Generation Zoning and Nodal exchange rates

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Recapping

- One to one TEC exchange Zones have been identified, and these zones are mainly
  - Existing Generation Centres
  - Demand Centres
  - Radial spurs
- Possibility of inter-zonal TEC exchange?
- Possibility of nodal TEC exchange?

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Setting TEC Exchange Ratio – Things to Consider

- Short-term or long term?
- Physical limit based or financial cost based?
- Transparency
- Stability
- Simplicity
- Accuracy
- …

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Transmission Rights - Overview

- Locational Marginal Cost (LMP) based, point-to-point rights
  - A transaction A→B can be converted to A→hub + B→hub
  - Bid-based, accommodating multiple constraints
  - Volatile and less transparent prices
  - Complicated

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Transmission Rights - Overview

- Flowgate based, branch-by-branch rights
  - Physical limits visible - transparent
  - One transaction requires a bundle of rights
  - Volatile: 1.5 billion updates of ATCs in less than a year!
  - Even more complicated to implement

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Transmission Rights - Overview

- Zonal transmission charges based on a fixed scenario and MWkm
  - Transparent
  - Simple to implement
  - Stable
  - Not suitable for short-term (typically day-ahead or hour-ahead) right definitions

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TEC Exchange Ratio – 1:1 or 1:k

- 1:1—suitable for bid-based and transaction-based model
- 1:k—only suitable for bid-based model
- Unlikely to get consistent exchange rates- i.e. A→C does not equal to A→B + B→C

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Points of discussion

- Nodal exchange rates MWkm methodology
- Nodal exchange rates MW (NZM) methodology
- Considering nodes with existing generation or signed applications only
- Number of trading parties and zonal TEC to measure size of zone
- Intra-zonal trading coupled with either
  - nodal exchange rates within zones or
  - 1 to 1 within zones

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Nodal exchange rate using MWkm methodology

- DCLF with various contingencies taken
- Xrate = Cont(node 1) – Intact (node 1)/Cont(node 2 – Intact (node 2)
- Advantage that some automation to pick up all circuits is available with Seculf
- No need for picking critical circuits
- Weaknesses –
  - MWkm does not equate to critical flow (exchange rates that are overestimated found)
  - Aggregrated approximation of the incremental MWkm
  - No direct correlation to overloaded flow and hence increase in system operator cost

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Nodal exchange rate using MW methodology (NZM model)

- DC load flow using linearized sensitivities, hence no need for consideration of amount of trade
- Contingencies and critical circuits important (automation of all)
- Choice of slack bus important (all right if sufficiently away from analysis region but not always the case)
- Xrate = Sens(node 1)/ Sens(node 2) – Note that worst case Xrate is then selected from all analysis
- Stable results – provides the exchange rates required to maintain current compliant status quo

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Nodal exchange rate using MW methodology (NZM model)

- Weaknesses –
  - Exchange rates that are quite onerous particularly when considering all contingencies and critical circuits
  - The non-symmetry of exchange rates mean that a particular region can lose all of its available TEC following a number of trades
  - No consideration of headroom and other measures (QB tapping, etc.) to remain compliant

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Questions that need answering

- Zonal methodology versus Nodal
- Intra-zonal trading?
- MW versus MWkm for exchange rates
- What is the extend of automation for nodal exchange rates
- Do we need to revert to SZM (Scenario based modelling) to enable consideration of headroom and provide link to cost of constraint analysis

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