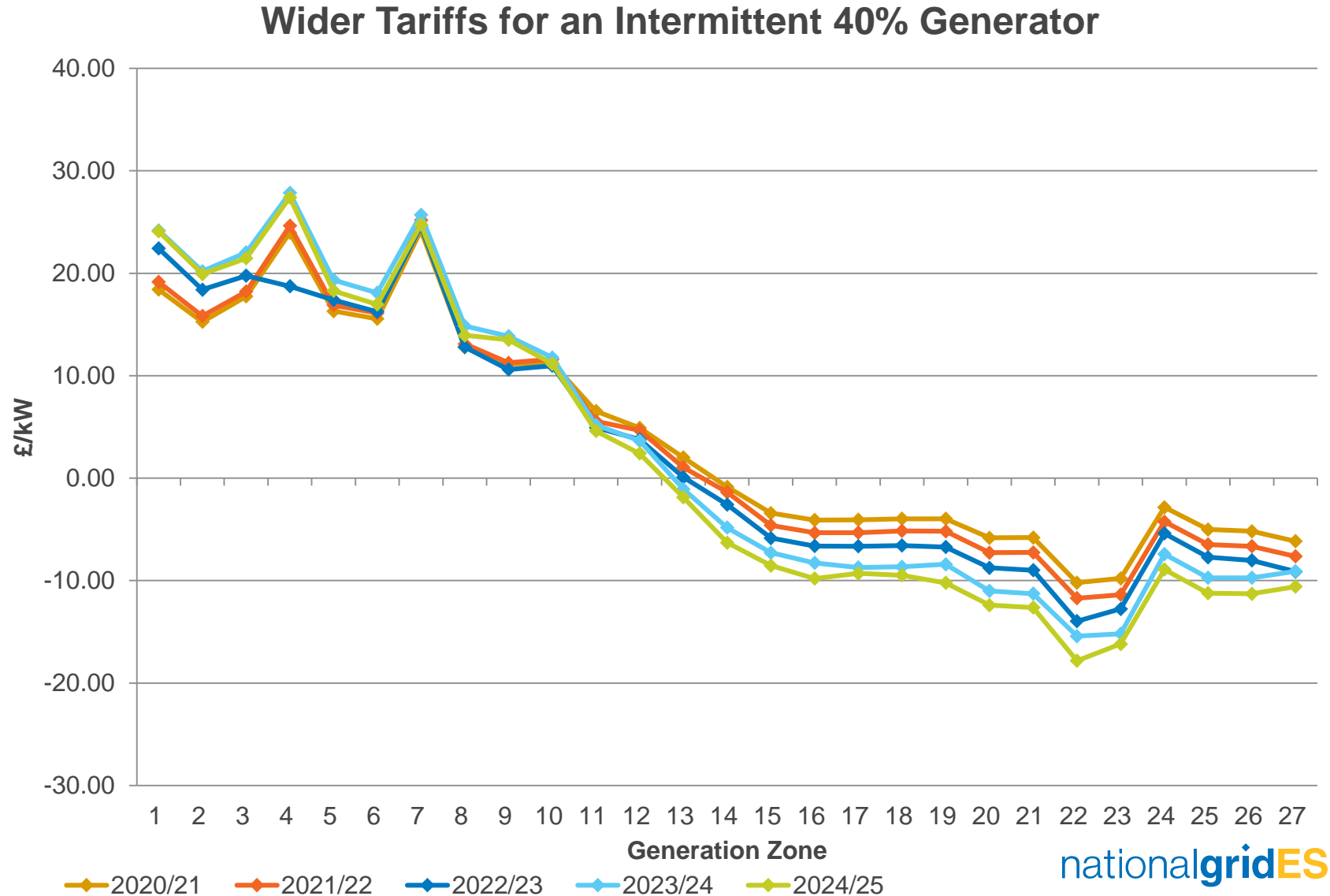
Figure S

Generation Tariffs – Intermittent

Tariffs follow similar profile to Conventional generators; zones 4, 9, 10 affected by generation increases from 2022

England & Wales – decreases follow the decrease in the residual; zone 27 affected by increase in intermittent generation from 2023

Figure U



Contracted, Modelled & Chargeable Generation Capacity

CONTRACTED:

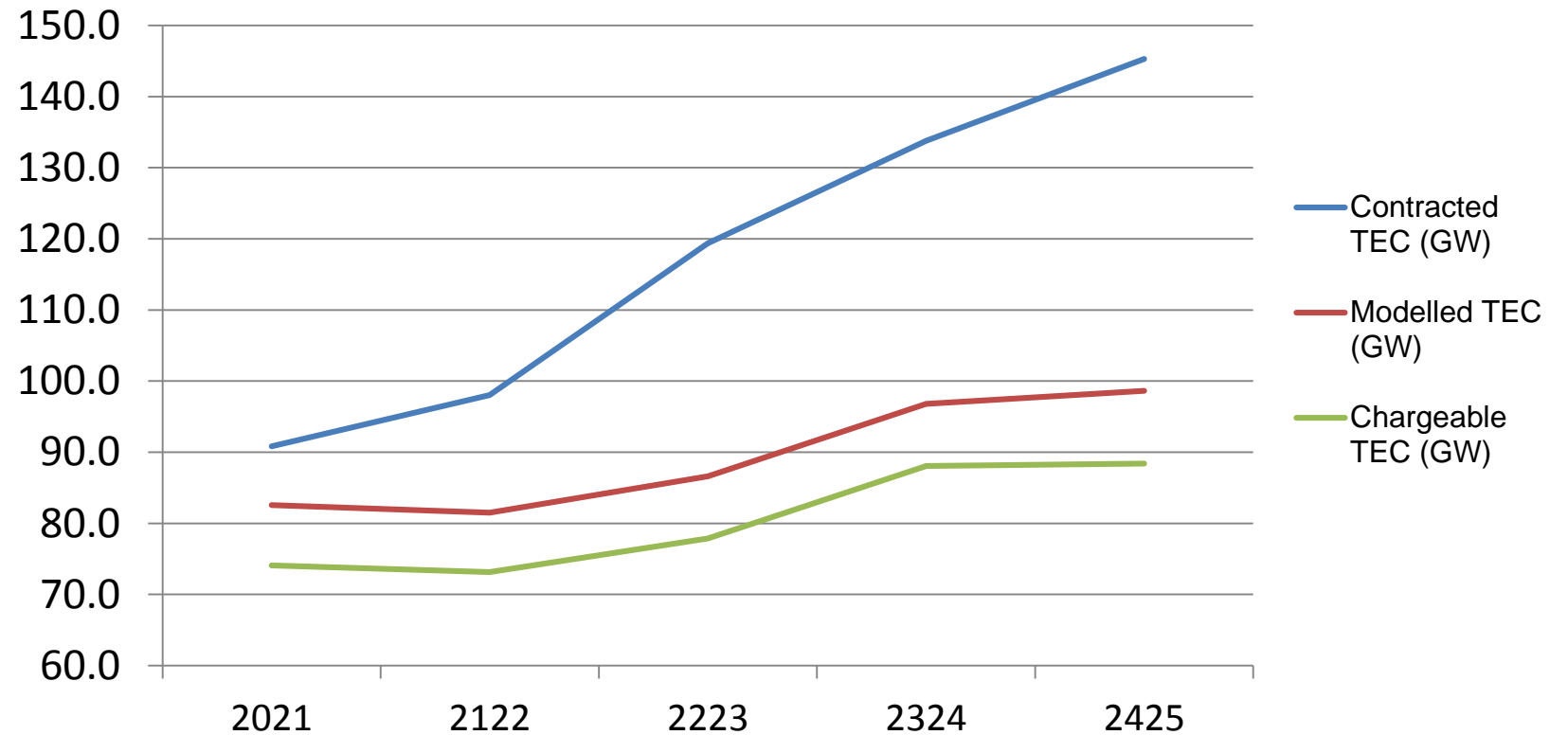
Full TEC register used

MODELLED:

Reduction in TEC in line with FES forecast

CHARGEABLE:

Modelled TEC minus interconnector capacity



GW	2021	2022	2023	2024	2025
Contracted TEC (GW)	90.8	98.0	119.4	133.8	145.3
Modelled TEC (GW)	82.6	81.5	86.6	96.8	98.6
Chargeable TEC (GW)	74.1	73.1	77.9	88.1	88.4

Table Z

Generation Residual

Table II – Residual calculation

Component	2020/21	2021/22	2022/23	2023/24	2024/25
Proportion of revenue recovered from generation (%)	14.1%	13.2%	12.5%	11.7%	11.2%
Proportion of revenue recovered from demand (%)	85.9%	86.8%	87.5%	88.3%	88.8%
Total TNUoS revenue (£m)	2950.8	3083.2	3177.4	3324.2	3459.2
Generator residual tariff (£/kW)	-3.96	-5.56	-6.66	-8.56	-9.91
Revenue recovered from the locational element of generator tariffs (£m)	331.7	382.2	442.3	569.1	584.4
Revenue recovered from offshore local tariffs (£m)	339.1	390.3	429.3	485.7	543.8
Revenue recovered from onshore local substation tariffs (£m)	19.4	19.7	20.9	25.1	25.0
Revenue recovered from onshore local circuit tariffs (£m)	18.1	20.0	23.6	64.0	111.6
Generator charging base (GW)	74.1	73.1	77.9	88.1	88.4
Demand residual tariff (£/kW)	52.18	56.09	57.61	60.97	63.53
Revenue recovered from the locational element of demand tariffs (£m)	-68.2	-112.5	-90.0	-110.0	-109.2
Amount to be paid to Embedded Export Tariffs (£m)	17.9	15.8	17.9	19.4	19.5
Demand Gross charging base (GW)	50.2	50.0	50.1	50.2	50.4

■ Generation revenue reduces gradually - £:€ rate and TWh output

- Increase in generation revenue in 2020/21 compared to the September 2018 forecast (+£22.6m)
- Onshore and offshore local revenue increases significantly

