

Generator Fault Ride Through (FRT)

Criteria for the NZ Power System

Gerard Demler
Investigations & Planning
Transpower System Operator



Keeping the energy flowing

TRANSPOWER

Transpower New Zealand Ltd. Inc License 1041

SYSTEM OPERATOR

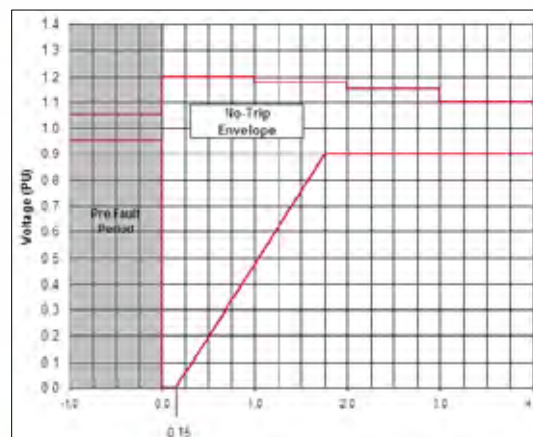
Background

- EC engaged SO in 2 part investigation
 - Part 1: Review of existing criteria
 - Part 2: Dynamic system studies and recommendations
- Objective: to determine FRT requirement for EGR's

Why?

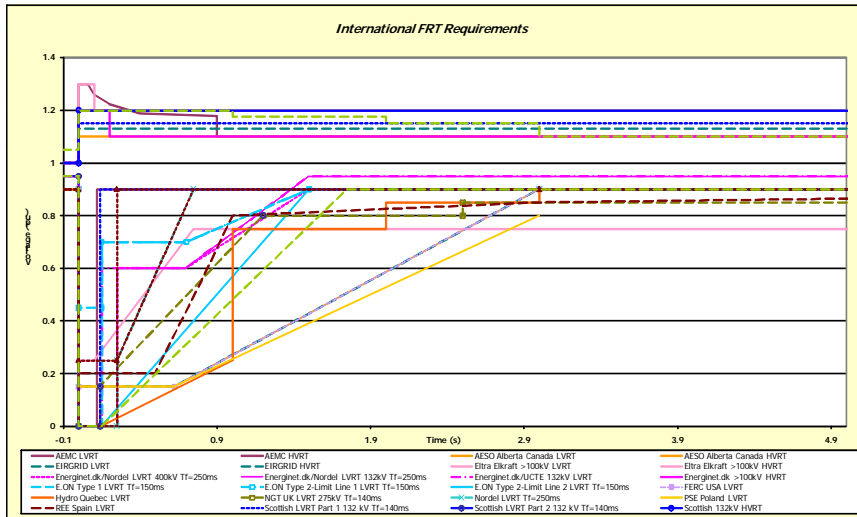
- Current EGR's insufficient
 - Part C, sect 3, 3.2 – plant must operate continuously to support system stability
 - No specific criteria for FRT
- Provide a specific requirement for vendors
- More certainty to SO around post fault generator performance

Fault Ride Through Envelope

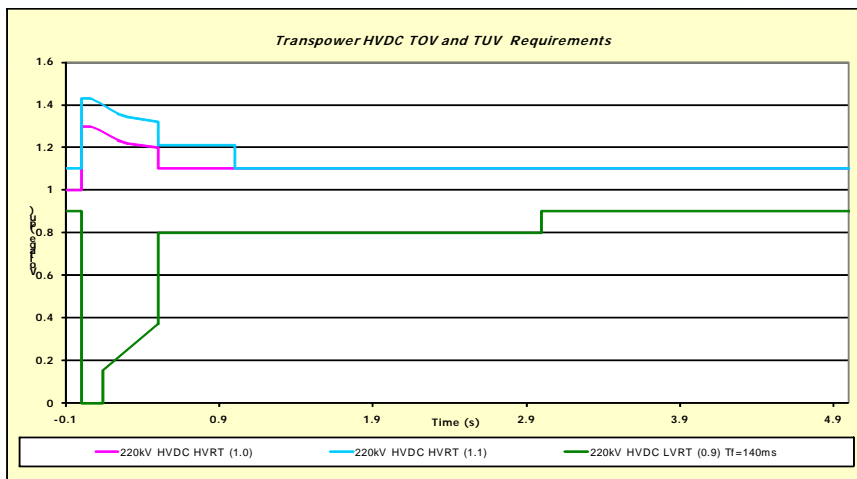


WECC- USA

Existing Criteria



Transpower HVDC TOV and TUV Requirements



System Performance Under Fault Conditions

- Driven by load behaviour
- System conditions at time
- Protection operation times
- Other plant operating times (AVR, RPC, SVC etc)

