Generation Zoning

AEP, 13th August 2008

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Agenda

- Proposed zones
  - Presentation of proposed zones derived from nodal exchange rates
    - Methodology
    - Results
- A zonal alternative
  - What are the cost risks associated with accepting larger zones?
- A nodal alternative
  - Problems with nodal exchange rates
    - Based on experience of zoning work
  - Point to point rights

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Proposed zones
What will be presented today?

- Nodal exchange rates based on an extension of the Scenario-based Zoning Methodology (SZM)
- Generalized Generation Distribution Factors (GGDF) – distributed slack in essence
- Using a fixed nodal exchange rate tolerance of < 1.2
- Zones which are similar to earlier zoning methods with NZM obtained

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Proposed zones Methodology

- To calculate the sensitivity of the flow on monitored circuits (local circuits excluded) to transfers between generators
- To pick up the worst circuit based on the circuit headroom and the sensitivity factor for each N-2 outage scenario
- To calculate the exchange rate by using the formula for each N-2 outage scenario
- To maximize the exchange rate and create minor zones

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Proposed zones
Calculating nodal exchange rate

- Step 1: Using a modified DCLF, setup demand and generation background for GB system at winter peak (2008 network)
- Step 2: Using indicative short term zones as base, regional nodal exchange rates calculated from sensitivity factors
- Step 3: Critical contingencies + Critical circuits selected (4 to 10 critical trips and 10 to 25 critical circuits)

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Proposed zones
Calculating nodal exchange rate

- Step 4: Select sensitivities on the worst critical circuit (obtained from headroom analysis)
- Step 5: Obtain exchange rates using

Node 1	Node 2	Formula
+	-	((Node 1 – Node 2)/ABS(Node 2))+ 1
-	+	
+	+	Node 2/Node 1
-	-	

- Step 6: Select maximum exchange rates – equates to cost of buying the TEC
- Step 7: Classification of zones using exchange rates < 1.2
- Step 8: Minor zones created within major zones

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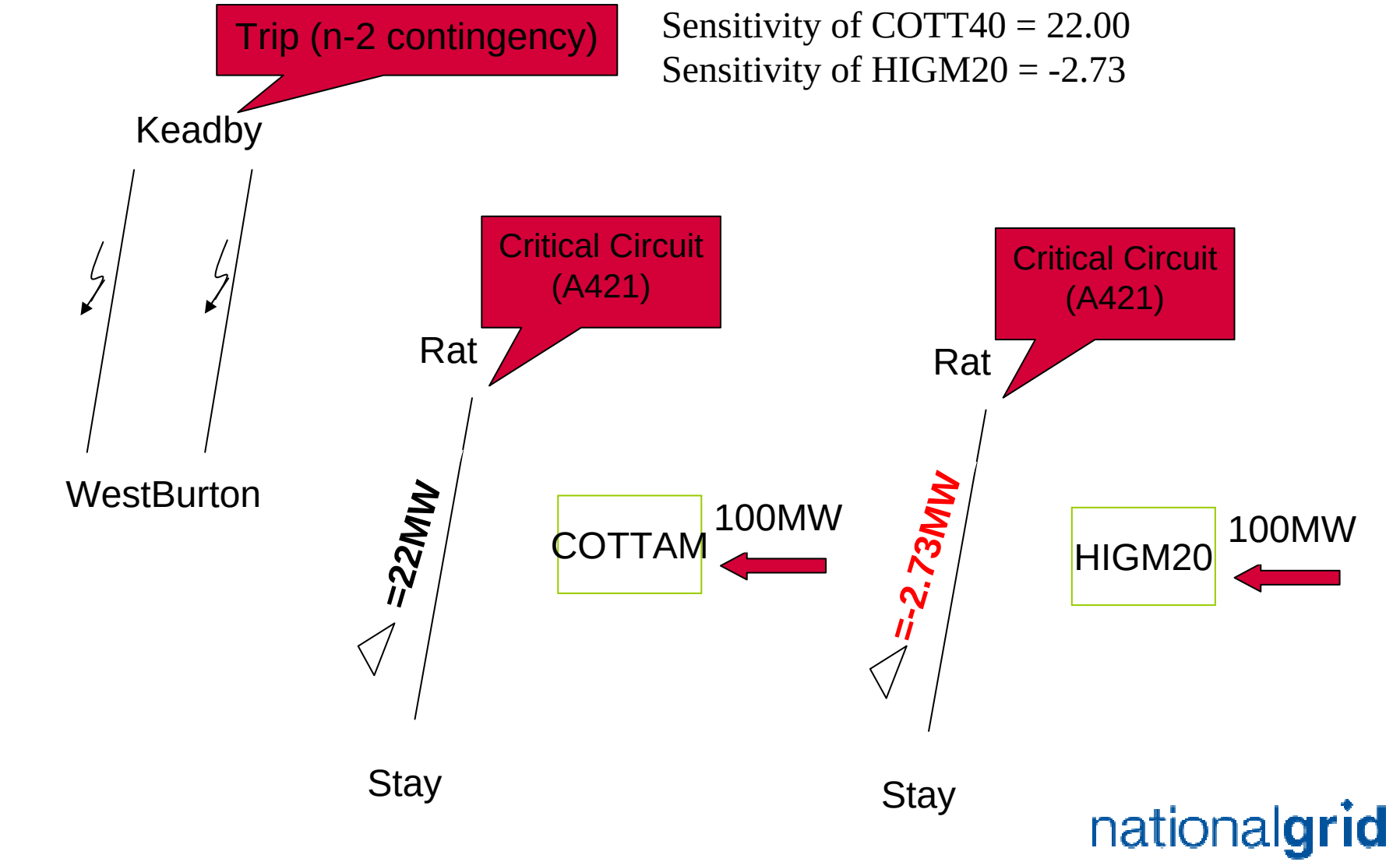
Example of Exchange Rate Calculation