■ Residual decreases to -£9.91 by 2024/25

Local Circuits



Onshore local circuits tariffs

Table W – Onshore local circuit tariffs

Connection Point	2020/21 (£/kW)	2021/22 (£/kW)	2022/23 (£/kW)	2023/24 (£/kW)	2024/25 (£/kW)
Aberarder	2.034445	1.780597	1.834015	1.889035	1.945706
Aberdeen Bay	2.647817	2.727365	2.809186	2.893461	2.980265
Achruach	4.360774	4.491935	-2.755675	-2.745855	-2.827708
Aigas	0.664180	0.684134	0.704658	0.725798	0.747572
An Suidhe	3.091629	3.184227	-1.034341	-0.962644	-0.991013
Arecleoch	2.109185	2.172551	2.237728	1.333211	1.373207
Baglan Bay	0.772554	0.795902	-0.157119	-0.161799	0.869548
Beaw Field				97.918615	100.655149
Beinneun Wind Farm	1.525325	1.571127	1.618278	1.666826	1.716828
Bhlaraidh Wind Farm	0.655675	0.675373	0.695634	0.716503	0.737998
Black Hill	1.577101	1.624482	1.673216	1.723413	1.775115
Black Law	1.774502	1.827813	1.882647	1.939127	1.997300
BlackCraig Wind Farm	6.392785	6.584843	6.782389	6.985860	7.195436
BlackLaw Extension	3.763060	3.876114	3.992397	4.112169	4.235534
Branxton				0.353701	0.362762

Onshore generators' completion dates are based on the TEC register

Local circuits are modelled using the best information available

Remote island links have the majority of their costs picked up by local generators (revenues collected via local circuit tariffs contribute towards G/D split generation revenue cap)

Offshore Local Tariffs

Table Y – Offshore local tariffs for 2020/21

Increased each year by RPI (currently our forecast of May-Oct 2019 average)

Galloper, Race Bank, Rampion & Walney Extension tariffs will be set at asset transfer (expected during 2019/20)

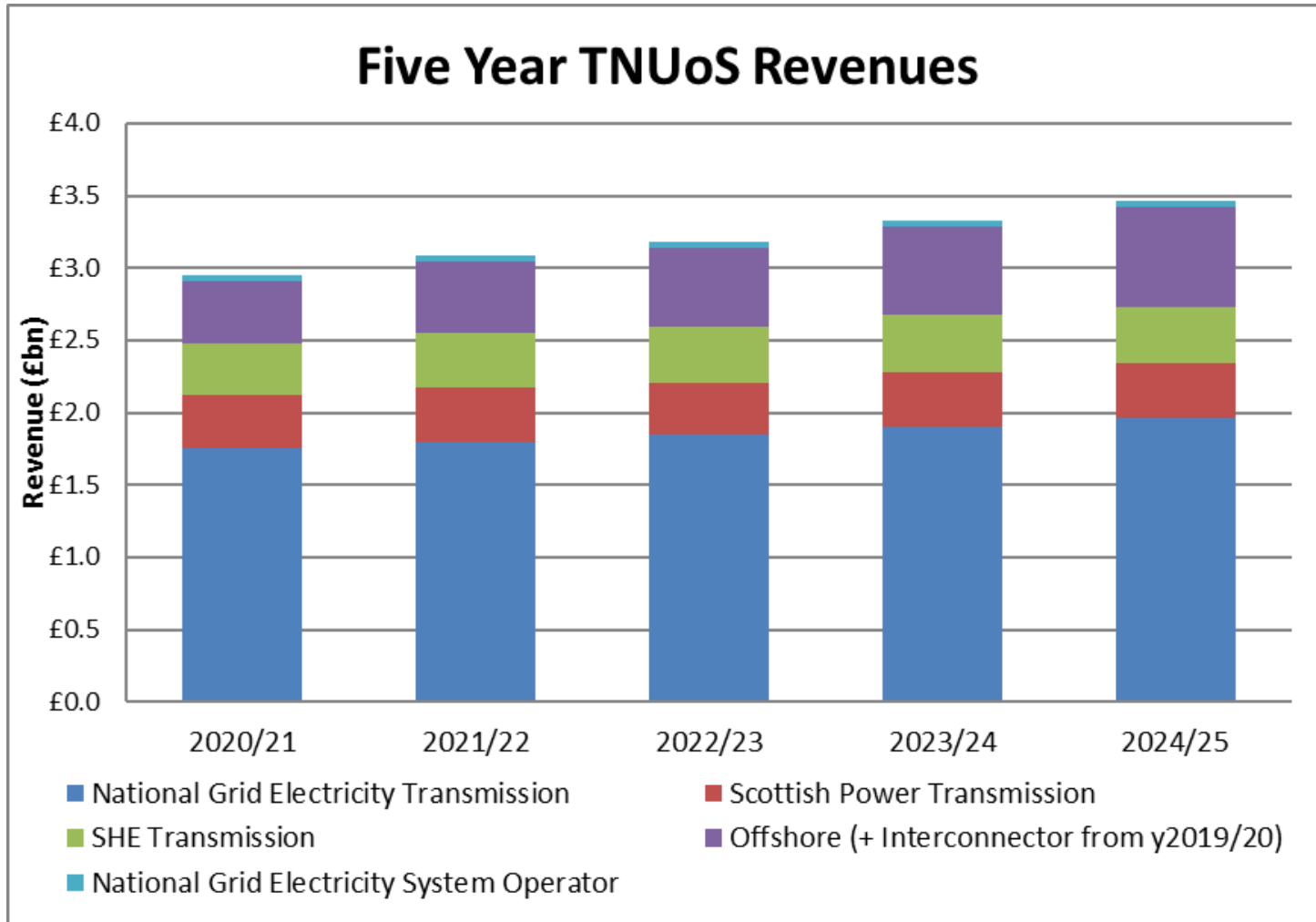
Offshore Generator	Tariff Component (£/kW)		
	Substation	Circuit	ETUoS
Barrow	8.216175	42.987017	1.067427
Burbo Bank	10.645155	20.381596	0.000000
Dudgeon	15.420477	24.044705	0.000000
Greater Gabbard	15.404361	35.397706	0.000000
Gunfleet	17.781578	16.324881	3.051215
Gwynt Y Mor	18.760047	18.480965	0.000000
Humber Gateway	14.928709	33.684142	0.000000
Lincs	15.354669	60.117037	0.000000
London Array	10.452326	35.600039	0.000000
Ormonde	25.399999	47.317820	0.377083
Robin Rigg	-0.469866	31.124583	9.646941
Robin Rigg West	-0.469866	31.124583	9.646941
Sheringham Shoal	24.540802	28.780611	0.625605
Thanet	18.688712	34.823751	0.838331
Walney 1	21.921404	43.656418	0.000000
Walney 2	21.761975	44.041034	0.000000
West of Duddon Sands	8.458871	41.739286	0.000000
Westermost Rough	17.811540	30.129503	0.000000