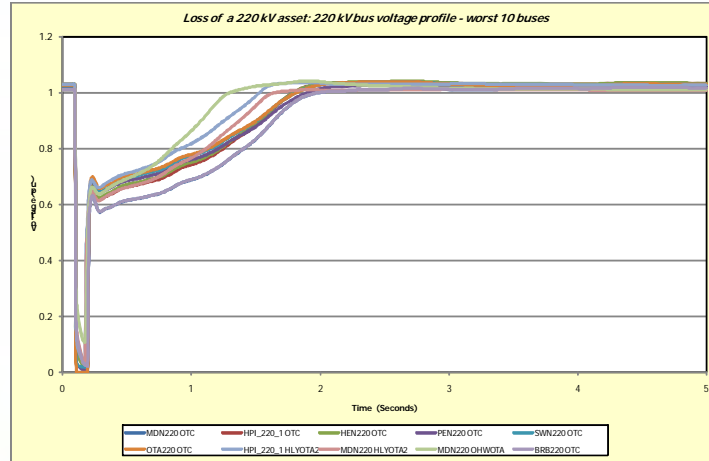
System Studies

- Load Modelling
 - Dynamic load model
 - Load composition: static/motor load %
 - % motor tripping under TOV and TUV
- Load/Generation scenarios
 - Historical SCADA data used
 - Seasonal peaks
 - Low/high load, low gen, north/south transfer

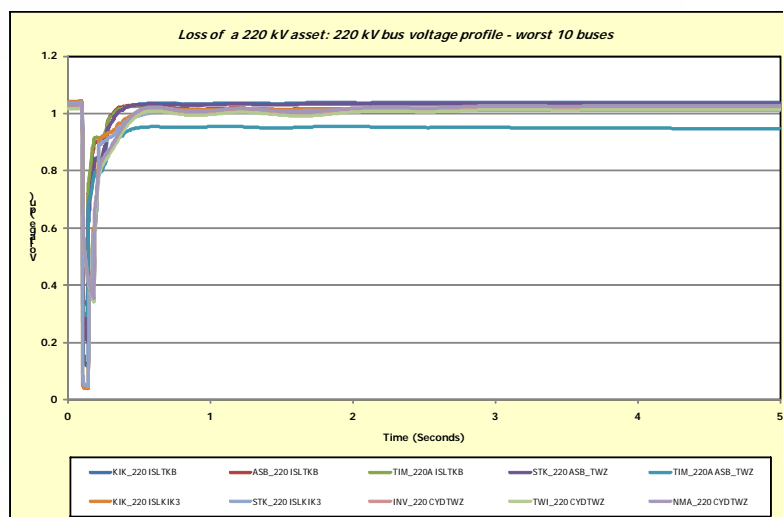
- System Faults
 - Close in zero impedance 3ph fault
 - Faults at transmission level only
- Credible contingencies
 - Regional/sub-regional effect
 - N-1
 - Loss of single circuit, generator, HVDC pole, dynamic reactive plant
 - Faulted and non faulted conditions

- Protection and other plant performance
 - Actual protection operation times
 - Signal aided and non-signal operation
 - No operation of shunt reactive plant and tap change control
 - HVDC RPC operation considered
- Future Grid
 - Committed upgrades and projected load to 2015 reviewed

