

CMP324/5 Workgroup 1

November 2019



What are TNUoS Generation Zones

Transmission Network Use of System (TNUoS) charge

- Recovers the cost of building and maintaining the transmission infrastructure network
- Sends locational signals via the locational tariff elements

Why do we need TNUoS Generation Zones?

- To dampen nodal marginal cost fluctuations
- To improve Tariff predictability which is required for long-term investment signals
- To reduce tariff volatility, while still retaining the locational signals

Why do we need to review TNUoS Generation Zones?

We undertake re-zoning prior to every price control, to capture network parameter/ topology changes, and the effect from long term “shift” in generation & demand patterns

Costs of building and maintaining the transmission network are also reviewed at each of the price control period

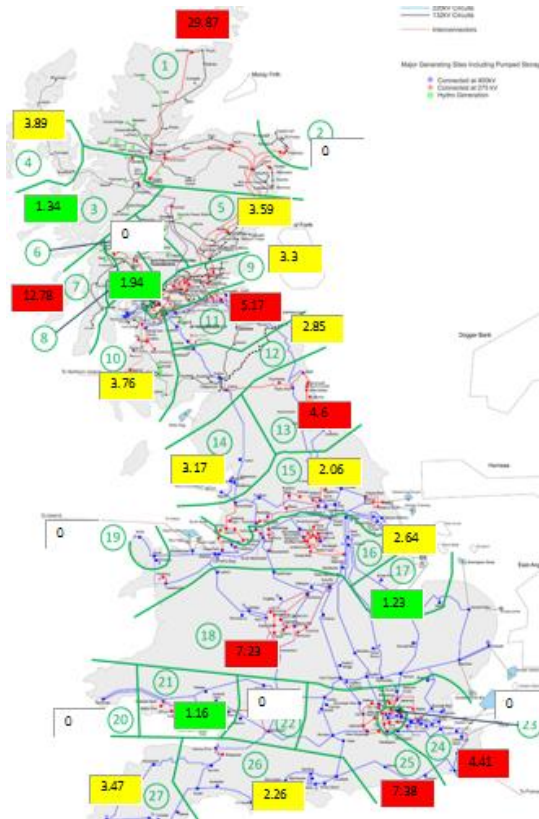
Re-zoning will be undertaken in such a way that minimises the adverse impact on Users

The new methodology needs to be approved by Oct 2020 to feed in to TNUoS charging process (TNUoS forecasts etc)

What can change the generation zones?

- Global parameters (annuity factor, inflation, wider security factor)
- Network changes
- Generation and demand (e.g. coastal areas in E&W, increased gen sites in Scotland), voltage level
- Circuits between MITS nodes (e.g. HVDC)
- Local/wider infrastructure assets
- Methodology

Validating current zones using the $\pm \text{£}1.00/\text{kW}$ range



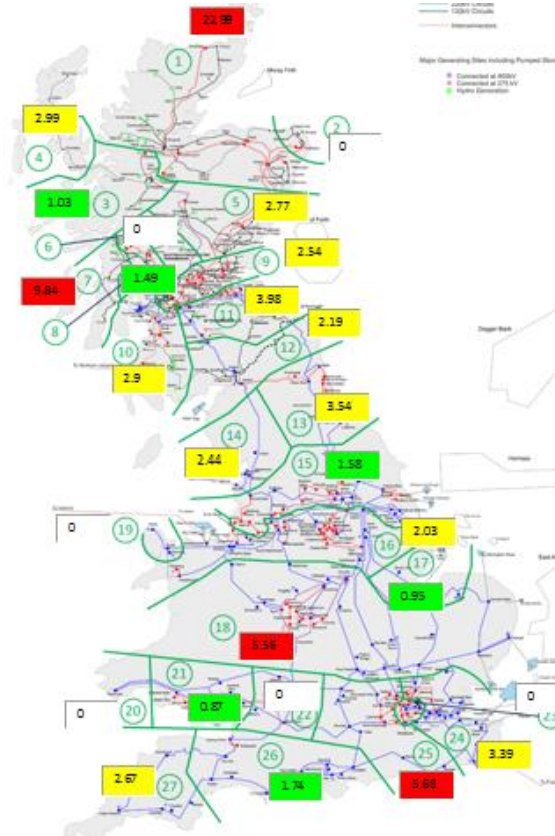
Gen Zone	Name	Range (£/kW)
1	North Scotland	29.87
2	East Aberdeenshire	0
3	Western Highlands	1.34
4	Skye and Lochalsh	3.89
5	Eastern Grampian and Tayside	3.59
6	Central Grampian	0
7	Argyll	12.78
8	The Trossachs	1.94
9	Stirlingshire and Fife	3.3
10	South West Scotlands	3.76
11	Lothian and Borders	5.17
12	Solway and Cheviot	2.85
13	North East England	4.6
14	North Lancashire and The Lakes	3.17
15	South Lancashire, Yorkshire and Humber	2.06
16	North Midlands and North Wales	2.64
17	South Lincolnshire and North Norfolk	1.23
18	Mid Wales and The Midlands	7.23
19	Anglesey and Snowdon	0
20	Pembrokeshire	0
21	South Wales & Gloucester	1.16
22	Cotswold	0
23	Central London	0
24	Essex and Kent	4.41
25	Oxfordshire, Surrey and Sussex	7.38
26	Somerset and Wessex	2.26
27	West Devon and Cornwall	3.47