Revenue

Changes to revenue

Table DD – Allowed revenues



High uncertainty around Onshore TOs' Revenues beyond RIIO-T1

Total revenue for 2020/21 is forecast to be lower than in the initial view (September 2018 five-year view), mainly due to revised OFTO revenue

Offshore revenues

OFTO allowed revenue recovered via TNUoS from date of asset transfer (18 months after commissioning)

OFTO revenue assumptions based on:

- Actual TRS (projects asset transferred or PB announced)
- Forecast TRS based on ETV & FTV (other TR5 projects)
- Forecast TRS based on Indicative Transfer Value if available (projects beyond TR5)

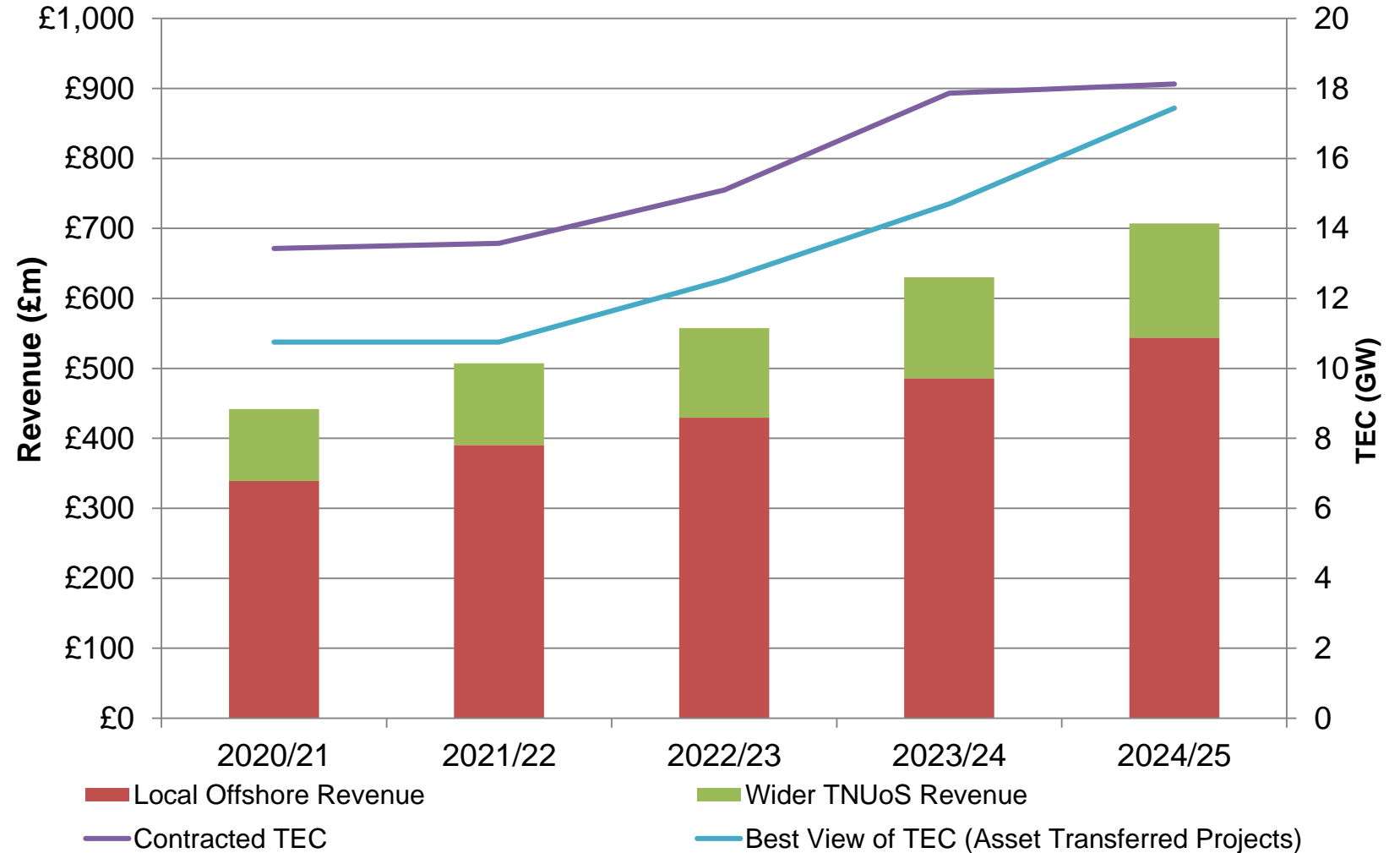
Offshore revenues

Asset transfer dates reviewed using FES, TEC register & CfD data

Assumptions on tender revenue streams and TCA values updated

Revenues impact the G/D split

Offshore Revenue v TEC



Scenarios - Sensitivity analysis



Sensitivity analysis

Analysis on:

- Effects of changes to remote island links tariffs
- Effects of changes to residual inputs
- Effects of changes to G/D split inputs