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Exchange Rate Calculation Example 1

Node1: COTT40 = 22.00 (+)

Node2: HIGM20 = -2.73 (-)

COTT40 / HIGM20 = ((Node1- Node2)/ABS(Node2))+ 1

=((22.00 - (-2.73)/2.73)+1

= 24.73/2.73 + 1

= 10.06

HIGM20 / COTT40 =((Node2- Node1)/ABS(Node1)) + 1

=((-2.73 - (22.00))/22.00)+1

= -24.73/22.00 + 1

= -0.12

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Exchange Rate Calculation Example 2

Node1: HIGM20 = 2.73 (-)

Node2: WBUR40 = 3.60 (-)

HIGM20 / WBUR40 = Node1/Node2

= (-2.73)/(-3.60)

= 0.76

WBUR40 / HIGM20 = Node2/Node1

= (-3.60)/(-2.73)

= 1.32

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Example Table and Sensitivity

Offset						
	Sensitivity			COTT40	HIGM20	WBUR40
COTT40	22.00		COTT40	1.00	10.06	8.12
HIGM20	-2.73		HIGM20	-0.12	1.00	0.76
WBUR40	-3.60		WBUR40	-0.16	1.32	1.00

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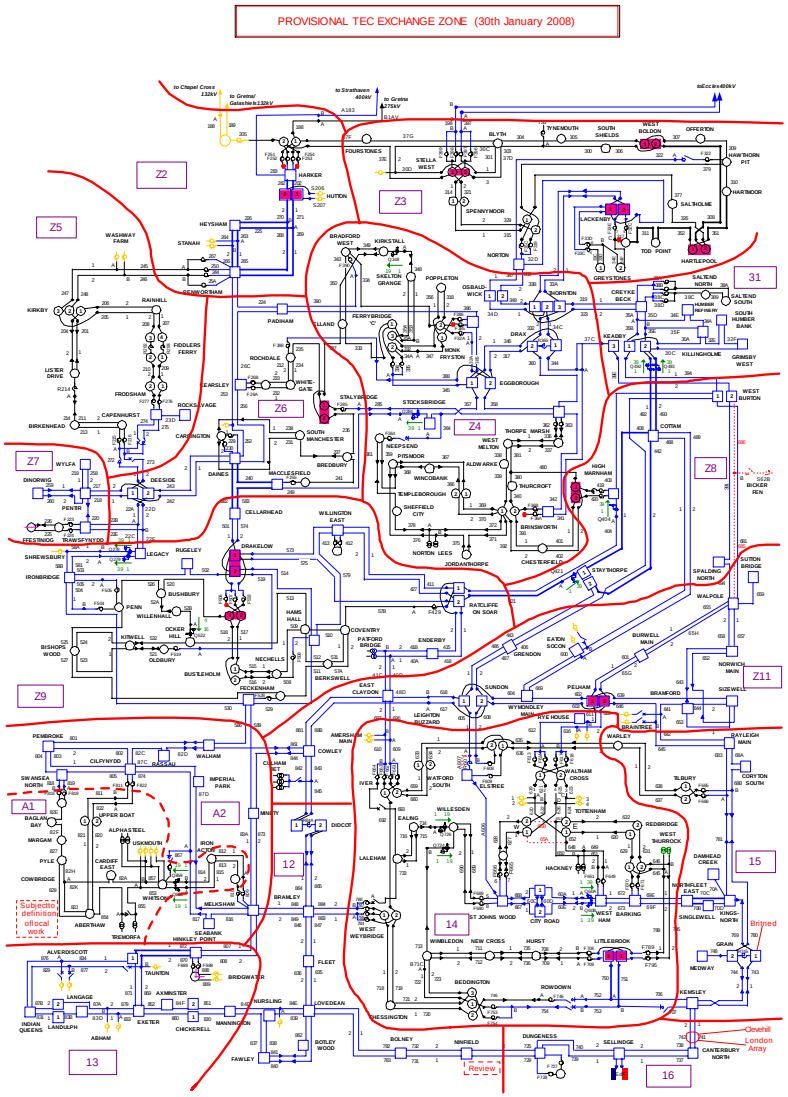
Proposed zones
Results – Short and Long term zones – E&W