Red and yellow areas: all exceed the $\text{£}2/\text{kW}$ limit.

Zones with range = 0: only one generator site, or no generator site within this zone.

Potentially ~60 zones if we follow the $\text{£}2/\text{kW}$ criteria. Too many generation zones will increase tariff complexity and volatility.

Validating current zones using the +/- £1.00/kW range, and using indicative RII0-T2 WACC



Gen Zone	Name	Range (£/kW)
1	North Scotland	22.99
2	East Aberdeenshire	0
3	Western Highlands	1.03
4	Skye and Lochalsh	2.99
5	Eastern Grampian and Tayside	2.77
6	Central Grampian	0
7	Argyll	9.84
8	The Trossachs	1.49
9	Stirlingshire and Fife	2.54
10	South West Scotlands	2.9
11	Lothian and Borders	3.98
12	Solway and Cheviot	2.19
13	North East England	3.54
14	North Lancashire and The Lakes	2.44
15	South Lancashire, Yorkshire and Humber	1.58
16	North Midlands and North Wales	2.03
17	South Lincolnshire and North Norfolk	0.95
18	Mid Wales and The Midlands	5.56
19	Anglesey and Snowdon	0
20	Pembrokeshire	0
21	South Wales & Gloucester	0.87
22	Cotswold	0
23	Central London	0
24	Essex and Kent	3.39
25	Oxfordshire, Surrey and Sussex	5.68
26	Somerset and Wessex	1.74
27	West Devon and Cornwall	2.67

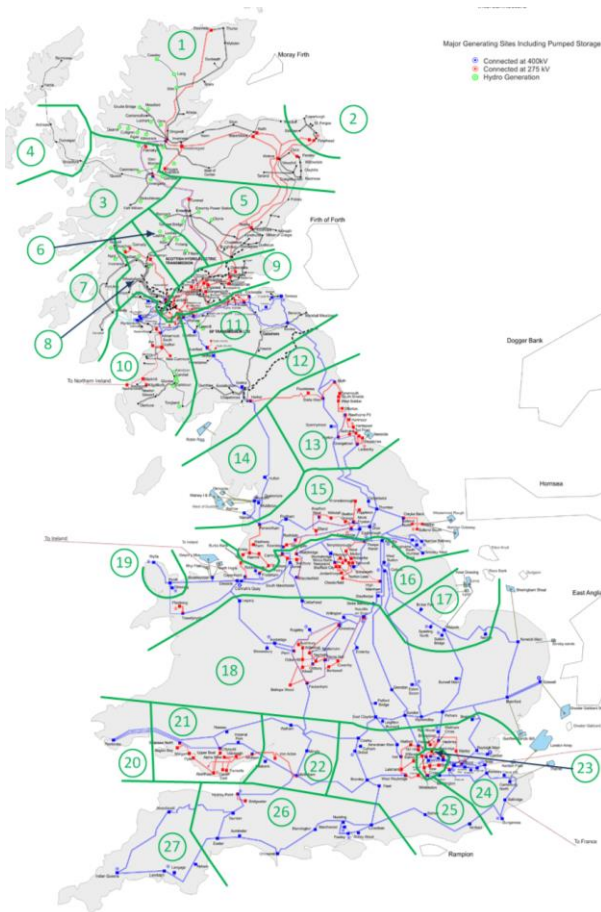
- Assuming pre-tax WACC is 3.23%, thus annuity is 4.06%
- Assuming overhead is still 1.8%
- Reduced “unit cost” leads to smaller cost difference across locations, however we still expect to split many zones