Effects of changes to remote island links tariffs

The first set of scenarios involved changes to the locational inputs

The effects of these sensitivities has an impact on the locational and residual tariffs for generation

All scenarios have been modelled in comparison to our best view for that particular year

The effect of wider security factor on island links

Best View –

Remote island links are “local” circuits, and generators on the islands pay local circuit tariffs, plus wider zonal tariffs (zone 1). A large part of the annualised costs of the links are paid by island generators via their local circuit tariffs. Local security factor is 1 for these links.

Sensitivity 1 (island links treated as MITS, without re-zoning) –

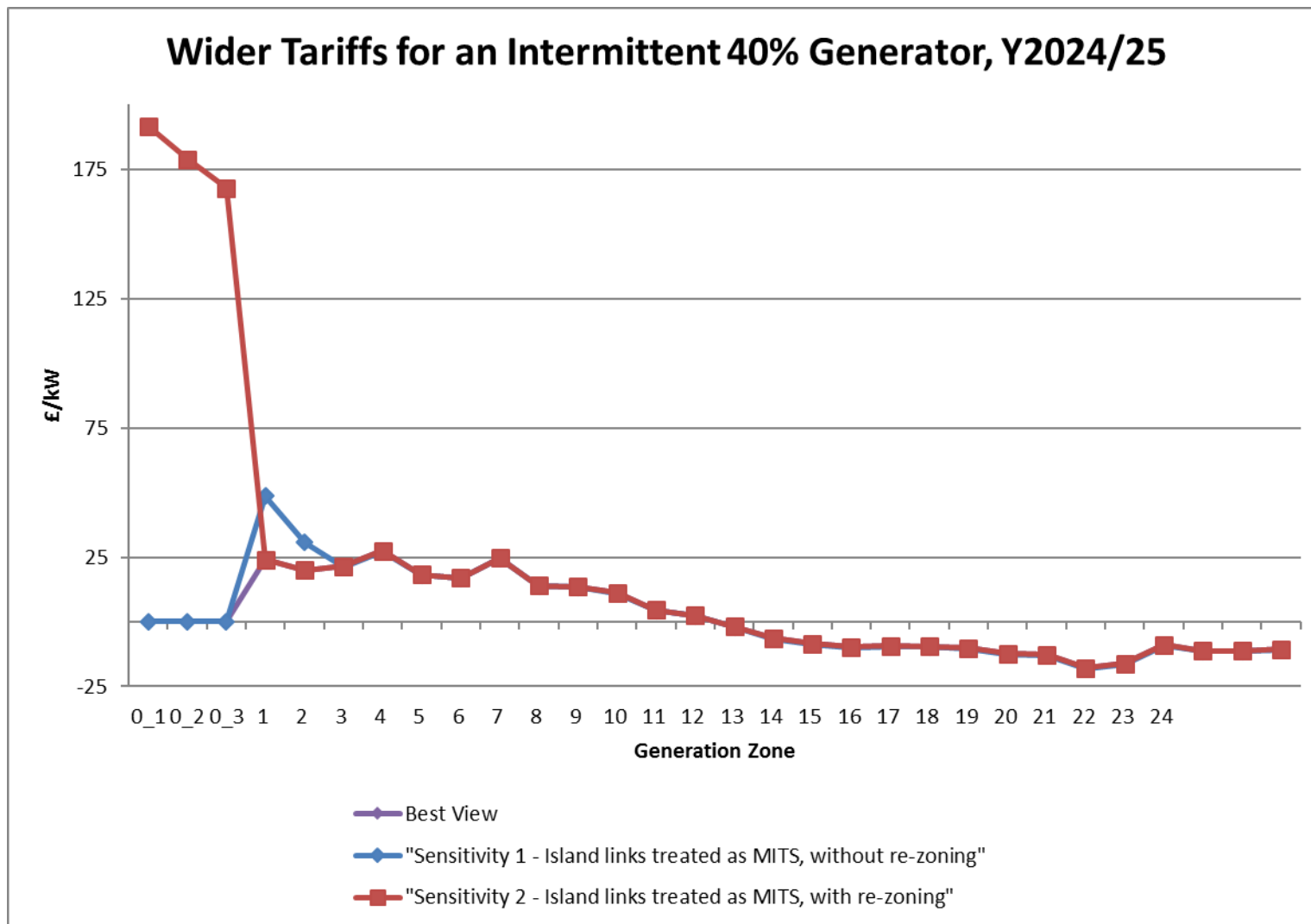
There is a possibility that the substations (Kergord, Finstown and Stornoway) on these remote islands become MITS nodes. According to the existing CUSC methodology, these island links will become part of the MITS network, where wider security factor (1.8) applies. This makes the links appear 80% more expensive.