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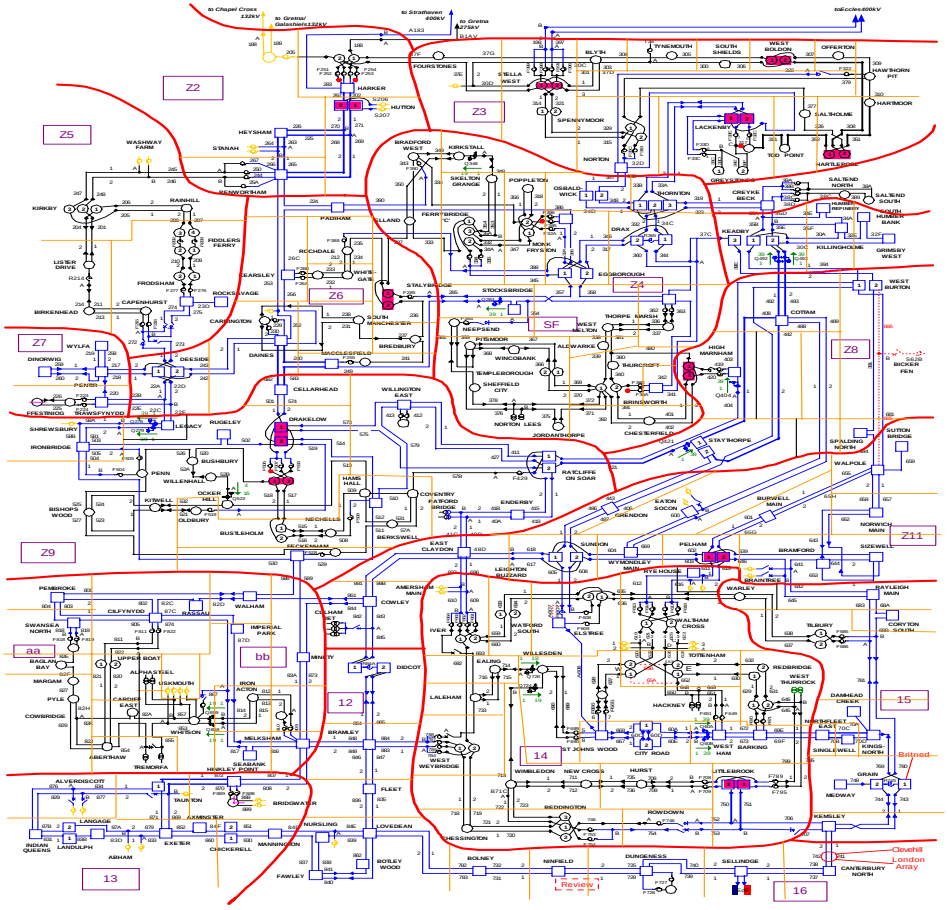
PROVISIONAL TEC EXCHANGE ZONE (30th January 2008)