Indicative zones to maintain the +/- £1.00/kW range

45~50 zones in total
(assuming annuity
factor of 4.06%)

The number of
generation zones
does not help tariff
stability

The purpose of
locational signals is
to help long term
investment certainty



Zone 1: split into about 10 zones (3 gen sites within each of the 10 new “zones”)

Zone 7: split into about 4 zones (1-2 gen sites within each of the 4 new “zones”)

Other areas in Scotland + North England:
revise boundaries and create ~5 new zones

Zone 18: split into 3 zones (1-2 gen sites within each of the new “zone”)

Zones 20, 21 and 22: can be combined

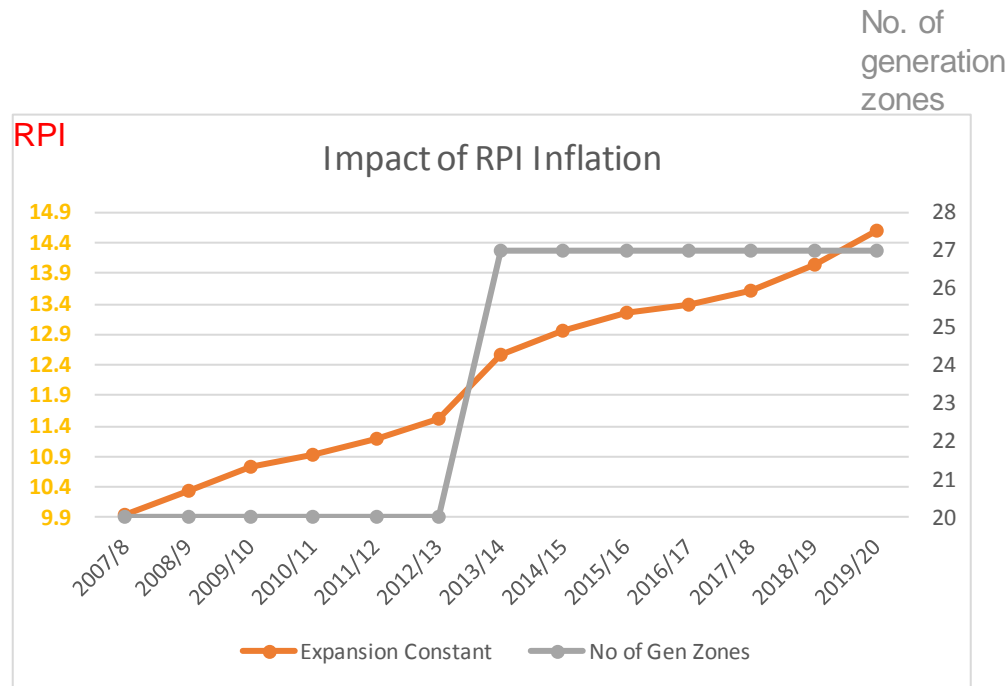
Zone 24: split into 3 zones

Zone 25: split into 4-5 zones

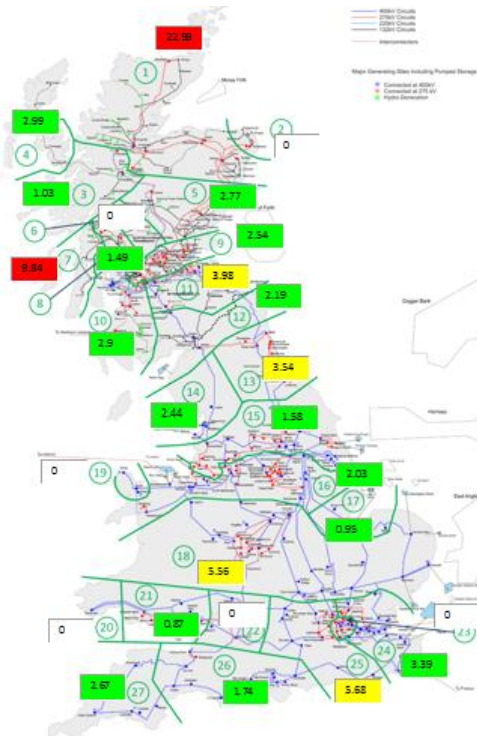
A few other zones are either split, or have their boundaries revised