Island generators will be included into generation zone 1, and contribute to the wider zonal tariff calculation.

Sensitivity 2 (island links treated as MITS, with re-zoning) –

In the above case, the island links have significant impact on generation zone 1, so re-zoning will be needed. Zones 0_1, 0_2 and 0_3 represents Shetland, Orkney and Western Isles respectively, and are three new “wider” zones. The indicative zonal tariffs are calculated using “nodal” costs at the island generators, times 1.8 (the wider security factor), therefore they are much higher than the tariffs in the Best View.

The effect of wider security factor on island links



If the remote island links are treated as part of the “wider” network, the wider security factor (1.8) will apply, despite no circuit redundancy for each of the three island links

Tariff figures under these scenarios are included in the five year view excel tables, available on our website

Effects of changes to residual inputs

The second set of scenarios involved changes to the residual (non-locational) inputs

The effects of these sensitivities has an impact on **ONLY** the residual tariffs for demand

All scenarios have been modelled in comparison to our best view for that particular year

The effect of decreasing chargeable demand by 1GW

Table QQ

		2020/21	2021/22	2022/23	2023/24	2024/25
System Gross Triad Demand (-1GW)	GW	49.25	49.03	49.13	49.24	49.36
HH Gross Triad Demand (-1GW)	GW	6.09	5.82	5.73	5.71	5.69
Embedded Export Volume	GW	7.09	6.82	6.73	6.71	6.69
NHH Demand	TWh	24.13	23.97	23.96	23.91	23.86
Demand Residual	£/kW	53.24	57.23	58.78	62.21	64.81
	<i>Change</i>	1.06	1.14	1.17	1.24	1.29
Change to NHH	<i>p/kWh</i>	0.19	0.21	0.21	0.23	0.24

- In this scenario the Chargeable demand has been decreased by 1GW
- This causes the demand residual to increase by £1.06/kW to £1.29/kW each year.
- This also causes the NHH average demand tariff to increase by 0.19p/kWh to 0.24p/kWh each year.

The effect of reducing NHH demand by 10%

Table RR

		2020/21	2021/22	2022/23	2023/24	2024/25
System Gross Triad Demand	GW	50.25	50.03	50.13	50.24	50.36
HH Gross Triad Demand	GW	7.09	6.82	6.73	6.71	6.69
Embedded Export Volume	GW	17.66	17.55	17.59	17.63	17.65
NHH Demand	TWh	21.71	21.57	21.56	21.52	21.47
Demand Residual	£/kW Change	HH tariffs and demand residual are unchanged				
Change to NHH	p/kWh	0.75	0.80	0.83	0.88	0.92

- In this scenario the NHH demand has been reduced by 10%.
- This causes the NHH average tariff to increase each year by 0.75p/kWh – 0.92p/kWh.
- There is no impact on the HH demand tariffs as these are calculated before NHH tariffs.