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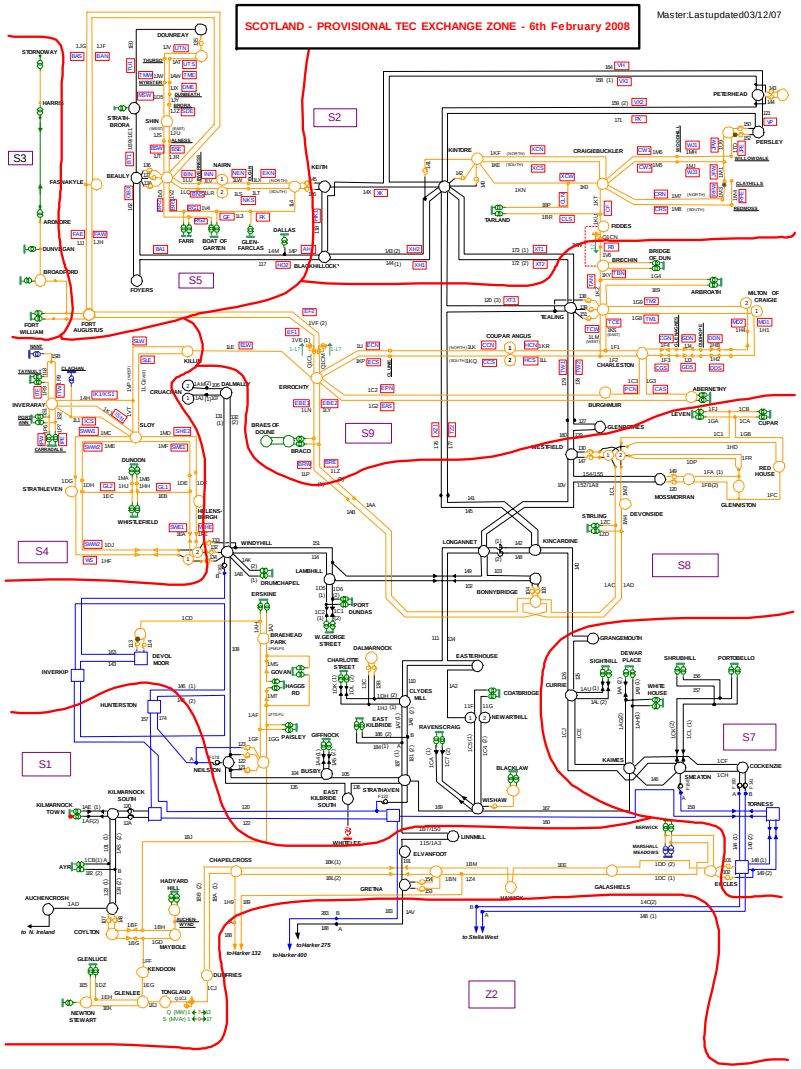
Proposed zones
Results – Short and Long term zones - Scotland



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Proposed zones
Conclusions

- Generators can exchange TEC in minor zone
- For wider TEC exchange, other options would need to be explored

- Options
  - A zonal alternative
    - Consider larger zones and assess additional cost risks vs benefits of sharing
  - A nodal alternative
    - Consider options by which users can share access between minor zones/nodes

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A zonal alternative

- Use predefined zones
  - E.g. zones identified for short-term
- Agree assumptions about extent of sharing in order to establish scenarios
  - High/Med/Low?
- Calculate additional constraint costs caused by access sharing
  - Volume
  - Price

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A nodal alternative
Ex ante nodal exchange rates?

- Zoning methodology work has identified issues with the calculation of ex ante nodal exchange rates
  - Exchange rate depends on volume of access right to be transferred
    - Exchange rate calculated based on 1MW transfer inappropriate for 1000MW transfer
  - Exchange rate depends on output from other generators
    - Transfers between other generators may invalidate exchange rate
  - The active constraint can be moved by the trade (or other trades) – [see 3-node example]