Impact of RPI on the generation zones

- Expansion Constant is RPI linked
- It will be reviewed at each price control
- The wider security factor (currently 1.8) will also be reviewed
- The +1£1/kW range, is not index-linked, nor is it dependent on the wider security factor



Option 1: Index-link the range limit (e.g. to +/- £1.75/kW)



Gen Zone	Name	Range (£/kW)
1	North Scotland	22.99
2	East Aberdeenshire	0
3	Western Highlands	1.03
4	Skye and Lochalsh	2.99
5	Eastern Grampian and Tayside	2.77
6	Central Grampian	0
7	Argyll	9.84
8	The Trossachs	1.49
9	Stirlingshire and Fife	2.54
10	South West Scotland	2.9
11	Lothian and Borders	3.98
12	Solway and Cheviot	2.19
13	North East England	3.54
14	North Lancashire and The Lakes	2.44
15	South Lancashire, Yorkshire and Humber	1.58
16	North Midlands and North Wales	2.03
17	South Lincolnshire and North Norfolk	0.95
18	Mid Wales and The Midlands	5.56
19	Anglesey and Snowdon	0
20	Pembrokeshire	0
21	South Wales & Gloucester	0.87
22	Cotswold	0
23	Central London	0
24	Essex and Kent	3.39
25	Oxfordshire, Surrey and Sussex	5.68
26	Somerset and Wessex	1.74
27	West Devon and Cornwall	2.67

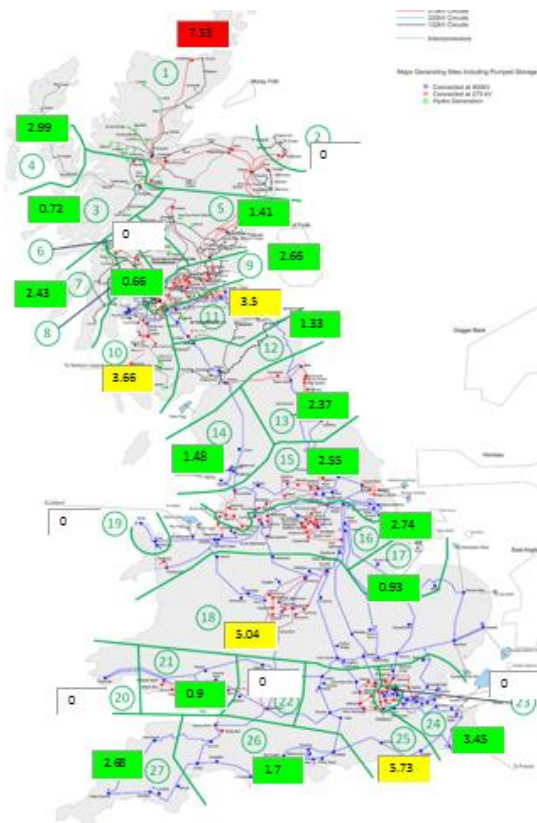
Many existing zones remain within the new range

However, we still need to make adjustment to some zones

This is a relatively simple solution, however re-zoning is still needed, driven by other factors

- Zones 18 and 25: split
- Revise boundaries in south Scotland & North England, to remain the number of zones
- Zone 1 and Zone 7 are still affected by the high “unit costs” of HVDC / undersea cables

Impact of HVDC – sensitivity analysis



Gen Zone	Name	Range (£/kW)
1	North Scotland	7.53
2	East Aberdeenshire	0
3	Western Highlands	0.72
4	Skye and Lochalsh	2.99
5	Eastern Grampian and Tayside	1.41
6	Central Grampian	0
7	Argyll	2.43
8	The Trossachs	0.66
9	Stirlingshire and Fife	2.66
10	South West Scotlands	3.66
11	Lothian and Borders	3.5
12	Solway and Cheviot	1.33
13	North East England	2.37
14	North Lancashire and The Lakes	1.48
15	South Lancashire, Yorkshire and Humber	2.55
16	North Midlands and North Wales	2.74
17	South Lincolnshire and North Norfolk	0.93
18	Mid Wales and The Midlands	5.04
19	Anglesey and Snowdon	0
20	Pembrokeshire	0
21	South Wales & Gloucester	0.9
22	Cotswold	0
23	Central London	0
24	Essex and Kent	3.45
25	Oxfordshire, Surrey and Sussex	5.73
26	Somerset and Wessex	1.7
27	West Devon and Cornwall	2.68

We tried to replace the “unit cost” of HVDCs with generic cable costs

The range within zone 1 has been greatly reduced.