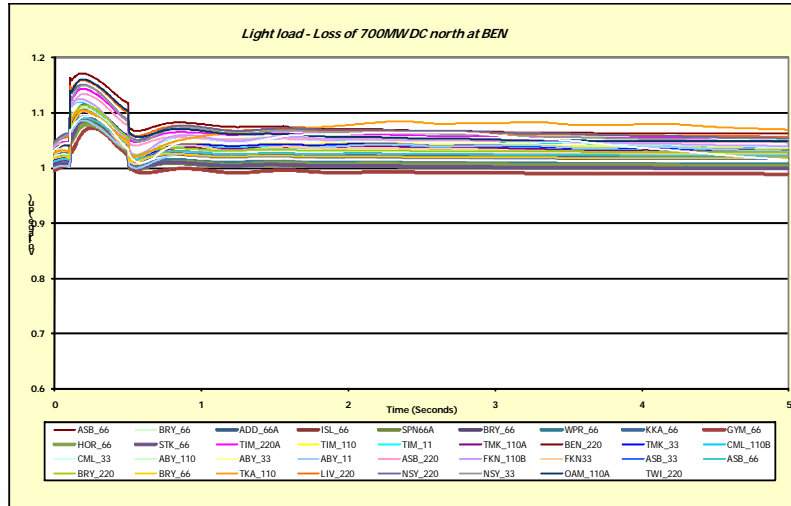
TUV – North Island worst 10 buses



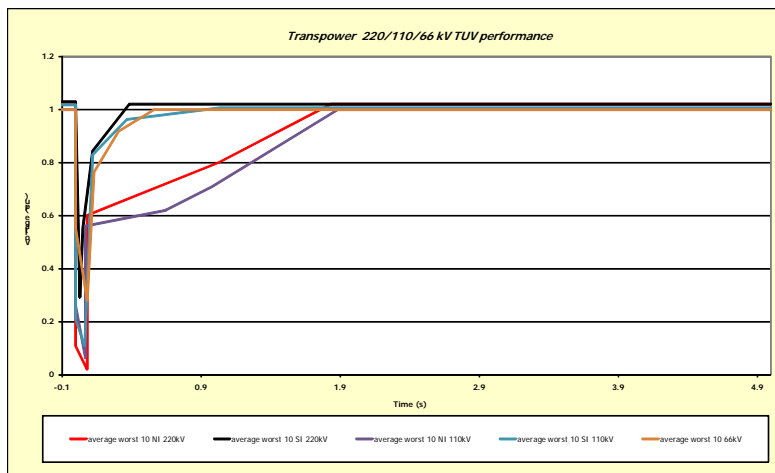
TUV – South Island worst 10 buses



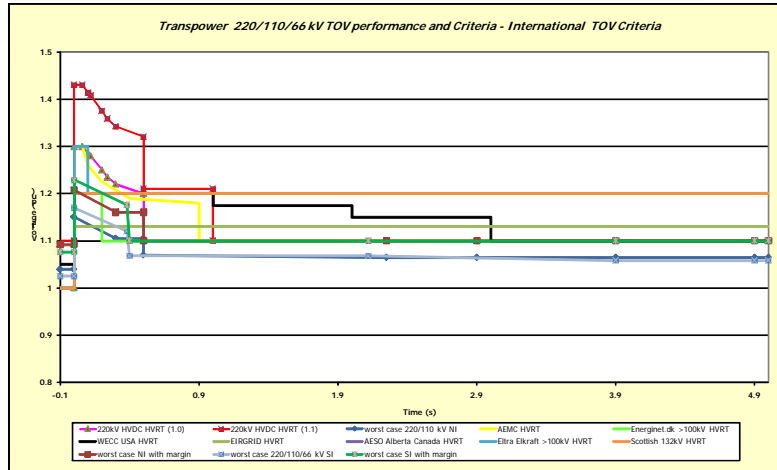
TOV – South Island



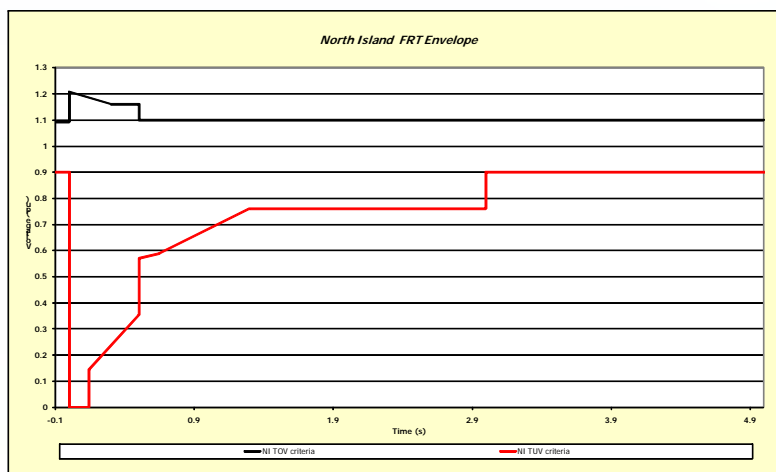
TUV Summary



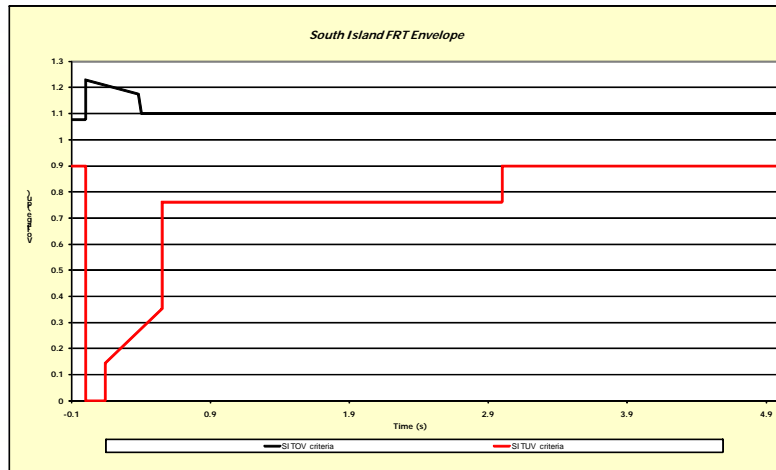
TOV and Existing Criteria



Proposed North Island Envelope



Proposed South Island Envelope



Conclusions

- TOV and TUV system performance determined using dynamic studies
- NI and SI performance differ
- NI and SI FRT envelope have been developed
- FRT envelopes compare favourably with existing criteria
- Proposed FRT criteria will give more certainty to both SO and AO for new generator connections

Questions?