The effect of increasing embedded export by 2GW

Table SS

		2020/21	2021/22	2022/23	2023/24	2024/25
System Gross Triad Demand	GW	50.25	50.03	50.13	50.24	50.36
HH Gross Triad Demand (+2GW)	GW	9.09	8.82	8.73	8.71	8.69
Embedded Export Volume	GW	17.66	17.55	17.59	17.63	17.65
NHH Demand	TWh	24.13	23.97	23.96	23.91	23.86
Embedded Export Revenue	£m	22.95	20.47	23.17	25.12	25.28
	<i>Change</i>	<i>5.05</i>	<i>4.64</i>	<i>5.31</i>	<i>5.77</i>	<i>5.82</i>
Demand Residual	£/kW	52.28	56.18	57.72	61.09	63.64
	<i>Change</i>	<i>0.10</i>	<i>0.09</i>	<i>0.11</i>	<i>0.11</i>	<i>0.12</i>
Change to NHH	<i>p/kWh</i>	<i>0.02</i>	<i>0.02</i>	<i>0.02</i>	<i>0.02</i>	<i>0.02</i>

- This increases the Embedded Export revenue in 2020/21 by £5m and £5,8m by 2024/25.
- For each year, the demand residual increase by £0.10/kW; NHH tariffs increase by 0.2p/kWh

The effect of increasing the value of the AGIC by £2/kW

Table TT

		2020/21	2021/22	2022/23	2023/24	2024/25
System Gross Triad Demand	GW	50.25	50.03	50.13	50.24	50.36
HH Gross Triad Demand	GW	7.09	6.82	6.73	6.71	6.69
Embedded Export Volume	GW	17.66	17.55	17.59	17.63	17.65
NHH Demand	TWh	24.13	23.97	23.96	23.91	23.86
Embedded Export Revenue	£m	30.29	22.88	25.49	28.06	27.62
	<i>Change</i>	12.38	7.05	7.62	8.71	8.16
Demand Residual	£/kW	52.43	56.23	57.76	61.14	63.69
	<i>Change</i>	0.25	0.14	0.15	0.17	0.16
Change to NHH	<i>p/kWh</i>	0.04	0.03	0.03	0.03	0.03

- The Embedded Export revenue increases by £12.4m in 2020/21 and gradually decreases each year.
- The demand tariff increases by 0.25p/kW in 2020/21 and increases by ~£0.15/kW for the other four years.
- NHH tariffs increase by 0.3p/kWh

Changes to the G/D split calculation (non-locational inputs)

The third set of scenarios involves changes to the calculation of the cap on revenue for generators

The effects of these sensitivities has an impact on the residual tariffs for BOTH demand and generation

All scenarios have been modelled in comparison to our best view for that particular year

The effect of increasing the G/D split error margin to 21%

The error margin is the percentage of error we build in to calculating the £:€ exchange rate.
The current error margin is 16%

The demand residual increases by just under £0.50/kW; the generation residual decreases by up to £0.33/kW

Table MM

a. Error margin		2020/21	2021/22	2022/23	2023/24	2024/25
Change to Generator	£m	- 24.71	- 24.15	- 23.65	- 23.22	- 23.15
Effect on Tariffs						
Generation Residual	£/kW	- 4.29	- 5.89	- 6.96	- 8.82	- 10.17
	<i>Change</i>	- 0.33	- 0.33	- 0.30	- 0.26	- 0.26
Demand Residual	£/kW	52.67	56.57	58.08	61.43	63.99
	<i>Change</i>	0.49	0.48	0.47	0.46	0.46
Change to NHH	p/kWh	0.07	0.07	0.06	0.06	0.06

The effect of reducing generation TWh output by 10%

G/D split inputs: This reduces the amount of revenue that can be recovered from generation, thereby increasing the amount of revenue to be collected from demand

The generation residual becomes more negative by up to £0.56/kW; the demand residual increases by up to £0.83/kW. NHH tariffs increase by 0.11p/kWh

Table OO

c. Charging volume		2020/21	2021/22	2022/23	2023/24	2024/25
Change to Generator Revenue	£m	- 41.51	- 40.57	- 39.74	- 39.01	- 38.89
Effect on Tariffs						
Generation Residual	£/kW	- 4.52	- 6.11	- 7.17	- 9.00	- 10.35
	<i>Change</i>	- 0.56	- 0.55	- 0.51	- 0.44	- 0.44
Demand Residual	£/kW	53.00	56.90	58.40	61.75	64.30
	<i>Change</i>	0.83	0.81	0.79	0.78	0.77
Change to NHH	p/kWh	0.11	0.11	0.11	0.11	0.11

The effect of removing offshore local revenues from the G/D split calculation

This reduces the amount of revenue taken into account when calculating the cap on revenue from generation

This increases generation tariffs by up to £6.15/kw, and decreases demand tariffs: HH up to -£10.80, NHH by up to -1.62p/kWh

d. G/D split without offshore local revenue		2020/21	2021/22	2022/23	2023/24	2024/25
Cap on generation revenue (G.MAR)	(£m)	415.1	405.7	397.4	390.1	388.9
Charging base	(GW)	74.1	73.1	77.9	88.1	88.4
Revenue from Offshore Local tariffs <i>(Revenue NOT included in the cap calculation)</i>	(£m)	339.1	390.3	429.3	485.7	543.8
Revenue from the Residual element	(£m)	45.9	-16.2	-89.4	-268.1	-332.2
Revenue recovered from generation	(£m)	369.2	421.9	486.8	658.2	721.1
New generation residual (£/kW)	(£/kW)	£ 0.62	-£ 0.22	-£ 1.15	-£ 3.04	-£ 3.76
Increase in generation residual	(£/kW)	£ 4.58	£ 5.34	£ 5.51	£ 5.51	£ 6.15
Impact on demand tariffs						
New HH demand residual	(£/kW)	45.43	48.28	49.05	51.30	52.73
Reduction in HH residual	(£/kW)	-£ 6.75	-£ 7.80	-£ 8.56	-£ 9.67	-£ 10.80
Reduction in NHH tariff	p/kWh	-1.01	-1.21	-1.28	-1.46	-1.62