This approach is not cost-reflective.

Zone 1 still has large range, mainly due to the 132kV circuits (electrically longer “distance”)

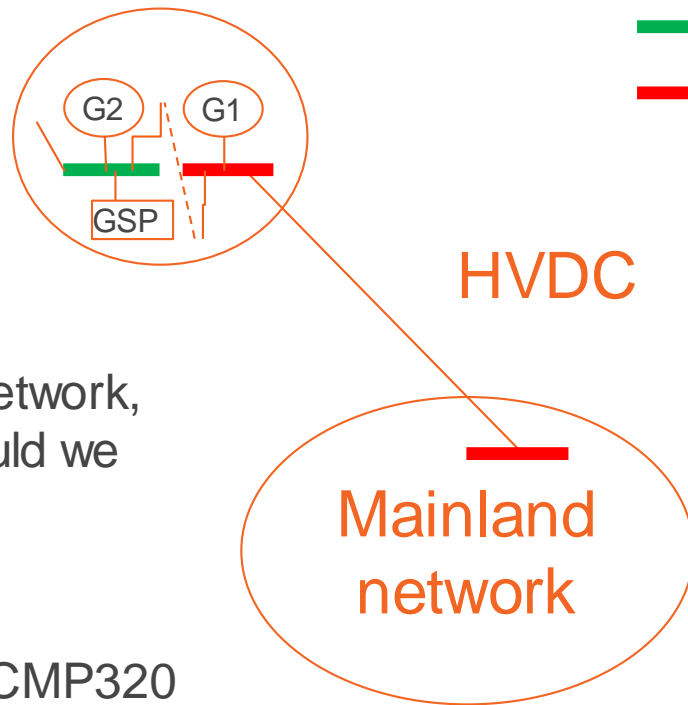
Additional challenges: segmented MITS network, T/D choice, etc.

A circuit between non-MITS nodes:

Is it always a local circuit?

If it is part of the wider network, what security factor should we use (1 or 1.8)?
– the CUSC says 1.8

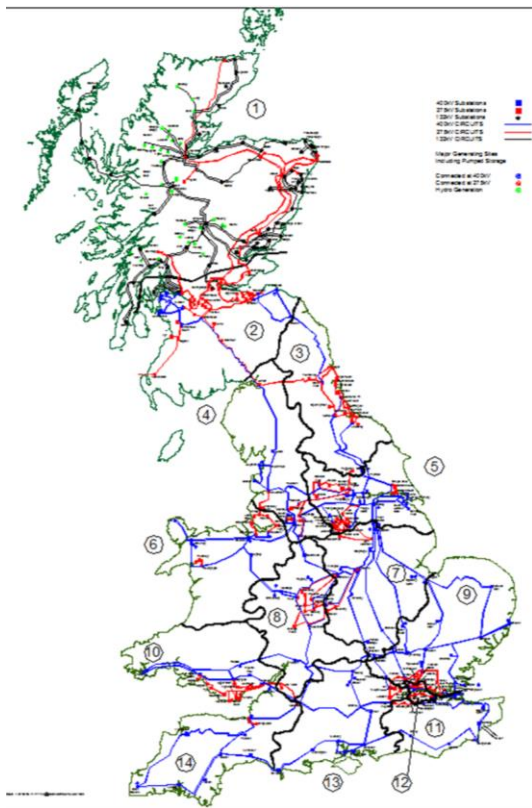
Under consideration by CMP320



— MITS node
— Non- MITS node

The existing definition of MITS node means generator 2 does not pay local circuit tariff

Option 2: aligning generation zones with DNO zones



- Zonal stability: generation zones will not need reviewing every 5 years
- Tariff stability: TNUoS value of each zone will change slower
- Aligns embedded generators with transmission-connected generators
- Simpler
- Still provides a locational signal (but weaker than today)

What remains unsolved;