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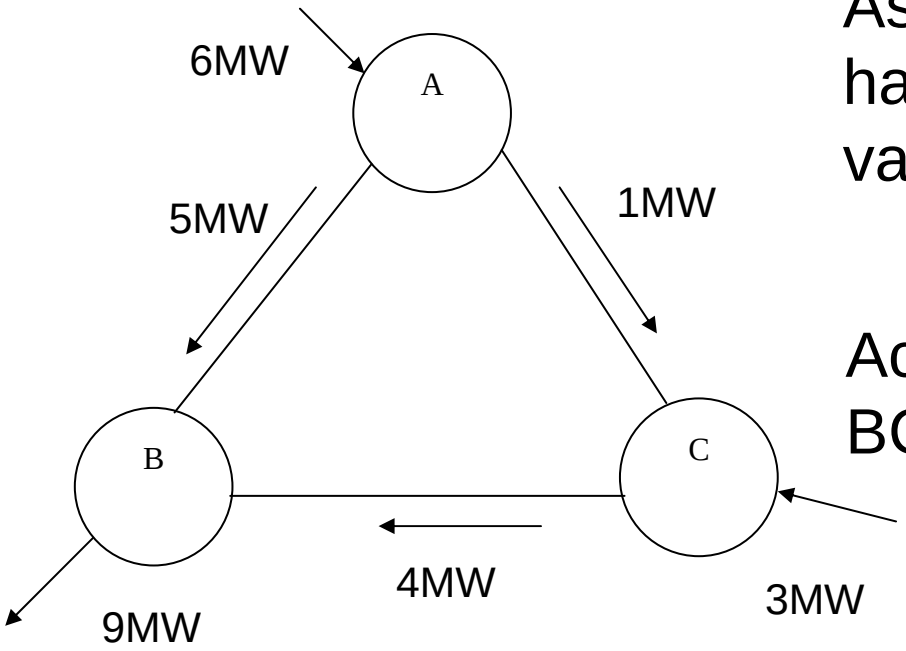
A nodal alternative
3-node example



Assuming the three circuits have equal reactance values

Active constraint at circuit BC (thermal rating is 4MW)

For circuit BC, the sensitivity factors are $\alpha_A = 1/3$ and $\alpha_C = 2/3$

Therefore 2MW of generation at bus A is equivalent to 1MW of generation at bus C

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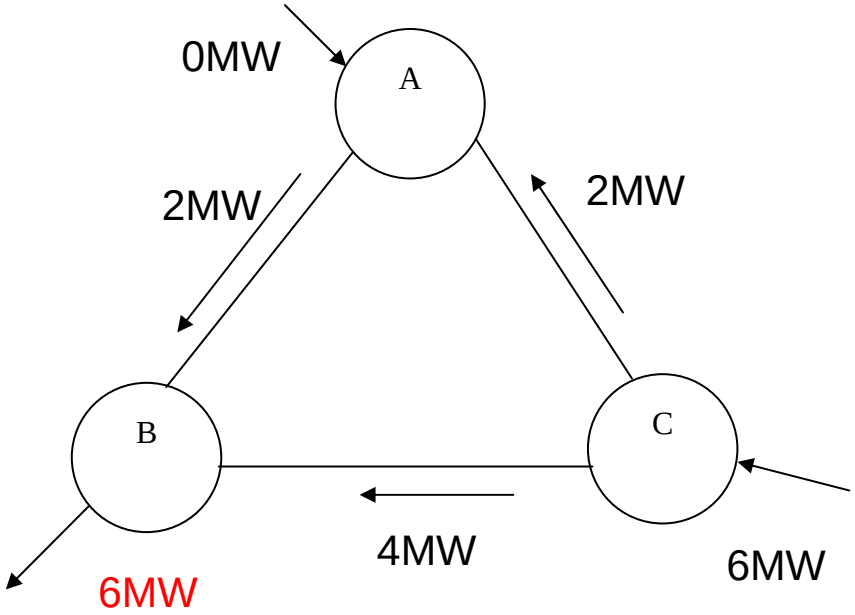
A nodal alternative
3-node example (continued)

By moving 6MW of generation from bus A to Bus C, we get



Assuming that the thermal rating of circuit AC is only 1.5MW, this constraint is now activated (and violated)

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A nodal alternative
3-node example (continued)

The new nodal exchange rate between A and C is set by constraint AC

For circuit AC, the sensitivity Factors are $\alpha_A = 1/3$ and $\alpha_C = -1/3$

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A nodal alternative
Point to point rights

- To manage risk, ex ante nodal exchange rates will be constrained by uncertainties around:
  - Level of access transfer
  - Other transfers
- These uncertainties are removed if users specify:
  - Nodes the access will be traded from/to
  - Maximum volume of trade
- Users could apply for point to point transmission access rights

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A nodal alternative
Point to point rights

- Features of point to point rights
  - Once granted, allows users to share nodal access in any timescale
    - Without exposure to difference in nodal overrun charges
  - Short or long-term?
  - Long-term
    - Invest then allocate for long-term?
    - Charges based on TNUoS differential between nodes
  - Short-term
    - Duration?
    - Allocation?
    - Charges?

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Next steps

- Zonal alternative
  - Agree timescales for analysis
- Nodal alternative
  - Point to point access rights
  - Agree further development required and associated timescales
- Assessment
  - Proposed zones
  - Zonal alternative
  - Nodal alternative

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