The July forecast of 2020/21 tariffs



2020/21 tariff publication schedule

29/03
5 Year Forecast
2020/21 – 2024/25, and
first quarterly forecast
on 2020/21 tariffs

31/7
July
Update

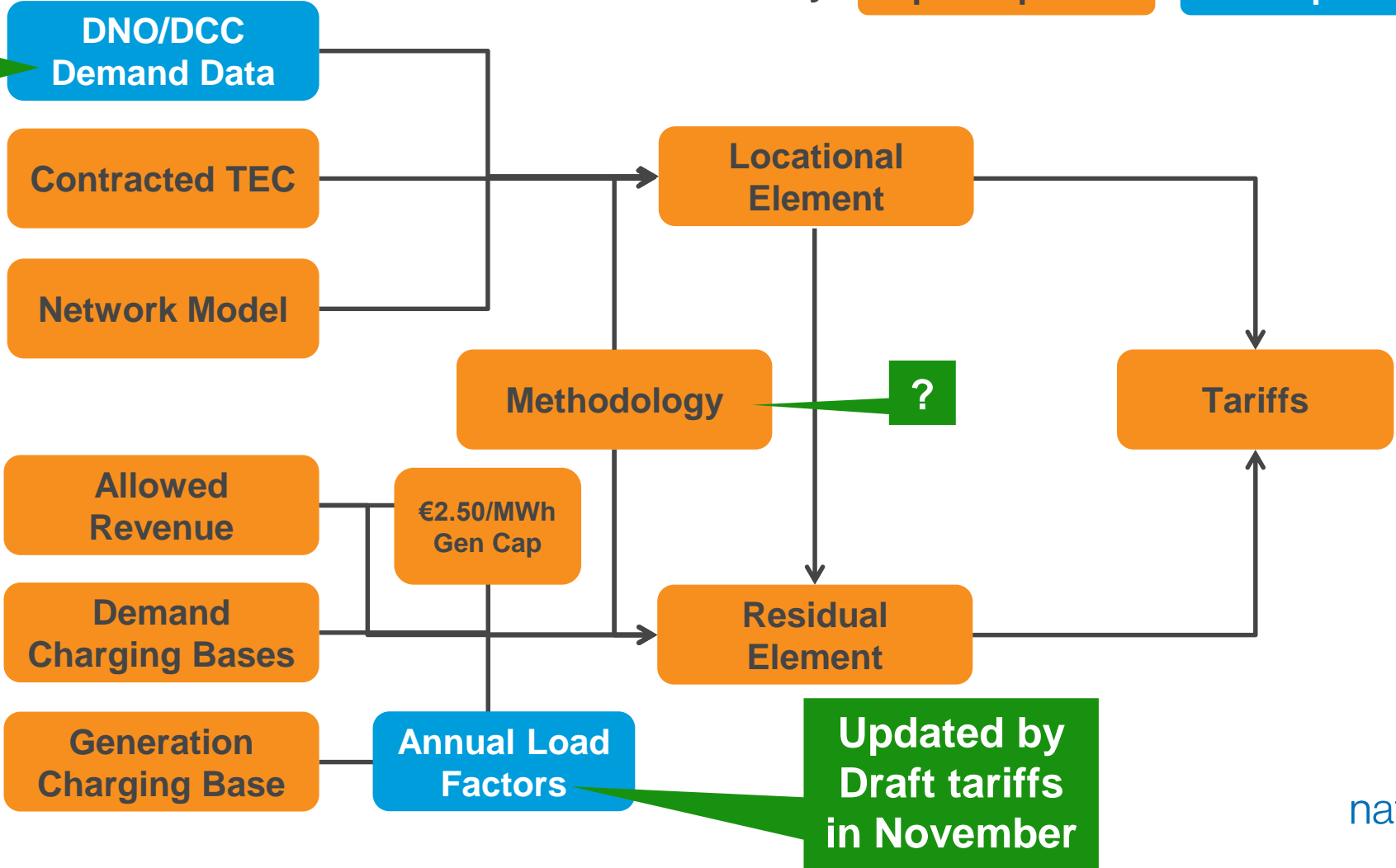
29/11
Draft
Tariffs

31/1
Final
Tariffs

July Forecast: Which inputs will change?

Data due
by Draft
tariffs in
November

Key: **Inputs updated** **Not updated**





Q & A

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Feedback

We are continuously looking at ways we can improve the experience of all our customers

We welcome your feedback on your experiences of the TNUoS tariff forecasting and setting process

Please take our 3 minute survey:

<https://www.surveymonkey.co.uk/r/JWXNHLV>



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