- HVDC & undersea cables “stretch” the nodal price difference

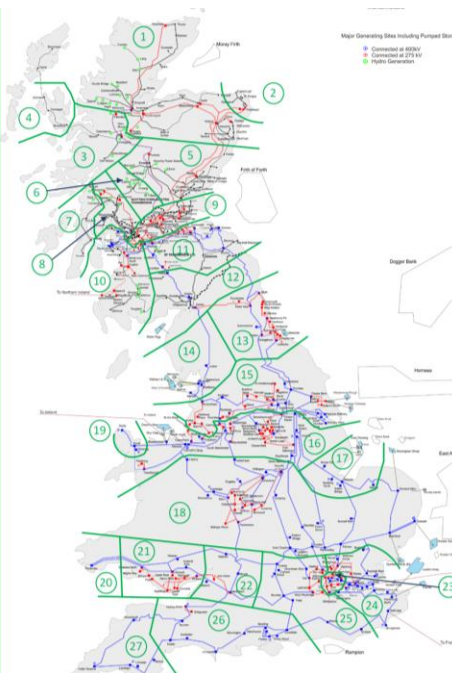
Indicative Tariffs under Option 2 (using the same global parameters as in March 2019 5-year forecast)

Generation – Wider Tariff Elements (2021/22)						Examples		
Zone No.	Zone Name	Peak Security (£/kW)	Year Round Shared (£/kW)	Year Round Not Shared (£/kW)	Residual (£/kW)	80% Conventional Carbon	80% Conventional Low Carbon	40% Intermittent
1	Northern Scotland	4.885969	18.516661	15.428808	-5.518340	26.524004	29.609766	17.317132
2	Southern Scotland	3.783275	10.379891	9.998559	-5.518340	14.567695	16.567407	8.632175
3	Northern	3.885423	6.487378	3.366132	-5.518340	6.249891	6.923117	0.442743
4	North West	2.704956	4.712392	1.858011	-5.518340	2.442938	2.814541	- 1.775372
5	Yorkshire	4.474122	1.897173	0.040002	-5.518340	0.505522	0.513522	- 4.719469
6	N Wales & Mersey	4.406501	0.813277	0.000000	-5.518340	- 0.461217	- 0.461217	- 5.193029
7	East Midlands	2.844281	0.813277	-1.081762	-5.518340	- 2.888847	- 3.105199	- 6.274791
8	Midlands	2.658743	0.813277	-3.749908	-5.518340	- 5.208902	- 5.958883	- 8.942937
9	Eastern	-1.975875	2.143544	0.000000	-5.518340	- 5.779380	- 5.779380	- 4.660922
10	South Wales	8.041456	-4.253861	0.000000	-5.518340	- 0.879973	- 0.879973	- 7.219884
11	South East	-4.674521	3.335713	0.000000	-5.518340	- 7.524291	- 7.524291	- 4.184055
12	London	-3.484951	3.335713	-4.414614	-5.518340	- 9.866412	- 10.749335	- 8.598669
13	Southern	-1.821473	3.335713	-5.829849	-5.518340	- 9.335122	- 10.501092	-10.013904
14	South Western	1.513683	-4.385977	0.000000	-5.518340	- 7.513439	- 7.513439	- 7.272731

Side by side comparison – 2021/22 Tariff forecast



Zone	Peak Security (£/kW)	Year Round (£/kW) = shared + not shared
1	4.9	33.9
2	3.8	20.4
3	3.9	9.9
4	2.7	6.6
5	4.5	1.9
6	4.4	0.8
7	2.8	-0.3
8	2.7	-2.9
9	-2.0	2.1
10	8.0	-4.3
11	-4.7	3.3
12	-3.5	-1.1
13	-1.8	-2.5
14	1.5	-4.4



Zone	Peak Security (£/kW)	Year Round (£/kW) = shared + not shared
1	3.7	36.6
2	5.8	28.3
3	3.0	34.7
4	3.0	41.1
5	4.0	32.3
6	4.8	31.0
7	4.6	38.2
8	4.7	26.1
9	3.1	22.8
10	4.3	23.5
11	3.1	17.4
12	2.7	14.5
13	3.9	9.9
14	2.6	7.4
15	4.3	2.2
16	3.6	0.6
17	1.5	0.6
18	1.0	1.0
19	5.7	0.9
20	10.0	-4.3
21	6.8	-4.2
22	3.5	-4.2
23	-6.3	-3.9
24	-4.2	3.3
25	-1.6	-2.3
26	-1.4	-2.7
27	0.3	-5.2

Conclusion and next steps

The CUSC clauses will need review, as the purpose of zoning is to achieve tariff stability & long-term investment signals

Recommended option: aligning generation zones with demand zones, as it provides tariff stability

Potential variation: creating additional zones with each of the HVDC / undersea cable transmission projects